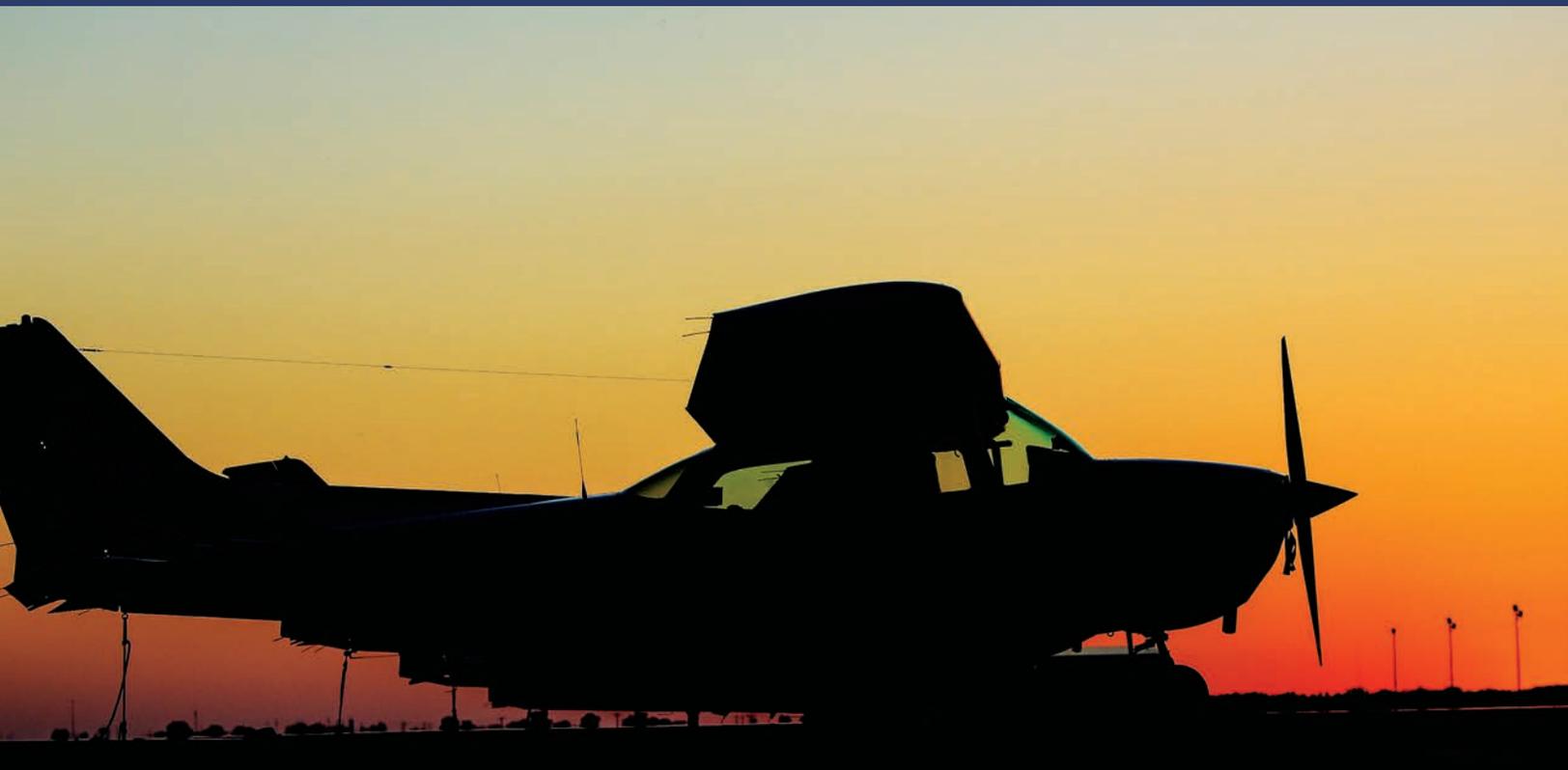


# FAA Safety

## BRIEFING

November/December 2015



Good  
N.I.G.H.T.



Federal Aviation  
Administration

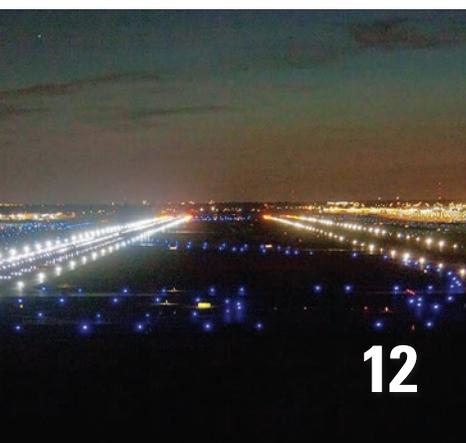
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The November/December 2015 “Good Night” issue of *FAA Safety Briefing* focuses on general aviation night operations. Articles in this issue address the importance of having both the right physical and mental preparation for flying at night, as well as how technology can help.

Cover photo by Maj. Robert Bowden, Civil Air Patrol

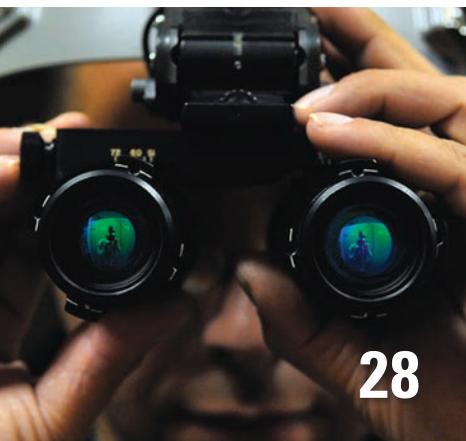
10



12



16



28

## Features

---

- 8 NextGen Advancements** Don't Overlook the Multiple Safety Benefits of ADS-B In  
by Clifton Stroud
- 10 Good N.I.G.H.T.** An Essential Checklist for Night Flying Safety  
by Adrian Eichhorn
- 12 N = Nightlights** Using “Pilot Nightlights” to Find Your Way in the Dark  
by Tom Hoffmann
- 16 I = Illusions** Nighttime Perils of Perception  
by Paul Cianciolo
- 20 G = Gadgets** Glowing Gadgets and Gizmos  
by Susan Parson
- 24 H = Human Factors** How Night Can Be Hazardous to Your Flying Health  
by Sabrina Woods
- 28 T = Terrain Avoidance** What Does It Take to Use NVGs?  
by James Williams

## Departments

---

- 1 Jumpseat** – an executive policy perspective
- 2 ATIS** – GA news and current events
- 5 Aeromedical Advisory** – a checkup on all things aeromedical
- 7 Ask Medical Certification** – Q&A on medical certification issues
- 23 Checklist** – FAA resources and safety reminders
- 32 Nuts, Bolts, and Electrons** – GA maintenance issues
- 33 Angle of Attack** – GA safety strategies
- 34 Vertically Speaking** – safety issues for rotorcraft pilots
- 35 Flight Forum** – letters from the Safety Briefing mailbag
- 36 Postflight** – an editor's perspective
- Inside back cover FAA Faces** – FAA employee profile

## Shedding Light on Night Flight

Like most things in aviation, night flying brings both its own risks and its unique rewards. To address some of those issues, the November/December 2005 issue of *FAA Safety Briefing* (then called *FAA Aviation News*) included an article by pilot and AMT Adrian Eichhorn called “N.I.G.H.T.” In that piece, Adrian deftly used the word “night” as a mnemonic checklist for items to consider for safety when flying after dark.

With Adrian’s concurrence, we have adapted the N.I.G.H.T. framework in two ways for this issue. First, we’ve updated the original checklist to account for things like the 2008 disappearance of local NOTAMs. Second, the magazine team has used N.I.G.H.T. as an organizing concept for all of the content in this night-themed edition. Here’s a quick preview.

### **N = Nightlights**

Finding your way home in the dark can be a tricky endeavor. That’s why the FAA carefully analyzes the risks associated with this task before implementing any change to existing airport lighting systems. This edition is a great chance to learn more about how LEDs are rapidly becoming our go-to “nightlights” for flight, and to brush up on how your local airport’s visual approach slope indicator (VASI) or precision approach path indicator (PAPI) lights keep you safely on the path to safety.

### **I = Illusions**

Technological advances can provide all kinds of enhancements to situational awareness, but our sensory perceptions — including the famous “Mark II Eyeballs” — haven’t evolved nearly as much. Accidents and incidents still occur because human beings fall prey to one or more sensory illusions. With fewer orienting cues in the night flying environment, visual illusions can be amazingly (and sometimes tragically) powerful. Since forewarned is forearmed, now is a good time to review some of the potential sensory illusions.

### **G = Gadgets**

The gadgets and gizmos that many of us now regard as essential flying tools can be an enormous boon to situational awareness at night. Just as in daytime, though, they can also distract the unwary pilot from his or her basic responsibility to aviate — that is, to maintain attitude, altitude, airspeed, and,

above all, awareness. At night, though, the potential for a distraction to end in disaster looms larger. So it’s especially important to practice the art of paying attention or, more precisely, the art of appropriately dividing attention among competing priorities.

### **H = Human Factors**

We humans are complicated creatures and, as in any complex and highly integrated system, all kinds of things can go wrong. I’ve already mentioned the perils of sensory misperception, but that’s just the tip of the proverbial iceberg. Our ability to function properly can be adversely affected by many other factors, such as those referenced in the well-known IMSAFE checklist. Nocturnal operation can magnify the impact of any and all these factors: illness, medication, stress, alcohol, fatigue, and eating/emotion.

### **T = Terrain**

Night flying has a lot in common with basic flying in instrument meteorological conditions (IMC), because both environments involve operating with reduced visibility. Except when distractions dominate the pilot’s attention, it’s easy to avoid visible terrain and obstacles. A well-illuminated obstacle may be visible enough, but what about an unpopulated or sparsely populated mountain ridge? For safety in night flying, it’s absolutely essential to know where all the rocks and ridges are in relation to your position, so as to ensure that you maintain sufficient altitude to avoid what you can’t see.

As noted in this issue’s Postflight department, night flying offers many joys and delights to aviators and their passengers. Just be sure you avoid the traps that can undermine the fun.

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**At night, the potential for distractions to end in disaster looms larger. So it’s especially important to practice the art of paying attention or, more precisely, the art of appropriately dividing attention among competing priorities.**



### **NOTAM for Drones Available**

Operators of unmanned aerial systems (UAS) can submit their flight plans online through Flight Services, which will be displayed graphically to pilots when they file their flight plans. Currently, only UAS operating under an FAA certificate are required to file their flight plans.

“Our objective is an open, standards-based system that individual operators and other private UTM (UAS traffic management) systems can use to interact seamlessly and securely with the NAS,” said Paul Engola, vice president of transportation for Lockheed Martin. “We look forward to partnering with UAS operators and manufacturers to help create a system that supports the safe coexistence of manned and unmanned flight.”

Maps are available on the Flight Service website at [1800wxbrief.com](http://1800wxbrief.com), where pilots can see where UAS are operating. Capabilities may be expanded to make it easier for hobbyist UAS operators to report their activities as well.

The idea is that if deviations from regulatory standards occur, the FAA’s goal is to find and fix the problem using the most effective means to return the certificate-holding individual or entity to full compliance and prevent reoccurrence. The FAA recognizes that some deviations arise from factors such as flawed procedures, simple mistakes, lack of understanding, or diminished skills. Deviations of this nature can most effectively be corrected through root cause analysis and training, education, or other appropriate improvements to procedures or training programs for regulated entities, which are documented and verified to ensure effectiveness.

In a future issue of this magazine, we will expand upon and explain what the FAA’s new compliance philosophy means to the GA community. You can download the order at <http://1.usa.gov/1NYfePK>.

### **Updated Model Aircraft Guidance**

The FAA published updated guidance in September about model aircraft operations that reflects current law governing hobby or recreational use of unmanned aircraft.

Advisory Circular (AC) 91-57A replaces the previous guidance that, as written in 1981, did not reflect the rules Congress wrote into Section 336 of the FAA Modernization and Reform Act of 2012.

The updated AC details the 2012 law’s description of a “model aircraft operation:”

- The aircraft is flown strictly for hobby or recreational use;
- The aircraft operates in accordance with a community-based set of safety guidelines and within the programming of a nationwide community-based organization (CBO);
- The aircraft is limited to not more than 55 pounds, unless otherwise certified through a design, construction, inspection, flight test, and operational safety program administered by a CBO;
- The aircraft operates in a manner that does not interfere with, and gives way to, any manned aircraft; and
- When flown within 5 miles of an airport, the operator of the model aircraft provides the airport operator or the airport air traffic control tower (when an air traffic facility is located at the airport) with prior notice of the operation.



### **New Approach to Compliance**

FAA Administrator Michael Huerta signed a new order in June setting overarching guidance for “implementing the FAA’s strategic safety oversight approach to meet the challenges of today’s rapidly changing aerospace system.” It applies to all offices that have regulatory responsibilities, which include flight standards, aircraft certification, aerospace medicine, air traffic control oversight, airports, security and hazardous material safety, and commercial space operations.

Model aircraft operators flying from a permanent location within 5 miles of an airport should establish a mutually agreed upon operating procedure with the airport operator and the airport air traffic control tower (when an air traffic facility is located at the airport).

The guidance stresses model aircraft operators must comply with all Temporary Flight Restrictions (TFR), that they may not fly in any type of restricted airspace without prior authorization, and that they should be aware of Notices to Airmen (NOTAMS) that address flights near federal facilities, stadiums, and other public and industrial areas.

The guidance also makes it clear that model unmanned aircraft operations that endanger the safety of the nation's airspace, particularly careless or reckless operations and interference with manned aircraft, may be subject to FAA enforcement action. Download the AC at <http://1.usa.gov/1XlChb9>.

### Strengthening the CFI Refresher Course Program

The FAA recently issued a revision to Advisory Circular (AC) 61-83, which provides information and standards for FAA-approved and industry-conducted flight instructor refresher courses (FIRC). In addition to being one of several methods by which a CFI may renew his or her flight instructor certificate, FIRCs are also designed to enhance aviation safety by keeping the flight instructor cadre plugged in to the changing world of general aviation (GA) flight training.

“The newly published update helps provide specific standards that are more commensurate to the credentials of a CFI,” said Aviation Safety Inspector Allan Kash, the lead contributor to the AC update.

Among the changes and enhancements to the AC include establishing minimum course times and testing standards, emphasizing pertinent core course topics (e.g., loss of control, automation fixation, and instrument proficiency checks), and an overall focus on high-level training. AC 61-83H encourages providers to develop and offer a “library” of elective lessons covering suitable aviation topics. The AC also contains a library of helpful resources and suggested elective lesson topics that FIRC providers can use. Download the AC at <http://1.usa.gov/1iivSNX>.

### Air Force Recognizes Civil Air Patrol Contributions

Historically, the broader term *Airmen* referred to uniformed and civilian members of the U.S. Air Force (officer or enlisted; regular, Reserve, or Guard) regardless of rank, component, or specialty. It now includes Civil Air Patrol (CAP) volunteers while they are conducting Air Force assigned missions as the official Air Force Auxiliary.

With this newest change in doctrine, Air Force leaders consider each part of the Total Force, including the Auxiliary, when determining the most effective and efficient ways to complete the mission. CAP has approximately 57,000 volunteers and 550 general aviation aircraft across the nation available

## Safety Enhancement Topics

**November: VMC Training and AOA** – Learn more about how VMC training and Angle of Attack can help prevent loss of control accidents in the event of a power loss.



**December: Enhanced Vision Systems** – Explore how Enhanced and Synthetic Vision Systems can help you maintain situational awareness in the dark and bad weather.



Please visit [www.faa.gov/news/safety\\_briefing](http://www.faa.gov/news/safety_briefing) for more information on these and other topics.



U.S. Department  
of Transportation

## Federal Aviation Administration

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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.

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### CONTACT INFORMATION

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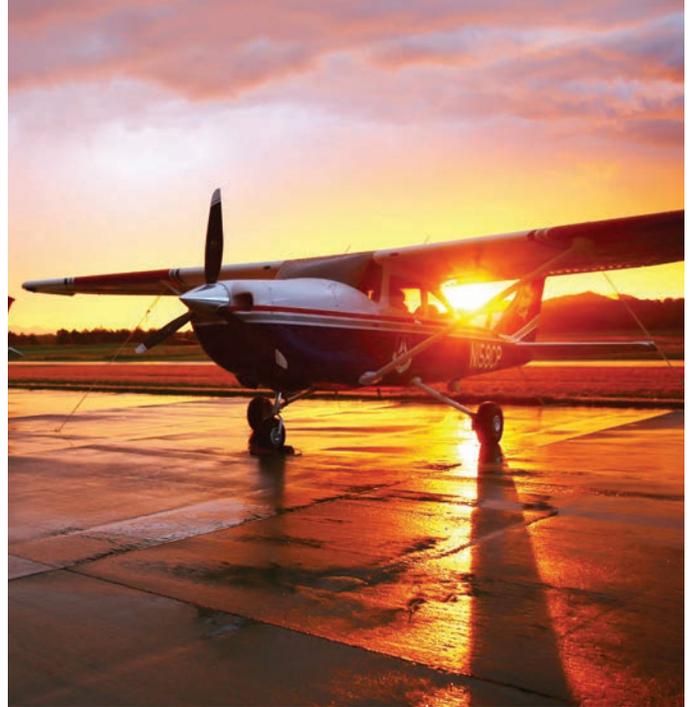


Photo by Staff Sgt. David Stockinger, Civil Air Patrol

or currently supporting non-combat missions on behalf of the Air Force.

“As a strategic partner, these unpaid professionals have boldly served our nation saving the Air Force almost 40 times the cost of using military assets for each hour served,” said Secretary of the Air Force Deborah Lee James. “Inclusion in the Total Force reflects the continuing key contributions of this highly trained and equipped organization.”

The Auxiliary members who fly nearly 100,000 hours per year performing disaster relief, counterdrug, search and rescue, fighter interceptor training, aerial observation and cadet orientation flights will now be included in the Total Force and referred to as Airmen during the performance of official duties in recognition of their contributions to the Air Force.

Beyond CAP’s support to achieve its homeland responsibilities for non-combat operations, the organization has been recognized for their efforts to inspire hundreds of thousands of cadets and K-12 students to pursue science, technology, engineering and mathematics education and training. Go to [GoCivilAirPatrol.com](http://GoCivilAirPatrol.com) for more information.

### **Amateur-Built Aircraft and Ultralight Flight Testing**

Before you and your new flying machine take to the skies, there are a few important questions to consider. How do you know your aircraft is in a condition safe for flight? Will it operate safely within its operational envelope? Will it have any quirky characteristics or design limitations? To find out, you’ll need to develop a detailed flight test plan.

The FAA has coordinated with industry to produce an excellent document that can help you develop such a flight test plan, taking into account everything from selecting the right airport and runway, to an exhaustive list of first flight and emergency procedures. It is Advisory Circular (AC) 90-89, *Amateur-Built Aircraft and Ultralight Flight Testing Handbook*, and it can be downloaded at <http://1.usa.gov/1NSIAQu>.

## Aeromedical Advisory: Building a Lasting Relationship

You won't be surprised to hear that the way the FAA evaluates a potential Aviation Medical Examiner (AME) is a little different from the way you approach this task. The FAA looks for a competent physician who can fairly, correctly, and efficiently apply our policies. Most airmen look for the most convenient and most affordable AME. And, yes, we know that you also want to find the AME who is least likely to "hassle" you.

That strategy might work well enough for a young and reasonably healthy airman, but it might be a bit short-sighted — and counterproductive — as the years accumulate. One of the most disheartening things I learn at events like AirVenture is the number of airmen whose AME denies or refers a case to the FAA when the condition could have been, and should have been, handled at the AME level.

Such issues occur when the AME isn't fully up to speed with the latest FAA policy. Unfortunately, the airman pays the price for it. An FAA study on the Conditions AMEs Can Issue (CACI) revealed that AMEs were not properly using this option in 39 percent of the cases. We are working on it, but you should do your part by ensuring that you choose an AME who knows FAA policy and how to apply it.

### Finding the Right AME For Now and the Future

One of the first things to look for in an AME is knowledge of current guidance. If you spot a well-worn, decades-old copy of the AME Guide on the desk, that's probably not a good sign. We constantly update our policies to reflect improvements to medical certification options and procedures, so a good AME will have the most current guidance.

You should also look for an AME who is proficient. That may sound odd, but an AME can be out of practice. FAA standards for AME currency include initial training, recurrent training, and a requirement to conduct at least 10 exams a year. But just as you can be legally current as a pilot without necessarily being proficient, an AME can be in the same situation. Ideally, you want an AME who conducts many exams and works continuously with the FAA.

### How Do I Know if an AME is "Good?"

Proficiency is an easier issue to scout, because you can always ask how many FAA exams a given AME conducts each year. Determining "good" is

harder. Your best bet is to approach AME selection in the same way you approach looking for a good investment: ask around! Ask your fellow pilots for information and advice. If there were some problems, how did the AME handle them? A good AME should be willing to check the latest FAA guidance or call the Regional Flight Surgeon (RFS) for additional assistance.

If you have a condition that might require a more extensive exam, either now or in the future, you probably want to find an AME who is familiar with that condition. One of the best ways to do that is to call the RFS office. The RFS can help by pointing you to an AME adept at handling that condition.

Our system of medical certification oversight is very good at detecting cases when an AME issues a certificate that should have been denied. Unfortunately, it is not very good at detecting the opposite situation — a case in which the AME could have, or should have, issued a medical certificate. That's where we need your help. Please check places like the CACI website and even the AME Guide to see if your medical concerns are addressed. If you don't believe your AME is properly handling your certification, please let us know. We've now achieved a 92 percent success rate for airmen walking out of the AME's office with a ticket in hand, but we need your help to push that rate even higher.

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**Ideally, you want an AME who conducts many exams and works continuously with the FAA.**

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**A good AME should be willing to check the latest FAA guidance or call the Regional Flight Surgeon (RFS) for additional assistance.**

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

### Learn More

#### Searching for the Right AME

[https://www.faa.gov/news/safety\\_briefing/2013/media/JanFeb2013.pdf](https://www.faa.gov/news/safety_briefing/2013/media/JanFeb2013.pdf) (page 10)

# 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 will be available to your AME to review prior to and at the time of your medical examination, if you provide a confirmation number.

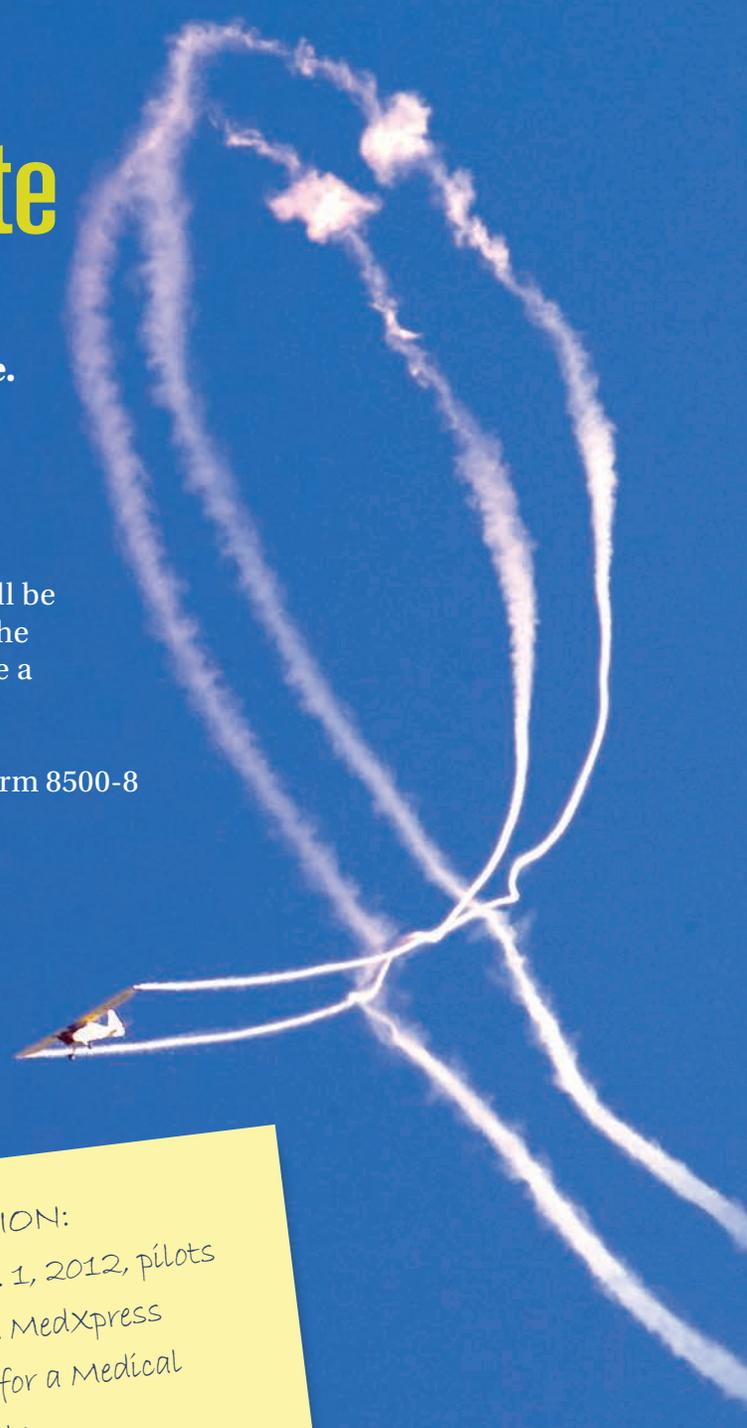
With this online option you can complete FAA Form 8500-8 in the privacy and comfort of your home and submit it before your appointment.

The service is free and can be found at:

<https://medxpress.faa.gov/>



**ATTENTION:**  
As of Oct. 1, 2012, pilots  
must use MedXpress  
to apply for a Medical  
Certificate.





# Ask Medical Certification

COURTNEY SCOTT, D.O.  
MANAGER, AEROSPACE MEDICAL  
CERTIFICATION DIVISION

**Q1.** My current medical certificate has expired. I submitted an application for a new third-class medical certificate, but my Aviation Medical Examiner (AME) is asking for more documentation on a medical condition I developed recently. May I continue to exercise sport-pilot privileges while this application is being processed?

**A1.** This is an interesting question. If you had NOT applied for a current examination through the FAA I would say that you could. But since you now have a current examination that is “not issued,” you cannot exercise sport-pilot privileges.

**Q2.** I’ve recently been diagnosed with breast cancer and am undergoing what my physicians call “adjuvant” chemotherapy. Most days, I feel fine. Will I be able to fly on those good days?

**A2.** I am sorry about your diagnosis. Hopefully, your physicians discovered your cancer early. The FAA does not allow airmen to fly while they are undergoing any chemotherapy or radiation therapy. These treatments are not without side effects, which are adverse to the aviation environment. In addition, the patient is generally fatigued and undergoing psychological adjustment to having the condition.

Once the treatment has been completed, you need to give it some time for any side effects to occur and dissipate. After a minimum of one month’s time you need to gather up any medical records from your diagnosis, (e.g., hospital admission and discharge summaries, operative and pathology reports, and pertinent X-ray results) and your physician’s status report after your treatment that addresses how you did, any side effects of the treatments, planned treatment, and prognosis.

**Q3.** I would like to know in layman’s terms the purpose of an FAA medical certificate. It seems to me the only legitimate purpose is to make it a statis-

tically low probability that a pilot will be unable to act as pilot in command due to a medical condition.

**A3.** Under Title 14 of the Code of Federal Regulations (14 CFR) part 1, the FAA defines a medical certificate as “acceptable evidence of physical fitness on a form prescribed by the Administrator.” The primary goal of the FAA’s airmen medical certification program is to protect not only those who exercise the privileges of a pilot certificate but also air travelers and the general public. I do not mean to belabor this point, but U.S. pilots have been required to have medical certification to fly since 1926. The purpose of medical certification in the United States is to minimize the risk that the pilot will suffer a sudden incapacitating event while flying.

**Q4.** I’m a returning veteran. Can I be treated for PTSD and still fly?

**A4.** If you are being treated through counseling sessions, you may be able to gain medical certification. You need to get copies of your medical records, plus a good status report, and take them to an aviation medical examiner (AME). The AME should be able to give you some idea of your chances. Alternatively, the AME can phone the FAA to discuss your situation. If you are taking one of the four acceptable medications and have been on a consistent dosage for six months, you need to follow the instructions on the FAA Medical Certification website. The requirements are listed here: [www.faa.gov/about/office\\_org/headquarters\\_offices/avs/offices/aam/ame/guide/app\\_process/exam\\_tech/item47/amd/antidepressants/](http://www.faa.gov/about/office_org/headquarters_offices/avs/offices/aam/ame/guide/app_process/exam_tech/item47/amd/antidepressants/)

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



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# NextGen Advancements

## *Don't Overlook the Multiple Safety Benefits of ADS-B In*

**W**hile Automatic Dependent Surveillance-Broadcast (ADS-B) Out will be required by January 1, 2020 for aircraft flying in most controlled U.S. airspace, general aviation operators may wish to consider the economic and safety advantages of simultaneously equipping with ADS-B In.

At this time, there is no FAA requirement to install ADS-B In. Pilots of ADS-B In equipped aircraft, however, can benefit from the enhanced situational awareness that comes with having subscription-free graphical weather delivered directly to the cockpit, as well as being able to see the same air traffic picture as air traffic controllers. For many pilots, having ADS-B In installed at the same time as ADS-B Out makes a lot of sense — your aircraft is already in the shop, and the safety benefits of ADS-B In are substantial.

### **Flying at Night and In and Out of Canyons**

Jay Cronk, an experienced pilot and certificated flight instructor (CFI) who has been flying for about ten years, owns and operates a Cessna 180 *Skywagon*. He spends much of his time flying in and out of small dirt strips deep in Colorado's Rocky Mountains. Although most of his operations are VFR, his Cessna is fully Instrument Flight Rules (IFR) capable.

Cronk is a big believer in ADS-B Out and In. He equipped his aircraft early on with a Garmin GTX 330 ES transponder combined with a hard-mounted Garmin GDL 39R receiver with a built-in Wide Area Augmentation System GPS receiver and an extended squitter. "I needed a new transponder anyway," he said, "so I decided just to do it all at once."

"Just about every time I fly, I'm glad I have ADS-B Out and In," said Cronk. "It's invaluable. When you are flying in the mountains, see and avoid is especially important, and with ADS-B the range is about six miles. Coming out of a canyon, for example, it's nice to have."

Cronk believes there are many benefits to both ADS-B Out and In that pilots do not yet realize. "Anyone with an ADS-B receiver will receive traffic alerts. That's a good thing," he said. "And with ADS-B Out, someone following me can see exactly where I am. That's a cool benefit."

Some of Cronk's flight training is at night. "It is critically important at night, because out here in Colorado it's so black at night. Additionally, with the forest fires and all the smoke we have to deal with out west, it helps a lot."

Cronk cites another benefit to ADS-B. On a recent trip, he flew over the Snake River Plain heading northwest into the mountains near Friedman Memorial Airport in Hailey, Idaho. He was at 10,500 mean sea level with VFR flight following. Air traffic control (ATC) called and asked if he had ADS-B. He said "affirmative." The controller said, "I had to ask because we usually lose radar contact with Visual Flight Rules (VFR) flights well before they get to your present position." Cronk said that "with ADS-B Out and In installed in my airplane, ATC was able to provide traffic advisories where otherwise they would not have known my position."

"I have a lot of friends who want to install ADS-B," said Cronk, "which is great because the real benefits are yet to come when everyone has it."

### **Commuting with ADS-B**

C.K. Haun is an experienced pilot who regularly flies a 1980 Mooney M20K 231 from San Jose to Boise, which means typically crossing three different weather patterns. Although he does not yet have an aircraft-mounted ADS-B installation, he uses a Stratus unit with an iPad for ADS-B Out and In. He has found ADS-B extraordinarily useful in both VFR and IFR operations.

"The weather data benefit is huge," said Haun. "I've had XM weather for a while but the ADS-B connection is more robust. The weather overlay on my charts on the iPad has the immediate, most real impact — lots of detail and lots of expandable

screen real estate to see the nuances of the satellite view and the radar picture.” Haun continues, “ Also very interesting is the ability to get the METARs quickly for my destination airport, and seeing two hours away what my landing will probably be like at Boise is very useful. Knowing, with a high probability, what approach might be necessary hours ahead of time allows a lot of prep and thinking time. It’s very useful.”

Haun said that ADS-B offers very rapid updates. “And even better, I know what direction the reported traffic is going and so the ability to plan ahead expands. When ATC calls traffic for me, I can get better situational awareness by glancing at the iPad screen than I get from ‘traffic, 3 o’clock, five miles.’ The graphical depiction of the traffic makes it more real to me and I know much better where to look if I’m in [Visual Meteorological Conditions].”

“Finally, knowing the aircraft speed from the ADS-B readout is huge. I’ve seen traffic at 140 knots and thought, ‘Ok, I’ll keep an eye out for a little guy

in the area.’ Then I’ve seen traffic at 350 knots and thought, ‘big guy, moving fast, be very alert here.’”

According to Haun, ADS-B is clearly beneficial for both VFR and IFR. However, in IFR the rapid weather reporting and graphical display — together with detailed traffic information — adds to the situational awareness and comfort when he is in the clouds.

The FAA is urging operators to equip soon with ADS-B Out to avoid a last-minute crunch, given a limited number of qualified repair stations. The equipment is available and the prices have come down considerably. When you equip, consider adding ADS-B In as well. The safety benefits are immeasurable — whether you are flying VFR or IFR.

For more information on how to equip for ADS-B, access [www.faa.gov/nextgen/equipadsb](http://www.faa.gov/nextgen/equipadsb). 

*Clifton Stroud is a contract writer/editor for Beacon Management Group assigned to the FAA NextGen Performance and Outreach office.*

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ADRIAN EICHHORN

# Good N.I.G.H.T.

## An Essential Checklist *for* Night Flying Safety

*(Editor's Note: This article first appeared in the Nov/Dec 2005 issue of the magazine, then called FAA Aviation News. We have streamlined and updated the information in this version.)*

In today's complex world of GPS, glass cockpits, and flight management systems, sometimes a simple rule of thumb or memory aid is the best way for a pilot to avoid an accident. For flying after dark, I use and teach "N.I.G.H.T." as one such flight planning aid. Each letter leads to a question or topic to consider before every night flight.

### **N**OTAMS - did I check all relevant NOTAMS?

Every prudent pilot obtains a full briefing to get all of the information necessary to conduct a safe flight. NOTAMS are classified into two categories: NOTAM (D) or distant; and Flight Data Center (FDC) NOTAMS. If your flight is to a distant airport, the

NOTAMS you receive typically will include information on navigational facilities, frequency changes, and regulatory amendments. NOTAM-Ds should also include information on runway or taxiway closures and airport lighting outages. A total or partial outage of a Visual Approach Slope Indicator (VASI) or Runway End Identifier Lights (REIL) system also will be reported in this format.

Today's flight planning apps make it easier than ever to sift, sort, and show precisely the NOTAMS you need for any given flight, so be sure you take advantage of this information.

### **I**llusions - have I considered them?

Many different illusions can be experienced in flight; some can lead to spatial disorientation while others can lead to landing errors. Illusions rank among the most common factors cited as contributing to fatal accidents. They can include: illusions

leading to spatial disorientation (e.g., Coriolis illusion; graveyard spiral; somatogravic illusion; false horizon; autokinesis; elevator illusion and the inversion illusion); illusions leading to landing errors (e.g., runway width and slope illusions); featureless terrain illusions; atmospheric illusions; and ground lighting illusions.

## Glide slope - is one available?

Check to see if a visual or electronic glide slope is available before departing to your destination. Although visual glide slope indicators are installed at most airports, it's important to note that they may be installed at only one runway end. Also, there are many variations. Some of the not-so-common indicators include the Tricolor System, Pulsating System, Alignment of Element System, and the Three-bar VASI.

In many places, today's GPS technology also offers an advisory glide path to smooth and stabilize your descent on non-precision approaches. Just be sure you review and understand the limitations of using such guidance.

## How do I control airport lighting systems?

Operation of airport lighting systems (rotating beacons, approach lights, VASI, REIL, taxiway lights and runway lights) may be controlled by the control tower or by the pilot via the appropriate radio frequency. On runways with both approach lighting and runway lighting (runway edge lights, taxiway lights, etc.) systems, the approach lighting system takes precedence for air to ground radio control over the runway lighting system.

Important: Although the common traffic advisory frequency (CTAF) is used to activate lights at many airports, there's no prohibition on using other

frequencies. Consult the Airport/Facility Directory or a standard instrument approach procedures publication to be sure you have the correct frequency before you arrive at an airport.

## Terrain - how do I avoid it?

Avoiding terrain at night is easier if you use altitudes shown on VFR and IFR charts as part of your preflight planning.

On VFR charts, review the Maximum Elevation Figures (MEF), which are shown in quadrangles bounded by ticked lines of latitude and longitude and represented in THOUSANDS and HUNDREDS of feet above mean sea level. MEFs are determined by rounding the highest known elevation in the quadrangle, including terrain and obstruction (trees, towers, antennas, etc.) to the next 100 foot level. These altitudes are then adjusted upward between 100 to 300 feet.

On IFR enroute low altitude charts, you will find the Off Route Obstruction Clearance Altitude (OROCA) values. The OROCA guarantees 1,000 foot obstacle clearance in non-mountainous terrain and can be used at night to ensure obstacle clearance. In mountainous terrain, this altitude offers 2,000 feet of obstacle clearance. ✈️

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# GA SAFETY ON THE GO



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# [N] = Nightlights

## *Using Pilot “Nightlights” to Find Your Way in the Dark*

TOM HOFFMANN

Ok, I admit it. I was a nightlight kid growing up. Besides keeping the under-the-bed variety of monsters at bay, the light also helped me safely circumnavigate the battlefield of plastic dinosaurs and army soldiers that would often collect on my bedroom floor. Even today, the groggy nocturnal schleps to the bathroom are always a bit safer with a nightlight’s steady glow helping me avoid painful encounters with walls and other obstacles.

I feel a similar reassurance to another type of “nightlight” that was first revealed during my introduction to VFR night flying. I’m referring, of course, to the rhythmic green and white flashes of a civilian airport beacon that would always catch my attention among a sea of endless city lights. Once I was able to lock in on a beacon, I would quickly make out the landing area, set up my entry for downwind, and with a few empowering clicks of the mic, the once dark expanse of the runway would be ablaze with light. Descending into the darkness was also made a little less daunting with the help of visual approach slope indicator (VASI) or precision approach path indicator (PAPI) lights to keep me safely on glidepath.

Today, advances in technology are helping pilots find their way in the dark with new lighting options — namely light-emitting diodes (LEDs) — that are more durable, efficient, and reliable. But with every new technology comes new challenges.

This is precisely why the FAA is taking a hard look at how LED and other new lighting technologies can be safely integrated into the National Airspace System (NAS). So, let’s have a look at some of the nightlight options pilots now have along with a peek at some future developments.

### **The Aviation Lighthouse**

Like the ships that safely navigate through harbors using a lighthouse, airport rotating beacon lights fulfill a similarly important role in guiding aircraft safely to the ground. A far cry from earlier airport navigational aids like bonfires, lighted concrete arrows, and signal flags, airport beacons can often be spotted well over a 40-mile range on a clear night and at altitudes far above their designed 1-10 degree range of vertical light distribution. In addition to identifying the type of airport (see chart), beacons can also be operated during the day to signify if ceilings drop below 1,000 feet and if visibility is less than three miles. Don’t rely on that however; always verify independently if the weather meets VFR requirements.

Some other beacon lights you might encounter — either on or off an airport — include those that identify obstructions or areas hazardous to flight. These are identified with flashing or steady red lights and are painted orange and white for daytime opera-

tions. High intensity flashing white lights are used to mark some supporting structures of overhead transmission lines over rivers, chasms, and gorges, as well as tall structures like chimneys and towers.

Many manufacturers now offer FAA-certified LED kits that can easily replace existing incandescent obstruction lights. Newer high flux (or Piranha) LED technology is also available with many of these lights. In addition to providing more light than traditional LEDs, this technology is more resistant to vibration while providing more viewing angle options. These improvements, along with the reduced need for harrowing high-wire acts to perform maintenance, will likely lead to LED obstruction lights becoming more the norm in the years to come. That's good news given an LED's propensity for color accuracy and conspicuity under varying conditions and distances. And although there are some known issues with night vision goggle compatibility, efforts are underway to improve LED visibility with these. Initiatives are also ongoing to address compatibility issues with other installed vision systems. One solution being considered is to embed infrared emitters in the LED bulb itself.

Another place you'll find LEDs is with different components of airport surface lighting including runway end identifier lights, runway edge lights, and in-runway lighting applications for runways and taxiways. In fact, there are already over 700,000 LEDs in use today, many of which are located at the nation's larger part 139 commercial airports. Although few in number, there have been valid pilot concerns about LED surface lighting that the FAA has addressed or is currently working on but more on that later.

### Call the Ball

Who can forget the opening scene of the film *Top Gun* when Maverick makes a cool-as-a-cucumber F-14 carrier landing shortly after a tussle with some unfriendly "bogeys"? On the approach, the carrier controller advises Maverick he's at ¾ of a mile and to call the ball (a type of glideslope indicator the Navy uses). Maverick's calm response: "Roger, Maverick has the ball." Too bad his fellow naval aviator, Cougar, "dropped the ball" on his landing attempt!

While you likely won't hear ATC ask you to "call the ball" on your next approach, there are similar types of visual aids that can help you manage your approach and keep you safely on glidepath, especially at night. Several variations of visual glidepath systems exist, so be sure to know which to expect at your destination.

## Common Color Combinations for Airport Beacons

- Flashing white and green – civilian land airport
- Flashing white and yellow – water airport
- Flashing white, yellow and green – heliport
- Two quick white flashes followed by green flash – military airport

The most common type you'll find is the standard two-bar VASI system. It uses red and white lights to project a visual glidepath and provide obstruction clearance within the approach zone. If you're on glidepath (normally three degrees), you'll see red lights on top and white on

bottom. Otherwise, with two reds — you're too low and with two whites — you're too high. An

easier way to remember is with the popular aviation idiom "red over white, you're alright."

At night, VASI lights can be seen up to 20 miles away, but a descent should not start until you are visually aligned with the runway. In addition to the two light configuration, VASIs can also have 4, 6, 12, or 16 lights. You can see a diagram of each in section 2-1-2 of the Aeronautical Information Manual (AIM).

PAPI systems use lights similar to VASIs but are aligned in a single row, usually on the left side of the runway. Like VASIs, PAPIs provide safe obstruction clearance within plus or minus 10 degrees of the extended runway centerline and up to four miles from the threshold. A proper glidepath will be indi-

**While you likely won't hear ATC ask you to "call the ball" on your next approach, there are similar types of visual aids that can help keep you safely on glidepath, especially at night.**



**Two-bar VASI system.**

## For a side by side comparison of PAPIs using LEDs vs. incandescent lights, check out the video on

<http://go.usa.gov/3JcsT>

cated by having two white lights on the left and two red on the right.

There are roughly 940 PAPI systems in the NAS and they are currently being used to replace VASIs. This expanding role for PAPIs has made it a prime candidate for modernization using LED lights. Testing is still ongoing but the outlook is extremely promising for leveraging the superior efficiency of LEDs for these systems.

Other glidepath systems you may encounter include the tri-color system and the pulsating visual approach indicator, both of which use a single light unit. See section 2-1-4 of the AIM for more on these.

### It's All in Your Approach

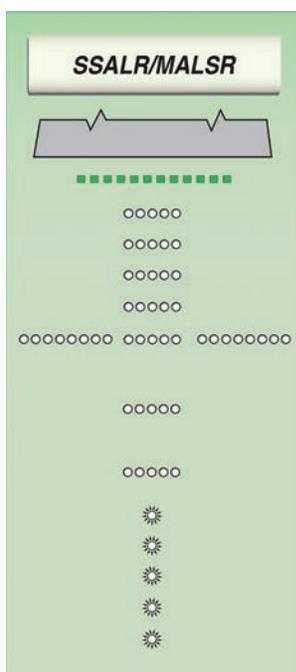
Although primarily designed for instrument approaches, a variety of approach lighting systems can be of great help during night VFR operations to keep you on target for a safe landing. The type of

system you'll find depends on whether the landing surface is a precision or a non-precision runway. The most sophisticated of them is the High Intensity Approach Lighting System with Sequenced Flashing Lights (also known as ALSF-2) which is only found at roughly 150 airports. It uses a mix of more than 250 steady and flashing lights that extend out 2,400 feet from the runway threshold to provide visual information on not only runway alignment, but also height, roll, and horizontal reference for Category II/III precision approaches. The ALSF-2 system also includes a high-intensity flasher system known as a "rabbit" which looks like a giant ball of light sliding toward the runway two times per second.

The ALSF-2's smaller sibling — and quite possibly the FAA's lengthiest acronym — is the Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights (or MALSR). With 900 locations, this is the system you will more likely encounter. MALSR uses threshold lamps, light bars, and flashers to provide guidance for Category I approaches.

A typical MALSR uses 18 green lamps along the runway threshold spaced 10 feet apart, nine white light bars with five lights separated every 200 feet, and five sequenced flashers also separated every 200 feet over a distance of 2,400 feet from the runway threshold. At the 1,000 foot point there are three light bars (15 lamps) for added visual reference for the pilot on final approach. Sequenced flashing lights provide added visual guidance down the runway centerline path.

To improve reliability and lower maintenance of these systems, the FAA has long considered using LEDs to replace the MALSR's less efficient incandescent lights. Early operational field tests at Phoenix Sky Harbor International Airport and Grand Forks International Airport in North Dakota, where green LED MALSR threshold lights were installed on select runways, further fueled this initiative. The test results were very encouraging and helped dispel some of the narrative about LED approach lights being too bright or distracting. Of pilots who were polled, most did not notice any difference with regard to the approach lights. Those who did stated the change was positive and not at all distracting. As a result, no adverse pilot human factors issues were revealed and the test was deemed a complete success for LEDs. The FAA later conducted a feasibility study on LED use for the MALSR which showed that the lights would pay for themselves in just two years. These findings paved the way for further FAA operational



**MALSR—Medium intensity approach light system with runway alignment indicator lights**

testing. This includes the possibility of LED replacement for other MALS components like the steady burning white lights and flashers.

### Too Good to Be True?

While LED use may seem like a no-brainer, there are operational safety concerns and issues — as well as popular misconceptions — that the FAA needs to address before continuing with a more mass integration. Among those concerns include excessive glare and brightness, distraction, compatibility with existing electrical infrastructure, and as mentioned earlier, compatibility with night vision goggles.

To provide a more collaborative approach for addressing many of these issues, as well as help advance efforts for increased LED use, the FAA's Flight Operations Branch in Flight Standards last year hosted a LED Symposium together with the aviation community. Working groups were formed at the meeting to put together an achievable action plan for LEDs, including identifying areas of research and testing still needed. Since then several follow-up meetings have occurred indicating how ongoing research is helping to provide more definitive data and drive what needs to be done in a test environment. Discussions are ongoing on ways the FAA can adjust for some of the concerns like glare from wet pavement, light dispersion in fog, the fact that LEDs don't produce enough heat to melt snow build-up like their incandescent counterparts do, and reducing the intensity of LEDs to match the brightness of incandescent bulbs.

"LEDs can be a bit trickier than incandescent lights to operate," says Flight Operations branch manager Coby Johnson. "For example, to dim an LED is not a matter of simply reducing current. They operate by turning off and on at a high frequency — the flicker effect — so we must use what's called pulse wave modulation to adjust the brightness." An example of how this technology is used can be seen with the FAA's use of new, five-step current regulators in certain in-runway lighting applications to better control dimming. This step was taken in response to pilot feedback on LED runway lights being too bright. Johnson adds that further flight testing of these systems is still needed to determine baseline brightness levels as the lowest of these levels may still be too bright.

The LED symposium is just one of many steps taken by the FAA to ensure safety remains paramount with LED technology. It's a paradigm shift for pilots and the entire aviation industry that will require



additional testing and training, but which carries the potential for many far-reaching safety benefits.

"LEDs are the way of the future and they are here to stay," says Johnson. "It might take us some time to smooth out all the wrinkles with this technology, but by joining forces with manufacturers and academic experts worldwide, we're on the right track for a successful and safe integration."

The future of aviation nightlights sure looks bright! And I think an LED replacement for my home nightlight is in order. ✈️

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

#### Learn More

##### FAA's Lighting

<http://go.usa.gov/3uHJH>

##### Airport Lighting

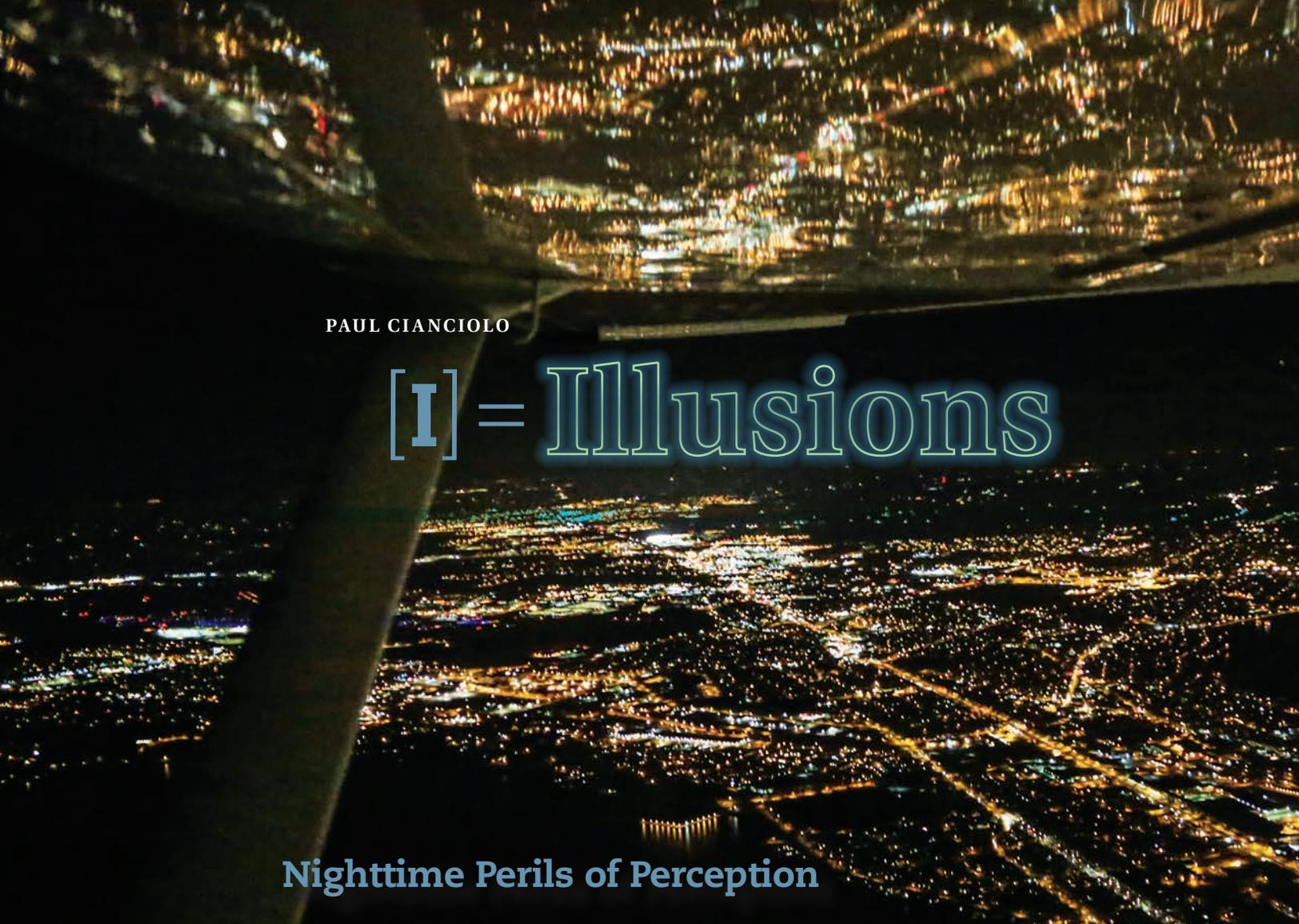
<http://go.usa.gov/3uHSP>

##### FAA Engineering

<http://go.usa.gov/3uHhF>

##### Advisory Circular

<http://go.usa.gov/3u63B>



PAUL CIANCIOLO

# [I] = Illusions

## Nighttime Perils of Perception

I love driving in the snow! Now I may be biased since I grew up in Wisconsin, but driving on back country roads at night with snowflakes falling all around can be a lot of fun. It feels like you're flying through space — and who doesn't like flying? Turn the high-beams on, and all you see are white flashes of fluff in every direction.

If you are thinking in the back of your mind that this scenario could turn into a potential disaster, you are correct. That being said, now consider that you are flying VFR at night in the exact same conditions. The visual reference to the moving snow makes it feel like you are going at "warp speed," and the opportunity for avection illusion to occur becomes high. Avection illusion, also known as a "false motion" illusion, is one of self-motion. It is similar to what might happen if you are on a train and a nearby train moves, giving you the sensation that you are moving in the opposite direction when in truth you are still stationary.

After snapping out of your trance, a quick check of your instruments reveals what you need to know.

Your airspeed is in the green. Good, not going at warp speed. Your vertical speed indicator shows level. Good. Your attitude indicator shows blue on the bottom. Not good. Emphatically NOT GOOD!

### Spatial Disorientation

A pilot can experience many kinds of illusions in flight. That's because we are genetically designed to maintain spatial orientation on the ground. The flight environment creates sensory conflicts that make it difficult to determine spatial orientation. Statistics show that approximately 10 percent of all general aviation accidents can be attributed to spatial disorientation and, sadly, the vast majority of these accidents are fatal.

You can prevent illusions of motion and position by maintaining a reliable visual reference to fixed points on the ground or, when the ground is not visible, to flight instruments. At night, your outside visual references on the ground may cause illusions when you see those references from different altitudes. For example, at 2,000 feet, you might see a



Photo by Maj. Robert Bowden, Civil Air Patrol

group of lights on an object individually. At 5,000 feet or higher, the same lights could appear to be a single, solid light mass.

If you start to see a halo or glow around the lights on the ground, then you may be flying into a layer of clouds or fog. Remember that if you have to descend through fog, smoke, or haze in order to land, the horizontal visibility when looking through the “soup” is considerably less than it is when looking straight down through it from above. As the *Airplane Flying Handbook* states (and aviation safety advocates agree), under no circumstances should you make a VFR night flight during poor or marginal weather conditions unless both the pilot and aircraft are certificated and equipped for flight under instrument flight rules (IFR). It follows that if you and the airplane are legal for IFR, it’s a much safer bet to file and fly that way than attempt night VFR in less than good weather conditions.

Crossing large bodies of water at night in a single-engine airplane is also potentially hazard-

ous because the horizon blends with the water and makes it difficult to establish depth perception and orientation. Even on clear nights, the stars reflect on the surface of the water, making water and sky blend together into one continuous array of lights.

### **Black Hole Effect Awareness**

If you have ever watched a sci-fi show, you know flying near a black hole never ends well. The same is true for black hole effect, which is one of the most dangerous illusions to GA pilots.

Here on Earth, black hole effect occurs when you land from over water or non-lighted terrain and runway lights are the only source of light. Without peripheral visual cues to help, it is challenging to maintain orientation. Any downsloping or upsloping terrain will make the runway seem out of position. Bright runway and approach lighting systems with few lights illuminating the surrounding terrain may create the illusion of less distance to the runway. If you believe this illusion, you may lower the slope of your approach and impact terrain before reaching the runway.

Pilots might be surprised to know that a black-hole illusion can be black, gray, or white, and it doesn’t always happen in the dark of night. Having another crewmember in the cockpit can help if you get disoriented. If you believe that has happened to you and you are fortunate enough to have a fellow pilot along, don’t hesitate to turn the flight controls over to your companion until you regain your bearings. Also, don’t be afraid to chat with ATC about what you are up against. If you are not confident in your landing, execute a go-around.

A similar illusion can happen over water or unlighted terrain on a night with no stars or moonlight. The sudden loss of a horizon or any ground reference can quickly produce vertigo. A pilot suffering from vertigo might bank

the airplane and push the yoke forward, which can produce a graveyard spiral. Alternatively, the pilot might bank the airplane and pull back on the yoke, which can lead to a stall/spin. Neither of these scenarios ends well at low altitude and low airspeed.

For VFR pilots, a good way to avoid night illusions is to fly to and from airports with a visual approach slope indicator (VASI) or an approach lighting system. These aids provide guidance on the correct approach

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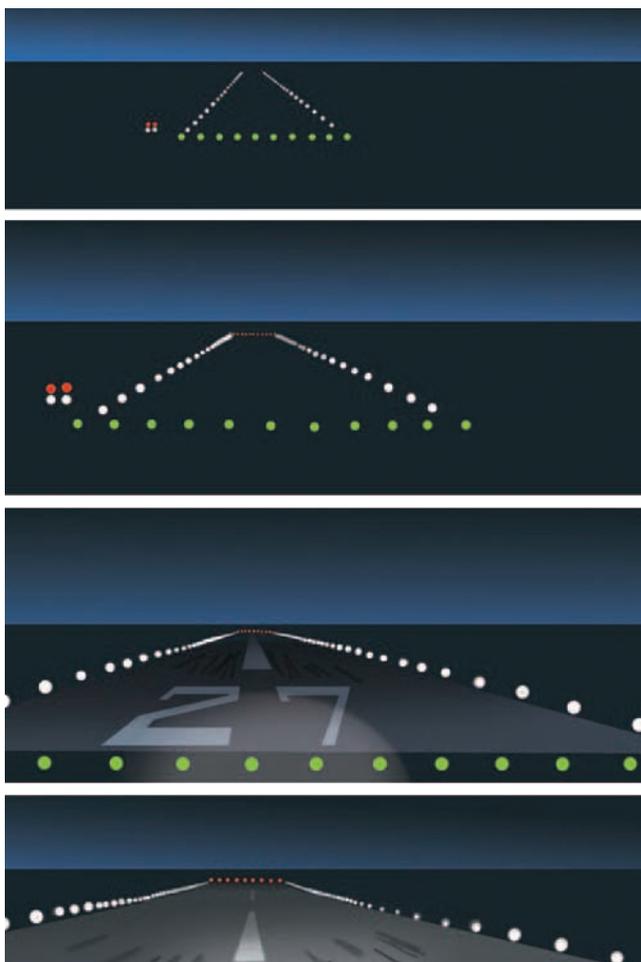
**You can prevent illusions of motion and position by maintaining a reliable visual reference to fixed points on the ground or, when the ground is not visible, to flight instruments.**

path and obstacle clearance within four nautical miles of the runway. (Read *Nightlights* for more about airport lighting.) IFR pilots can use electronic glide slopes to assist in flying the correct glide path even in visual meteorological conditions (VMC).

### Preventing Perils

Understanding what causes spatial disorientation and illusions in flight can help you avoid losing control of your aircraft should these conditions occur. Section 8 of the *Aeronautical Information Manual* does a great job describing “Medical Facts for Pilots.” Additionally, here are some steps to help prevent you from losing your bearings when encountering illusions in flight:

- Before you consider flying at night with less than three miles visibility, get an instrument



**Remember that if you see “red over white, you’re alright” and on the glidepath. And to aid in determining the proper roundout point, continue a constant approach decent until the landing lights reflect on the runway and tire marks on the runway can be seen clearly.**

rating and maintain proficiency.

- At night or with reduced visibility, use and rely on your flight instruments. Test them before each flight.
- Maintain night currency if you intend to fly at night, and include cross-country and local operations at different airports.
- Study and become familiar with unique geographical conditions in areas where you plan to fly.
- Check weather forecasts before departure, while enroute, and at destination. Be alert for weather deterioration, especially at night.
- Do not attempt VFR flight when there is the possibility of getting trapped in deteriorating weather.
- If you experience a visual illusion during flight, have confidence in your instruments; ignore all conflicting signals your body gives you.
- If you fly single-engine IFR frequently, consider installing an alternate vacuum system or electric standby attitude indicator.
- At night, adjust the cockpit (and handheld device!) lights to a minimum setting so you are not hindered by reflections on the windscreen and windows or loss of night vision.
- If you have been able to see ground lights while flying enroute or descending at night, and then they disappear, consider pulling up immediately. You may have encountered a dark ridge or hilltop which lies in your flight path!

As mentioned at the beginning, night can be a great time to fly. Just be sure you gain — and maintain — the knowledge and experience you need to stay safe. ✈️

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### Learn More

#### Spatial Disorientation Fact Sheet

<http://1.usa.gov/1Cb4hmH>

#### FAA Spatial Disorientation Videos

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

# Need ADS-B? Get Answers...



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Next**GEN**

# [G] = Gadgets

## Glowing Gadgets *and* Gizmos

It's pretty obvious that I'm a big fan of today's mobile technology. With a personal inventory of two iPhones (one for work, one for personal use) and two iPads (Mini 3 — might be Mini 4 by the time you read this article — and Air 2) plus WiFi subscriptions in three locations (one of those being an unlimited airline WiFi plan), at least one connected device is always close at hand.

While I don't always take the full array of gadgets when I fly, I do make it a point to have at least a couple of devices capable of assisting with flight management tasks. These include pre-flight weather briefings, en route weather updates, route planning/route management, airport and communications info and, of course, the stunningly precise situational awareness provided by geo-referenced moving map GPS on VFR sectional charts, IFR en route charts, and (best of all) IFR approach plates. And don't even get me started on the recent addition of synthetic vision and AHRS display capability to tablet devices!

When flying a new glass cockpit airplane or one with some degree of glass panel retrofit, the addition of portable gadgets sends the geek factor into the stratosphere.

It's great — except when it's not.

In the Jan/Feb 2014 issue of this magazine, I wrote about the dangers of distraction in an article called *The Lost Art of Paying Attention* ([www.faa.gov/news/safety\\_briefing/2014/media/JanFeb2014.pdf](http://www.faa.gov/news/safety_briefing/2014/media/JanFeb2014.pdf)). The article explored how our technology can magnify mistakes, dominate rather than serve, and tempt us to step out of the situational awareness loop. From the remarkable volume of reader response to that piece, it's clear that I'm not alone in constantly battling the potentially fatal attraction to technological distraction. While I believe that everything I wrote then — including the tips for keeping the pretty toys in the proper context — still applies, there are some additional considerations for using them at night. Let's take a look.

## Practice Glow Control

The combination of panel-mounted glass cockpit technology and portable big-screen smartphones and tablets can produce an enormous amount of light in an otherwise dark cockpit. You already know where I'm going with this one: beware its impact on your precious night vision! While it takes only a matter of seconds to brightly illuminate a panel or a tablet, it can take as long as 30 to 45 minutes for the photoreceptor rods in your eye to fully adapt to darkness. Even if you have traffic awareness/avoidance gear on board, you cannot afford to be "night blind" for such a long period of time. That's true for all phases of flight, but especially so for the critical takeoff and landing phases.

To mitigate the risk of night blindness from bright screens and tablets, make it a point to practice "glow control" right from the start. Dim all the displays before you turn them on — better to start with too dim and adjust upward rather than the opposite tactic. Many devices offer a "night" setting, so find it and activate it before you need to use it.

If your passengers have their own devices (likely) and/or you need them to hold and manage yours, please be sure to brief them fully on the importance of glow control.

It's bad enough if their loss of night vision leaves them unable to assist with traffic spotting, but it's even worse if their unknowing actions create that problem for you.

While we're on the subject of glow control, it's also a good idea to be sure your flashlights (yes, you still need those for night flying!) are functional, stocked with fresh batteries and, ideally, equipped with a red lens.

## Master the Machine(s)

When operating at night and practicing "glow control," as you must, the reduced lighting conditions make mastery of the machine even more important than it is in daytime. You can't afford to be fumbling to find the functions you need for a given operation or ATC instruction.

**To mitigate the risk of night blindness from bright screens and tablets, make it a point to practice "glow control" right from the start.**



Photo by Susan Parson



Photo courtesy of Avidyne

**When operating at night the reduced lighting conditions make mastery of the machine even more important than it is in daytime. You can't afford to be fumbling to find the functions you need for a given operation or ATC instruction.**

Even with an autopilot engaged for basic aircraft control, that kind of heads-down time is dangerous because it takes you farther from the “howgozit” situational awareness loop. As I wrote in the 2014 article, today's pretty panels and portables are a major eyeball vacuum. They suck us into a technology-created time warp that robs us of any real sense of time spent staring at them. Even the slowest GA airplane can cover a significant amount of territory in the space of mere minutes, and moving maps aren't much help if you are, for example, trying to remember how to bring up some other function you needed five minutes ago. And, of course, if you don't have an autopilot, heads-down time in the night flying environment can quickly lead to spatial disorientation and loss of aircraft control.

The key, as always, involves disciplined preparation. Learn and practice all of the functions you'll need for the flight. Download all of the information

**Don't let the glowing gadgets and gizmos distract you from enjoying the beauty, the serenity, and the simple joy that night flying can offer.**

you expect to use, and organize it in a logical way. To assist in this task, one popular app offers a “pack” function that downloads and sequences this kind of data. Even if you have some means of onboard WiFi, verify that you have successfully downloaded the big ticket

items. You might find it helpful to use the venerable “chair flying” technique to be sure you've covered everything: with tablet in hand, make an accelerated mental pass through your flight plan. You might be surprised by how many “obvious” things you've forgotten to learn or do.

Ensure that your device has a fully charged battery, and make provisions for keeping it charged as long as you expect to need it — plus a reasonable reserve (yes, just like fuel planning). The ubiquitous 12-volt adapter is one option, but portable battery packs abound these days. Consider getting one specifically for your flight bag. As with any battery, regularly check the charging pack to ensure it has all the juice it's advertised to hold.

### Remember the Basics

Never, ever forget that technology is merely a tool! Regardless of the time of day or weather conditions, don't let the technology take over or tempt you to trust it without constant and assiduous verification. Technology can help you, but it can never substitute for adherence to the Pilot's Prime Directive to aviate, navigate, and communicate.

A discussion of the basics is not complete without a final plea: don't let the glowing gadgets and gizmos distract you from enjoying the beauty, the serenity, and the simple joy that night flying can offer. ✈️

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## Things That Go Bump in the Night

*From ghoulies and ghosties / And long-leggedy beasties / And things that go bump in the night, / Good Lord, deliver us!*

– traditional Scottish poem

Though I'm fairly fearless now, I was definitely one of those 'fraidy cat kids whose overactive imagination conjured all manner of noxious nighttime perils. Those little bumps in the night no longer set my heart pounding when I'm safe and sound at home, but it's a different matter when I'm engaged in "after hours" aviation. That's because I've seen and heard too many tales of close encounters with "long-leggedy beasties" rambling on runways after dark. As regular readers may recall, a fellow club pilot's nocturnal encounter with deer on the runway a few years ago put our C-182 *Skylane* out of service for months. I had my own narrow escape a couple of years after that when, just after landing, the LED lights illuminated several Cervidae skittering across the runway just ahead.

And then there was the nighttime aerial bird strike. At 4,000 MSL over the Brooke VORTAC one calm summer night, a club partner and I were startled by the sound of a bump and the slight feel of a "thud." We were instantly on high alert, scanning the gauges, gently testing the flight controls, and directing the flashlight to every part of the structure we could see. After landing, we found the fuzzy remains of a small bird smashed all over the lower section of the nose cowling. It was bye, bye, birdie for the feathered flyer, but we humans luckily escaped with nothing more serious than an unpleasant cleaning task.

### What Can You Do?

The typical advice with respect to birds (at least those you can see) is to climb, since the bird's instinctive reaction is to dive for greater airspeed. In the case of deer, however, there is probably little that you as the pilot can do to avoid collision if a deer decides to make a runway incursion while your airplane is using the asphalt for taxi, takeoff, or landing. But if you hear or feel something go bump in the flight, the most important thing you can do is, as always, fly the airplane and avoid any action that could lead to loss of control. The same advice holds for landing phase wildlife encounters. Evasive action attempts that result in loss of directional control can be more damaging — and sometimes more deadly — than impact at the relatively low speed of the landing roll.

In the sense of prevention through avoidance, you can certainly help by reporting wildlife strikes of any kind to the FAA. Reporting collisions with wildlife is crucial to helping the agency develop and use its wildlife strike database for a greater understanding of the problem. The link to file an online Wildlife Strike report is below, along with other helpful resources:

- **Airport Wildlife Strike Summary and Risk Analysis Reports** provide a summary of strike data for selected part 139-certified airports. These reports are primarily intended to provide a species risk analysis to help local officials set wildlife risk management priorities. However, you can search by airport, by FAA region, or by state to see what kind of wildlife strikes are most prevalent in your area(s) of intended operation.
- **Annual Bird Strike Report: The annual bird strike report for 2014, "Annual Report: Wildlife Strikes to Civil Aircraft in the United States (1990-2014),"** summarizes analysis of data from the National Wildlife Strike Database for the 25-year period 1990 through 2014.
- **Trends in Reporting of Wildlife Strikes With Civil Aircraft and in Identification of Species Struck Under a Primarily Voluntary Reporting System 1990-2013(PDF)**  
This document shows that wildlife strike reporting for both commercial and general aviation airports continues to increase. Happily, though, strike reports show a decrease in the number of damaging strikes and in the number of damaging strikes within the airport environment.

While we can't completely eliminate the risk of wildlife strikes, especially in the reduced visibility of the night hours, we can all use this information to enhance awareness.

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

### Learn More

#### **FAA Wildlife Hazard Mitigation Program**

[http://www.faa.gov/airports/airport\\_safety/wildlife/](http://www.faa.gov/airports/airport_safety/wildlife/)

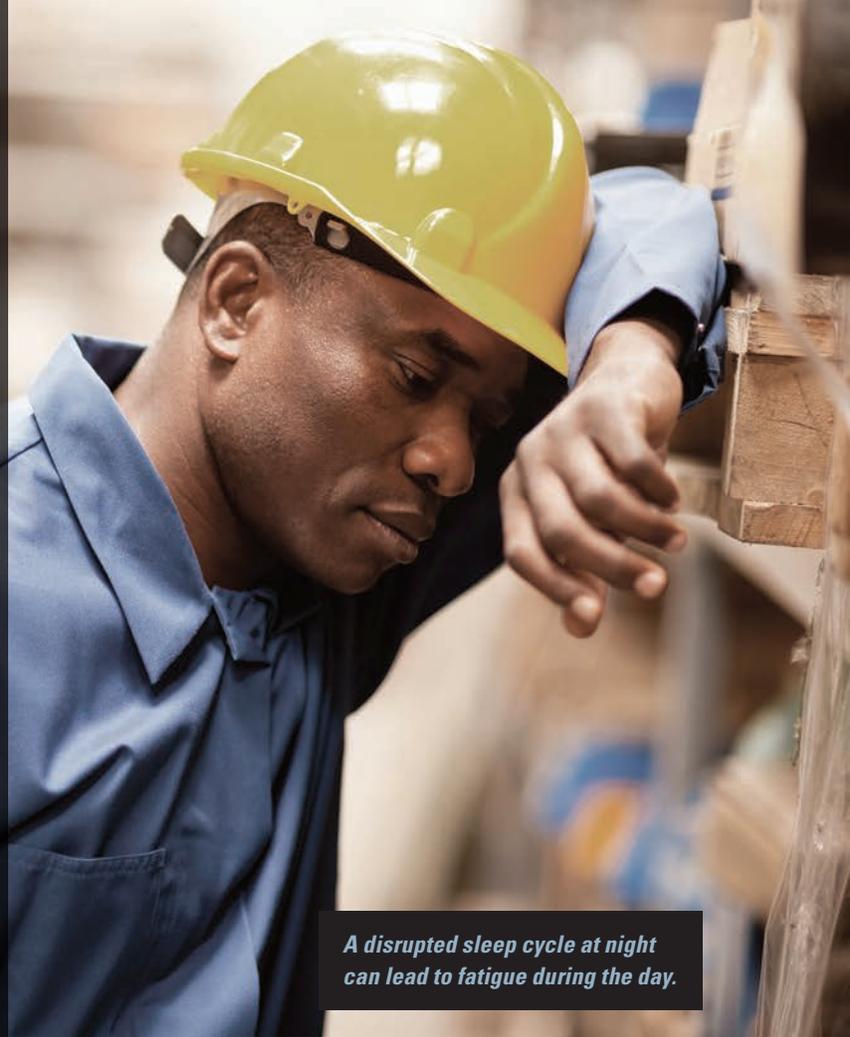
#### **Wildlife Strike Report**

<http://wildlife.faa.gov/strikenew.aspx>

SABRINA WOODS

# [H] = Human Factors

*How Night Can Be Hazardous to Your Flying Health*



*A disrupted sleep cycle at night can lead to fatigue during the day.*

Last winter in the D.C. metropolitan area was rough. While our drop in temps wasn't quite as vicious as some others I could name (I'm talking to YOU, Boston) the shorter days and frigid weather turned this typically super active, outdoorsy aviation enthusiast into a slow, sleepy, stay-indoors hermit. I

**Because sunlight plays such an active role in producing and regulating key hormones in your body, absorbing as much of the light as you can when it is available is a good idea.**

wasn't proud of it, but the fact of the matter is that our human biology and constitution all but ensures we can't help it. Thankfully though, we are also wonderfully adaptive. If I want to perform at the same activity and cognition levels as I do in the sunnier, long days of the warmer months, all I (and you) have to do is incorporate a few mitigation strategies to be successful. This entire edition of *FAA Safety Briefing* is dedicated to just that.

## Human Hardwiring

First, we humans just don't perform as well in the dark as we do in the day. This is primarily due to the fact that we don't see as well in the dark. For largely visual creatures, this can be a bit of a problem. That's because for us, night equals sleep.

For the majority of us, our eyes are fantastically good at picking up critical details like depth, distance, and color, and transmitting that information to our brains to be ordered and interpreted. This all starts with light. Light travels in a straight line, bounces off objects and into our eyes through the pupil. The light then passes through the lens. The lens focuses the light onto the retina. Depending on how far away the object is, the lens changes shape to keep the light focused on the retina. After receiving the focused light, the retina transforms it into an electrical impulse that travels to the brain via the optic nerve. With a decrease in light, this transaction becomes much more limited.

We also need sleep. For most of us, it's normal to get sleepy when night falls. Scientists and medical doctors haven't really settled on a unified reason of why we need it exactly — particularly because of the fact that it has been proven that our brains are nearly as active as during the day — but they all agree that we *do* need it. Some of the prevailing theories are:

- Sleep keeps us quiet and dormant during those hours that might be most dangerous to us as one of the more fragile species atop the food chain.

- Sleep is the body’s way of replenishing all of the energy we expend during the day.
- Sleep enables the body to launch restorative efforts that ensure muscle growth, repair minor tears in tissue, encourage healthy hormone release, and break down the unhealthy byproduct from the chili cheese fries that passed as “dinner.”

All of these functions are important, but probably the most important theory applicable to aviation is that experts believe sleep is the time when our higher levels of cognitive function get the tune-up they need, sharpening memory, strengthening neurotransmitters, and enhancing recall.

The reason we are more inclined to sleep at night versus day is also up for debate. Most scientists agree this is because of our years and years of conditioning to hunt and gather during the day (again, we see better then and there are bigger, badder creatures prowling at night). In addition, melatonin and vitamin D (key factors, respectively, in controlling your wake and sleep cycles, and promoting bone growth) are better developed during the day. So now that winter is upon us, the colder, shorter days and longer nights wreck what was a finely tuned process within us. For some people the effect is so severe it can lead to what is known as “winter depression” — a nasty condition whose symptoms can include irritability, restlessness, and difficulty concentrating.

### Got Rhythm?

No doubt by now you have heard about that biological clock that tells people when to sleep. As a quick refresher, our circadian rhythm follows a roughly 25-hour cycle. It controls physical, mental and behavioral changes in our bodies, and it is very much affected by key environmental triggers like sunlight and temperature. In a typical day, when the sun starts to go down, our bodies produce the hormones that make us sleepy. This rest cycle occurs naturally every night (if our electronic gadgetry doesn’t mess things up too much), and winter has the same basic effect. Because we are biologically hardwired to slow down with the lack of light, winter can make it difficult to maintain the same level of activity as you might have in May or June. And, once our circadian clock throws a hand, it can be notoriously difficult to find that rhythm and balance again. The best way to combat this challenge is to seek out sunlight, remain active, keep healthy through diet and exercise, and to get plenty of *uninterrupted sleep*.

### Sunlight and Armchair Aerobatics

Because sunlight plays such an active role in producing and regulating key hormones in your body, absorbing as much of the light as you can when it is available is a good idea. By simply opening up your blinds to let more sunlight into your home or getting outdoors into the natural light for a few hours, you can help maintain the balance you need.

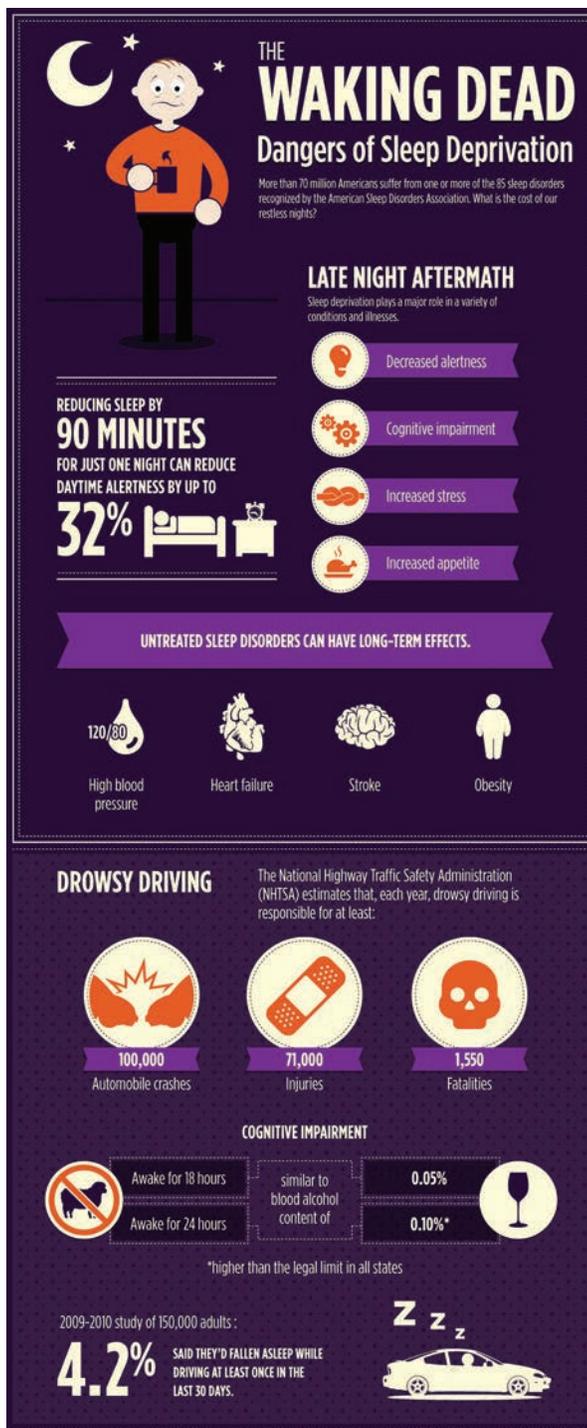


Chart courtesy of Health-Science-Degree.com



*When flying at night you have to strike a healthy balance between what your body needs and what your inner aviator wants.*

For the record, the soft glow of your tablet *does not* count. In places where the winter sun simply refuses to shine for any significant amount of time (hello, Alaska!), some people resort to using sun lamps or over-the-counter supplements to stimulate melatonin and vitamin D production.

It is also helpful to keep your mind engaged. Many people decide that operating during the winter months is not for them. Understandable, but instead of bedding down your aircraft completely and forgetting flying for two to three months, take advantage of the hibernation time to hone your flying skills through

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**Once asleep, most people need eight hours (during a 24-hour period) to sustain performance indefinitely.**

activities such as participating in FAA Safety Team (FAAST) sponsored seminars, watching FAA safety.gov videos and, of course, reading publications like this magazine. Training devices are also a possible winter substitute for the real thing. These training tools also allow for you to practice tricky scenarios and emergency procedures from the safety of the ground. If you have incorporated a new avionics suite into your flight regime, quite often the manufacturing companies have online training that will help increase your knowledge and skill in using it. If you don't have access to a training device, simply sitting in a chair and running through your checklists — reaching out to “touch” dials, levers, knobs, and controls as you would if you were really flying — goes a long way to committing the information to both muscle and mental memory.

Winter can also be a great time to catch up on a little “light reading” by settling in with a cup of cocoa and going through the practical test standards, your

aircraft's flight manual, and training handbooks like the recently revised, information packed *Pilot's Handbook of Aeronautical Knowledge* (FAA-H-8083-25A) or the *Airplane Flying Handbook*. (FAA-H-8083-3A, [http://www.faa.gov/regulations\\_policies/handbooks\\_manuals/](http://www.faa.gov/regulations_policies/handbooks_manuals/)). Catching up on regulatory changes and refreshing your memory by reviewing sections of the Aeronautical Information Manual can also do wonders for keeping your head in an aviation mindset. You will be better prepared for early spring flying.

Keeping your body healthy goes hand-in-hand with keeping your mental skills sharp. Winter months also tend to bring the winter goodies. While I'll be the first to admit I am an absolute pushover in the face of anything “pumpkin spice,” I also know that the unintended consequence of too many tasty treats can be a general feeling of lethargy and slightly tighter trousers. To combat this challenge, eat balanced, nutritional meals and maintain a healthy body weight through exercise. Make indulging in seasonal sweets a special treat and not a daily occurrence (yes, I know — easy to say; hard to do).

### **Practice Good Sleep Hygiene**

The National Sleep Foundation describes sleep hygiene as “a variety of different practices that are necessary to have normal, quality nighttime sleep and full daytime alertness.” One tip to consider is to avoid napping during the day. While good for growing children, in adults it can disturb the normal pattern of sleep and wakefulness. It pains this avid coffee drinker to say so, but you should also minimize use of stimulants such as caffeine, nicotine, and alcohol

too close to bedtime. While alcohol is well known to speed the onset of sleep, it does not contribute to high quality sleep. Finally, as mentioned before, exercise is good for maintaining a healthy weight, but it can also promote good sleep. To make sure you don't overdo it, try relaxing exercises such as yoga or *tai chi* before bed to help ensure a restful night.

Food can be disruptive. Stay away from large meals, and it is probably best to lay off the spicy Italian sausage right before turning in for the night. Lastly, associate your bed with sleep. I'm totally guilty of this crime against good sleep hygiene, but it's not a good idea to use your bed to watch TV, fiddle around on the computer, or read. These actions tend to stimulate your brain too much for sleep. In addition, such habits weaken the mental link between "bed" and "rest."

Once asleep, most people need eight hours (during a 24-hour period) to sustain performance indefinitely. Making sure your sleep covers the hours between 0200 and 0600 is preferable, because this timeframe provides the most recuperative bang for your buck. Although not ideal and not without limits, shorter periods may be nearly as beneficial as a full night, so long as you take such an opportunity immediately before flying. Always keep in mind, though, that too much napping throws your natural rhythm off kilter.

## Out of Sync

Let's just say these mitigating strategies don't work, and you get all out of sync. You are drowsy by day, and sleep at night is intermittent at best. Please recognize that this is a BIG deal and the lack of sleep can quickly escalate into sleep deprivation. Acting as a pilot or a required crewmember when you're out of sync has been shown to degrade your performance and can significantly affect your risk assessment for any given flight. Sleep deprivation symptoms are sneaky and can creep up on you if you aren't careful. While one night of poor sleep won't do you in, a week or more can bring about crankiness or irritability, forgetfulness, clumsiness, and decreased cognitive ability. Long term effects can include significant reductions in performance and alertness. Your ability to think and process information would be critically compromised. Reducing your nighttime sleep by as little as one and a half hours for just one night could result in a reduction of daytime alertness by as much as 32 percent. This is not the time to "soldier on," rather, this is the time to make the effort to get back in the groove.



*It's not a good idea to use your bed to watch TV, fiddle around on the computer, or read. These actions tend to stimulate your brain too much for sleep.*

The FAA is very concerned about the effects of sleep deprivation and fatigue. To that end, a whole team of human physiology/factors/psychology experts at the Civil Aerospace Medical Institute (CAMI) have conducted numerous laboratory and field experiments on the effects of fatigue with ATC, technical operations, maintenance technicians, flight attendants and pilots, and have developed a host of risk mitigation strategies and awareness initiatives. Recently, fatigue mitigation elements have been written into 14 CFR part 117

(<http://go.usa.gov/3FN9Q>) and the associated AC-120-103A (<http://go.usa.gov/3FN9e>) covers flight, duty and rest requirements and fatigue risk management systems (FRMS), respectively. While the target audience is air carrier, there is a great deal of information applicable to GA in these resources. Consider checking them out so you can develop your own personal fatigue risk assessment.

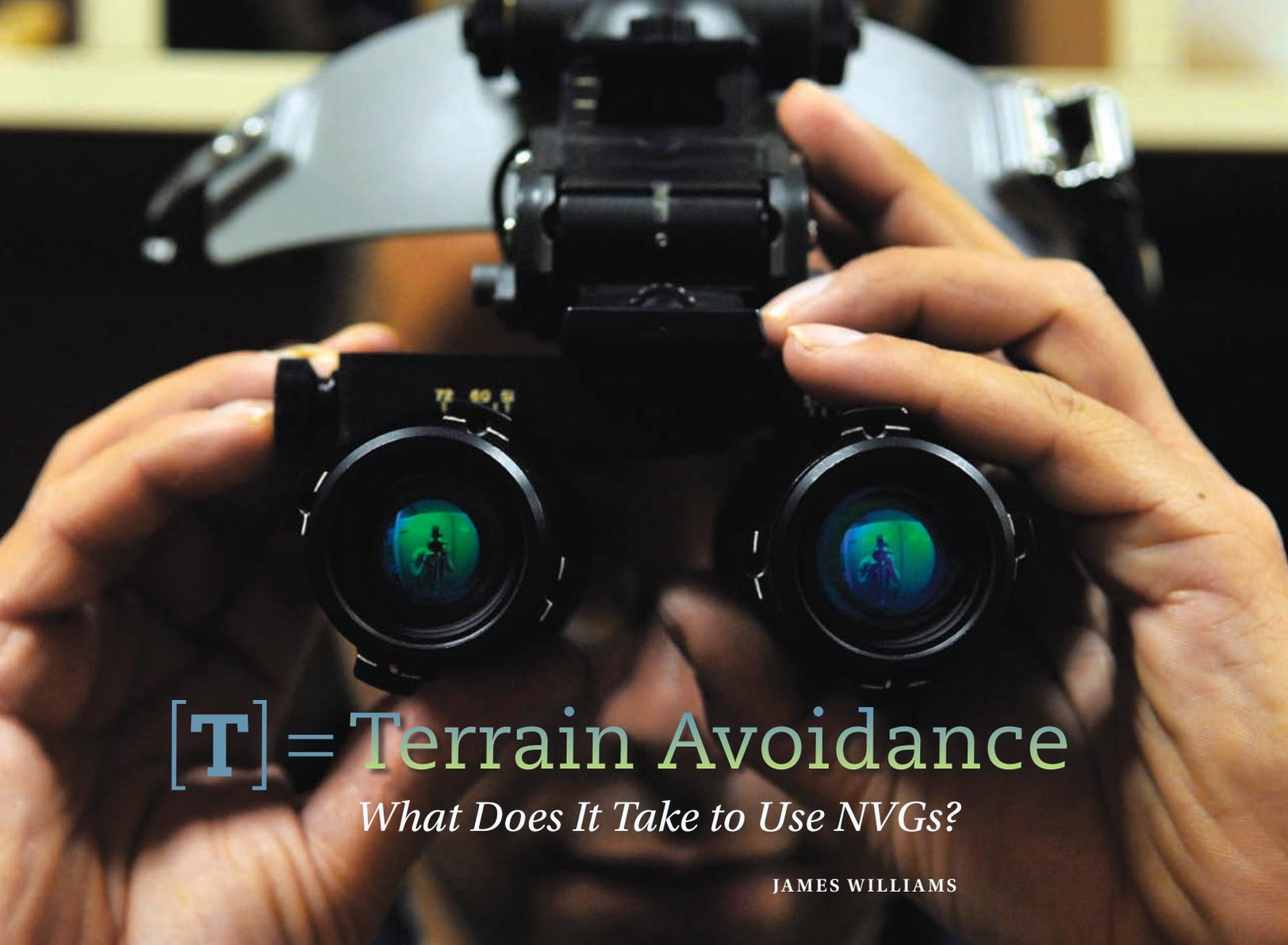
We live in a time where we can manipulate our habits and our surroundings to get the most out of each and every day. As the old adage says, though, "with great power comes great responsibility." Our ability to alter things does not circumvent our base level biological imperatives. The trick is to strike a healthy balance between what your body needs and what your inner aviator wants. ✈️

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**Reducing your nighttime sleep by as little as one and a half hours for just one night could result in a reduction of daytime alertness by as much as 32 percent.**

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



# [T] = Terrain Avoidance

## *What Does It Take to Use NVGs?*

JAMES WILLIAMS

*So the darkness shall be the light ...*

- T.S. Elliot.

Even in the darkest night there is light. Last year, *FAA Safety Briefing* looked at the technology of Night Vision Imaging Systems (NVIS) and Night Vision Goggles (NVG) (Jan/Feb 2014). We reported that a great deal can be done with just a little bit of light.

We also learned that these wonderful appliances still have very distinct limitations. While researching the technology, we heard raves about the effectiveness of night vision systems. Though casual users couldn't easily see (so to speak) the drawbacks apart from limited field of vision (FOV), the fact is that serious issues remain.

### **Rules of the Road**

Before we delve into details on the drawbacks, let's start by reviewing rules for the use of NVGs.

First, in order to act as a PIC while using NVGs you must be properly trained in accordance with the requirements of 14 CFR 61.31(k). The training

includes both ground and flight portions, and some of the topics covered include aeromedical factors, visual illusion, NVG performance, scene interpretation, preflight of aircraft lighting, proper piloting techniques, and emergency procedures.

Second, the aircraft must be approved for NVG use. This is either done as part of the Type Certificate (TC) of the aircraft or by the addition of a Supplemental Type Certificate (STC) to the aircraft. Requirements typically include filters on annunciators and other cockpit lighting, which allow you to read cockpit instruments without reducing the effectiveness of the NVGs. (Note: See *Vertically Speaking* for more information on cockpit issues.)

To get a better idea of what the training encompasses, we consulted Aviation Safety Inspector (ASI) Shawn Hayes, who serves as the NVG focal point for GA operations. "The regulations don't require minimum training times," he explained. "It's all based on the proficiency of the person being trained." Hayes also stressed that GA owner/operators need to

remember that it may take a while to get comfortable and, more importantly, proficient in operating with NVGs. “Remember, currency does not equal proficiency — especially with NVGs,” he cautioned.

The currency concept will be familiar to instrument-rated pilots. Hayes outlined the requirements stated in 14 CFR 61.57(f)(1)(i)-(v). “The specific requirements for currency, or night vision goggle operating experience, are pretty straightforward,” he observed. The rules require operating as PIC while carrying passengers in the two calendar months preceding the month of the flight in airplanes, helicopters, and powered lift aircraft.” Hayes continues, “If those requirements are not met, then the person has another two calendar months (for a total of four calendar months preceding the month of the flight) while acting as PIC and not carrying passengers.”

To summarize, a pilot seeking to maintain NVG currency has a window of two months beyond the currency to carry passengers in order to regain legal currency. After that, the pilot needs to take a NVG Proficiency Check with a qualified person as listed in 61.57(g). Again, though, Hayes emphasizes that “currency does not equal proficiency, especially with NVGs.”

### Getting to Proficient

To get information on what constitutes proficiency, I consulted ASI Ray Johnson, a long-time NVG user. In fact, Johnson has used NVGs since 1972, when these devices were introduced for widespread use with the Army’s AN/PVS-5. Johnson maintains his own NVG knowledge by serving as a rotorcraft expert in the Flight Standards General Aviation and Commercial Division. “I feel safer flying with NVGs than I do without them,” Johnson says. “When I started using them again, I felt comfortable within two weeks. That’s because I had a lot of experience with NVGs, which taught me about good scanning techniques.”

Johnson went on to outline some of the issues that first-time NVG users can encounter.

### Field of View and Contrast

“The first time you slap on a pair of goggles, you notice it is very similar to holding a pair of toilet paper tubes up to your eyes.” Johnson said. “Your field of view is limited, and that has a dramatic effect on your situational awareness. To counter this limitation, it’s imperative for the pilot to learn correct, effective scanning techniques for terrain contrast.”

The term “terrain contrast” refers to the reflectivity of two or more surfaces. It’s important in NVGs,

Photo by Senior Airman Austin Knox



Photo by Airman 1st Class Benjamin Wiseman





because all vision — aided or unaided — is based on the reflection of light. With less visual information (the FOV issue again), contrast between surfaces

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**Training is critical to using NVGs safely, and recurrent training is required to maintain those skills.**

is important. Johnson explains that when over water and with no land in your field of view, NVGs do not provide very good contrast in the image they provide.

“The 20/40 vision you get with NVGs won’t let you see wires because they tend to blend with their surroundings.” He warns that “Bad things can happen if you stop scanning.”

### **Depth Perception**

Another NVG issue – one that provokes debate – is depth perception. Early U.S. Army studies showed that NVG use essentially eliminated depth perception. Later studies, however, showed that stereo vision is indeed present when using NVGs.

Still, there are other issues. According to FAA training information, NVG users tend to overes-

timate distance and underestimate depth. That’s because loss of detail, which arises from the fact that the NVG user is viewing an object on a screen, can make users think objects are farther away. In addition, an object’s reflectivity will change how it appears in the NVG. Shiny or reflective objects will appear closer, while dull objects will appear farther away than they are. And, of course, any light source will tend to appear closer than it is. Any of these false perceptions can create a dangerous situation. Hayes summarizes with this comment: “The bottom line is that distance estimation and depth perception is reduced while using NVGs.” This reality is one more reason for the extensive training required to use NVGs.

### **Focus**

Focus matters a lot too. In fact, Johnson states unequivocally that “everything else is secondary” to this task. “If your goggles aren’t focused properly before you go out to the aircraft, you’re setting

yourself up for failure. Everything that happens between the time you leave the focusing lane and the time you put the goggles on in the aircraft works to degrade your visual acuity.” By properly focusing your NVGs, you ensure that your eyes don’t have to adjust to bring the displayed image into focus. Improper focus makes a noticeable difference in eye strain and fatigue. Johnson cautions, though, that even with the best focus, eye fatigue is very possible during long periods of NVG use. In addition, the additional weight of the goggles themselves, plus the power packs and counter weights, can accelerate fatigue by putting extra strain on the pilot’s head and neck.

### How Do I Start?

After covering all of these real concerns, you might be wondering if it’s worth using NVGs. The answer is that it depends.

Ray Johnson stresses that training – *proper* training — is critical to using NVGs safely, and recurrent training is required to maintain those skills. His bottom line is that NVGs are a great appliance, but “if you can’t afford to build and maintain the skills to use them safely, then it is best to leave them in the case.”

If you decide you can indeed afford to make the necessary investments in pilot training (both initial and recurrent) and aircraft equipage, Hayes offers this advice: “Do your homework. Be sure that the instructor giving you NVG training is properly endorsed by the regulations to provide that training.” (Note: see FAA Notice 8900.320 for more information.) Hayes also suggests a form of “benchmarking” that pilots should use for any kind of training: “Ask questions, and check with people who have already taken this step. See what pitfalls they may have encountered. Learning from other people’s mistakes can help make your transition into aided flight much more safe and seamless.”

With proper training and proficiency, NVGs can be a powerful safety and operational tool. Without it they can be a disaster waiting to strike. “I was surprised at how dramatically NVGs increased my overall situational awareness on nearly every night flight,” Johnson stated. “But be aware of the limitations of NVG operations.” 

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

Photo by Airman 1st Class Stacia M. Willis



***Like any piece of technology NVGs need to be tested to make sure they are performing up to acceptable standards.***

### EFVS and SVS

Other ways of seeing in the dark include Enhanced Flight Vision Systems (EFVS) and Synthetic Vision Systems (SVS). Each works differently, but they provide similar results. EFVS systems usually provide a picture of the outside world derived from either Forward Looking Infrared (FLIR) or millimeter wave radar. FLIR is also considered a night vision technology, but is generally more expensive than Image Intensifier (I<sup>2</sup>) technology. It does have the benefit of being able to see through clouds and other obstructions where I<sup>2</sup> systems cannot.

SVS is a view of the outside that is generated based on GPS positioning and a topographical database. SVS is by far the most accessible of the technologies, as it has been built into many avionics suites and even into mobile apps. But SVS is a “garbage in, garbage out” system, meaning that it’s only as good as the database it runs on and the GPS location data it has. Both must be completely accurate for the system to be accurate.

As databases get better and GPS accuracy improves with programs like Wide Area Augmentation System (WAAS) and Local Area Augmentation System (LAAS), SVS has tremendous potential to offer safety improvement at a reduced price.



## The Dark Side of Maintenance

Alas, gone are those glorious days when the sun rose at roughly 0530 and set at around 2030. The Earth keeps merrily on her orbital trek and we find that the day suddenly has markedly less *day* in it. And while work will undoubtedly slow down as seasonal aviators opt to stock and stow their vessels, there is always work for aviation maintenance technicians.

Aircraft maintenance is inherently a risky business with technicians frequently being required to work in dark, tight, or even fully enclosed spaces to get the job done. The shorter days of winter only exacerbate the situation as our body's natural tendency to wind down in those melatonin-starved hours, coupled with the often unrelenting drop in temperatures, disrupt our natural rhythms. The end result is a whole host of human factors issues to include fatigue, stress, distraction (did I leave the coffee machine on?), agitation, and complacency. And when a tired, cranky, distracted, cold, and stressed-out person has to work on an aircraft — well, you can see how that might become a safety hazard.

### Chill Out, Thaw Out, and Rest Up

An old Sergeant I knew claimed flexibility was the key to airpower. I think that preparation is the real key to airpower. Meaning: take the time to adequately plan out your day taking into account what tools you'll need (an area heater to keep you and your tools warm?), the circumstance(s) that best lends itself to achieving success (extra lights for when it gets dark?), and building in a small contingency for "just in case." I call this last one the *Star Trek* "Scotty" maneuver. An aircraft owner has a problem with magnetos? You know that, under the best of circumstances, you can probably get the aircraft back to health in five hours. Allow for a full day. Maybe even a day and a half. That way when the temp drops to 38 degrees in your hangar and you can't feel your fingers anymore, you are much more obliged to go get warmed up rather than just "fight through it." If everything goes well and you finish the job early, all the better.

Adopt a checklist/double-check mentality in every task — regardless how small — even if you have done it "a hundred times before." Never rely on just your "corporate knowledge" and memory. Going into your day with an idea of what you plan to get done, with everything laid out and ready, takes off a

lot of the burden from the start. It changes your day from reactive (i.e., stressful) to proactive which is where you want to be. Once you have taken the extra bit of time to prepare your day, you can just "chill out" and do what you do best — work the problem.

Back to that space heater — sometimes it is just no match for the arctic temps a nor'easter can blow in. Dark and cold go hand-in-hand; that being said, mitigate those drops in mercury by making sure your body is in peak condition to handle the cold. This means wearing properly layered thermal clothing, eating a balanced and nutritious meal, properly hydrating (coffee does *not* count), and being cognizant of which medical conditions or drugs might make you more sensitive to cold (e.g., high blood pressure medicine).

Limit direct skin exposure. This is the tricky part, as some maintenance issues require delicateness and dexterity that even the best gloves can prohibit. If this is the case, make sure you are set up to execute the task well before you take off those protective mitts. As soon as you start feeling the ominous tingling set into your fingers, go thaw out. Numbness is one of the early stages of frostbite and/or hypothermia, which can have vast negative effects on your work and more importantly, your health.

Last, one of the things the dark is good for is sleep, so get plenty of it. A good night's sleep is paramount for good health, alertness, sound decision-making skills, and memory retention. Lack of sleep has been associated with heart disease, diabetes, and stroke, and can cause irritability, anxiety, and impairment to nearly the same levels that alcohol can. With all that in mind, make sure you have rested up and are fog-free before you start your day. The fatigue section at [www.humanfactorsinfo.com](http://www.humanfactorsinfo.com) offers plenty advice on fatigue and how to manage it.

As we swap out our cargo shorts for coats, it is important to realize that winter maintenance is far more austere an endeavor. Hopefully these quick tips can help you make the best of the dark side of doing business.

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



## Learn from the Past, Improve Safety in the Present

“Those who cannot remember the past are condemned to repeat it,” says the age-old adage. In the case of aviation accidents, the consequences of forgetting could be fatal.

The FAA’s one-of-a-kind online safety library capturing “lessons learned” from some of the world’s most historically significant accidents (<http://lessonslearned.faa.gov/>) is keeping the knowledge of the past alive. Quite literally, in fact, as each module relies heavily on multimedia to educate and engage today’s aviation community. Creative combinations of videos, animations, and photographs make the information easy to follow and understand in just 30 minutes, even for the aviation novice.

Some of the accident modules relate to this issue’s night operations theme. One such example is Comair Flight 5191 in Lexington, Ky. The crew of this ill-fated Bombardier CL600 lined up and attempted a night takeoff from a closed runway designed for daytime VFR general aviation traffic. Cockpit distractions and the inability to heed red flag warnings from airport marking and lighting cues were cited as contributing factors to the crew’s lack of situational awareness and ultimately, their decision to takeoff with only 3,500 feet of runway.

Last April, six new accident modules were added to this lessons learned library, including the Miami DC-8 accident in 1997, the Concorde Paris accident in 2000, and the 777 Heathrow accident in 2008. That brings the collection to 76, with almost 20,000 subscribers; impressive for an initiative that began with the release of 10 modules just six short years ago.

Dan Cheney, FAA Safety Program Manager, has been there since the beginning, initiating the effort to capture lessons learned from the past to improve aviation safety in the present. Dan explained that his experience with the Paris DC-10 accident fueled his passion for this project. “That historic accident changed aviation in a number of ways, yet I watched the lessons learned fade with time. Knowledge that should be available widely became not available at all.”

Thus, the idea for the lessons learned library was born, with an objective of capturing and passing on valuable safety lessons. “We explain what led to the accident and what was done about it. No sensationalizing, no blaming. Just the facts. So, within minutes, someone not familiar with a crash at all will become completely fluent and able to explain it to others,” Dan summarized.



After creation, the modules then go through a few months of vetting before final posting. Content covers a wide range of operational, maintenance, and design issues, and is edited and critiqued by FAA employees, aviation industry experts, and other international regulatory authorities. Significant support and coordination ensures that the content is accurate, complete, and internationally relevant before final posting.

Tragedies can be timeless, and learning from the lessons of the past can help prevent future accidents from occurring under similar circumstances or for similar reasons. Future modules are slated to include historical safety content (e.g. cabin pressurization safety) as well as major current safety initiatives (e.g. shipment of lithium batteries).

As the lessons learned library continues to evolve and grow, the benefits may extend beyond transport aircraft. In fact, the National Transportation Safety Board (NTSB) notes that most general aviation (GA) accidents are attributed to the same causes that have been assigned to many previous accidents and often occur under similar circumstances. These “repeat accidents” suggest that lessons learned could also pay big dividends for improving safety in GA.

*Emily Harcum is a communications specialist with the FAA’s Aircraft Certification Service. She has recently started training in pursuit of her private pilot certificate.*

## Night Vision Lighting Discipline

As with most systems we trust to assist us in flying, pilots who regularly use night vision goggles (NVGs) may develop a certain degree of complacency with them. Awareness is one way to avoid complacency, so the purpose of this article is to encourage you to examine your “NVG lighting discipline” — that is, your NVG knowledge and your approach to using them.

Let’s start with the basics: What is acceptable to you as a pilot, and do you have the correct knowledge to back your decision?

From a big picture standpoint, do you believe degraded NVG performance is better than no NVG? If so, what is the basis for that belief? Many variables could lead you to think that a degraded NVG image is better than flying without NVGs. However, are you aware of how the degradation affects your NVG image, so that you know what you are *not* seeing? How does this awareness affect your NVG lighting discipline, or more importantly, how you fly with a degraded NVG image?

Some light leaks are bad enough to make it obvious that the NVG image is washed out. Others may not be so obvious, but will still affect the NVG’s image. What if you notice the leak in a high-illumination environment, such as a ramp or helipad with cultural lighting? If you have a questionable light leak, do you consider the effect of the leak given a minimum-illumination scenario? What are the potential hazards as a result of a subtle degradation of your NVG image? For example, subtle degradations, such as a minimal glare or blooming in the NVG image can mask terrain features or obstacles that would otherwise be visible in the NVG image. Another hazard is more subtle: the more you fly with a degraded image, the more likely it is that you will subconsciously consider it normal (habituation).

How do you deal with light leaks in the cockpit? If you discover a light leak or other NVG lighting issue on the nightly or shift-change preflight, do you report it to maintenance? What if you find it on preflight? Do you “work around” the light leak and try to mitigate it, and report it after the flight? How effective is your workaround, and how do you make that evaluation? What is your tolerance? Or, do you report it to maintenance immediately and exercise the relief of your Minimum Equipment List (MEL) if you are approved to use one?

Does your NVG lighting discipline change based on the type of flight and destination? If you are a helicopter air ambulance (HAA) pilot and your flight is from one hospital pad to another hospital pad, are you more likely to accept the potential effect of a light leak on your NVG image? On the other hand, are you more concerned with NVG lighting discipline if you are flying to a scene in the middle of a rural county on a moonless night, or maybe working with first responders who have no experience with HAA operations?

How effective is your NVG lighting compatibility preflight? Are you even aware of how to effectively accomplish this critical task? If the aircraft is parked on a brightly lit ramp or pad, the high ambient cultural lighting may make it difficult for you to perform an adequate visual check. You may have to settle for a visual sweep of the cockpit with the NVGs looking for hotspots, and understand that it may be the only way of detecting small cracks, chips, or debonding of filter material on instrument faces. If you notice a hotspot or see glare in the NVG with the hotspot outside the NVG field of view, consider how it affect your NVG image in flight.

These are only a few of the questions that arise in the context of NVG lighting discipline. While there are probably “book” answers to most of them, the key to safety in any operation is your judgment and the decisions you make as a result.

International Security Assistance Force photo



*Clark Davenport is the FAA Rotorcraft Directorate NVIS Programs focal and human factors flight test specialist. He has worked civil rotorcraft NVIS certification programs for 12 years.*

*Shawn Hayes is an Aviation Safety Inspector assigned to the Airman Certification and Training Branch (AFS-810). He is the NVG focal point for AFS-800 and has operated both rotary and fixed wing aircraft with NVGs in the military and civilian sectors since 1987.*



# Flight Forum

## Drone Zone

I've been asked to do a demo of my drones (DJI type multi-copters, 3 - 5 pounds) at a very popular airport gathering. The airport manager and the event rep were thinking of the demonstration taking place at a flight area separated from the public by an unpassable ditch near the hangars. The nearest flying aircraft would be several hundred yards distance from the runway. The traffic pattern at one active runway would encompass the "drone" area but would still be very distant. My altitude would be 100' or so and not over the crowds or parked aircraft.

I am a private pilot and do have my AMA membership card. There would also be a spotter with a hand-held transceiver on the airport's frequency next to me while flying. I just wanted to make sure this was authorized as I really want to promote responsibility and safety, and make sure I do this correctly.

— Jamie

*If your operation is conducted in accordance with section 336 of the 2012 Federal Aviation Administration Modernization and Reform Act (Public Law 112-95), then the FAA would not levy additional requirements. The FAA has also produced an interpretive rule of section 336. For further information regarding possible ways to operate your UAS outside of section 336, the FAA has an educational letter in FAA Notice 8900.268 which explains alternate methods to operate UAS. All of this information can also be found at <http://faa.gov/uas>.*

*Also for the future, the FAA is set to launch an easy-to-use smartphone app called B4UFLY that helps UAS operators determine whether there are any restrictions or requirements in effect at the location where they want to fly. Currently it is in testing but once it is fully operational, key features will include: a clear "status" indicator that immediately informs the operator about their current or planned location, information on the parameters that drive the status indication, a "planner mode" for future flights in different location and informative, interactive maps with filtering options.*

## Oops!

*In the September/October 2015 edition of the magazine there is a small error at the top of page three of ATIS. The conclusion of the sentence states "...the leading casual factors for loss of control accidents." This should read "...the leading causal factors for loss of control accidents." We apologize for any confusion that this might have caused.*

*Under "Checklist" of the same edition, Head Editor Susan Parson discusses the new, 2015 edition of the Instrument Procedures Handbook. The link that we provided currently still only goes to the 2014 edition. The new IPH is still in review with anticipated release by the end of this year. At the time we were putting the magazine together, we believed the latest version would release during the same time frame as the magazine.*

## Mr. Clyde Shelton — DPE Extraordinaire!



Photo courtesy of Marty Sellers

Over the Labor Day weekend this year, an event happened in Alabama that set a record for all FAA Designated Pilot Examiners (DPE) everywhere. Mr. Clyde Shelton, a DPE for the Birmingham Flight Standards District Office, recorded his 10,000th pilot certification examination on Saturday, September 5, 2015.

Mr. Shelton has been conducting pilot certifications since 1987 and the previous record for pilot certifications was Ms. Evelyn Johnson (Nashville FSDO) who recorded something in the area of 9,500. He is pictured second from right and the pilot applicant is the third from the right. Congratulations and "well done" to Mr. Clyde Shelton!

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

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



## The Beauty of Flight at Night

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*When I opened my eyes I saw nothing but the pool of night sky, for I was lying on my back with outstretched arms, face to face with that hatchery of stars.*

— Antoine de Saint-Exupéry, *Wind, Sand and Stars*

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Though I am admittedly wary of the potential for crossing paths with nocturnally active critters (see Checklist), there is still something magical about night flying. Whether in the night skies as a GA pilot or as an airline passenger on a red-eye flight across the country, there's a lot to like about what I call "after hours" aviation. Here's a short list of my favorite things.

### Alone Is Not Always Lonely

We all know it's a Big Sky, but it can still be pretty congested with fellow GA pilots (especially around high-activity GA airports) on a nice flying day. The twilight and evening hours, though, are usually a very different story. When most other pilots have tucked their planes into tiedowns or hangars and retired to home and hearth, there's less competition for space in the pattern, and less waiting for takeoff and landing opportunities. And, once aloft, I've often had the sense of being the only one flying during the night hours.

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**There's a lot to like about "after hours" aviation.**

### Less Clatter and Chatter

Less congestion around airports and fewer planes in the sky translate to less chatter on the radio. I'm an extravert by nature, and enough of a geek to enjoy listening to (and participating in) the aviation-speak cross-talk most of the time. Still, it's awfully nice to get an occasional break from the din of the madding crowd. How peaceful it is to fly along in the serenity of near silence, a quiet pierced only by the necessary background "white noise" of your trusty engine.

### Night Lights

It's hard to imagine now, but I found it challenging to spot traffic and runways in my student pilot days. During the daytime, it can still be tough to see all the traffic you need to avoid. Night flying makes

that task much easier, because a properly lit aircraft (especially one with strobes) is nearly impossible *not* to see against the backdrop of the inky black sky. (Note: As I wrote in Checklist, though, birds and bats are a different matter. I guess they didn't get the memo on the use of position lighting.)

Darkness dramatically simplifies the task of finding the target airport and runway. I'll never forget the sense of giddy satisfaction when, on my first foray into "after hours" aviation, I discovered that I could light up the runway with just a few clicks of the mic. The airport beacon helps as well. On airline flights at night, I sometimes make a game of seeing how many airports I can spot via the flashing welcome of green-and-white beacon lights.

### Power of Perspective

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*One cannot live any longer without poetry, color and love.*

— Antoine de Saint-Exupéry, *Wind, Sand and Stars*

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I've never been in the night sky without appreciating its power to provide a new and beautiful perspective on the world. In urban areas, the cloak of darkness transforms surface sprawl into a patchwork of scintillating lights. On airports, the multi-colored lights can make it easier to get around on the ground — provided, of course, that you have a firm grasp of what each color conveys.

And what can I say about the aviator's night view of the sky? Saint-Exupéry speaks of the "hatchery of stars," a view that contributes to the "poetry, color, and love" we all crave in this life. I recently stumbled on a YouTube video called "The Unbearable Beauty of the Night Sky" (<https://www.youtube.com/watch?v=pV58YptFTK0>). While few of us will ever get the opportunity to see the spectacular star fields from the large telescopes situated in the Chilean Atacama desert, we aviators do have a unique ability to see the night sky from a powerfully different perspective. May we never take that privilege for granted.

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

## Shawn Hayes

*Aviation Safety Inspector, Airmen Certification and Training Branch*



**Shawn Hayes**

As an enlisted Army soldier, Shawn Hayes one day found himself on a military exercise in a muddy rice paddy in South Korea with rain pouring down. While thinking (as most of us would) that there must be a better way to make a living, his inspiration came from the skies — literally.

As Shawn tells the story, “we were walking through the mud when we heard a pretty loud racket. A helicopter was landing right in the middle of our assembly area to drop someone off. As that person walked away, the pilot got out of the aircraft. He had shiny boots, aviator sunglasses, and above all else, he was clean and dry! I looked at my friend and told him that I had found that better job.”

His friend laughed, but Shawn followed up on the inspiration and spent the next 23 years flying on active duty for the Army. “It was a great experience that I would not trade for the world,” he reflects.

Shawn also became interested in fixed-wing airplanes, so he used part of his educational benefits to earn private and commercial certificates for single and multi-engine airplanes, along with his instrument rating. He later became an instructor.

“I had so much fun earning those certificates, and I decided I wanted to do more — and not have to pay for it. So I applied to the Army’s fixed-wing program, and I got to fly Army King Airs for a several years.”

After retiring from the Army, Shawn moved home to Buffalo. While taking a routine part 135

checkride, the Flight Standards District Office (FSDO) operations supervisor gave him a new opportunity.

“At the end of the ride he looked right at me and said that I had done very well as I always did, and then asked me why I didn’t work for him. Being the jokester that I am, I said, ‘because you have haven’t asked me yet.’ He didn’t miss a beat — he said ‘I think I just did.’ The rest, as they say, is history.”

In 2010, Shawn became a principal operations inspector with oversight of air carriers certificated under 14 CFR part 135 to include helicopter air ambulance operations for several operators in the Rochester FSDO area. He was also designated as a Flight Standards Inspector Resource Program check pilot for night vision goggles (NVGs). In this capacity, Shawn travelled across the country to conduct NVG evaluations for operators nationwide. He is currently assigned to FAA’s General Aviation and Commercial Division’s Airman Certification and Training Branch.

Shawn has had experience flying with NVGs since 1987. At the FAA, he serves as the NVG focal point for his division to provide advice on issues pertaining to NVG operations under 14 CFR parts 61, 91, 133, 137, and 141.

“The biggest issue that I see flying with NVGs pertains to training,” explains Hayes. “The regulations don’t have any minimum training times. It’s all based on the proficiency of the person being trained. Owners and operators should be aware that it may take a little longer than they expect for their personnel to be comfortable, and more importantly, proficient, in operating with NVGs. Remember, currency does not equal proficiency.”

To get to proficiency, Shawn stresses that pilots need to fly often to build a substantial experience base. It’s also good to fly with a safety pilot if it has been a while since you have flown at night. The main thing is to “get as much night exposure as you can.”

If you are attending a FAA Team safety seminar or flying the skies around Buffalo, look for Shawn and say hello.

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



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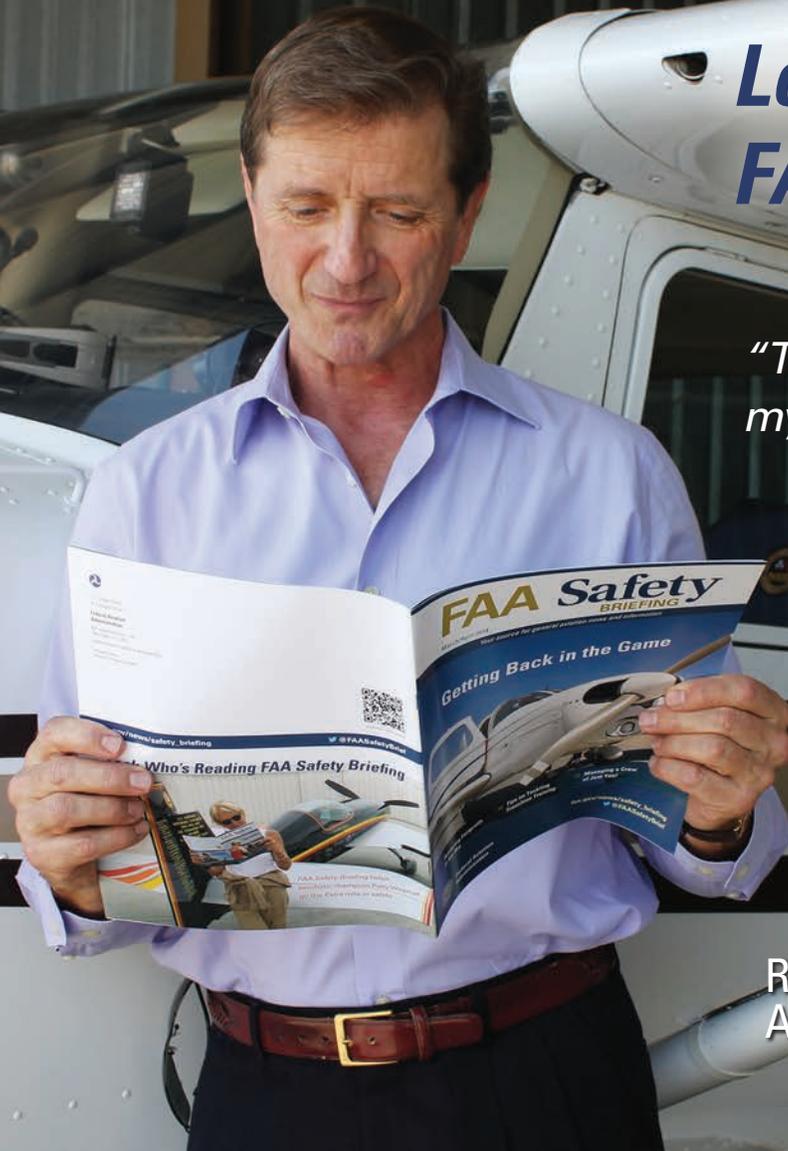
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