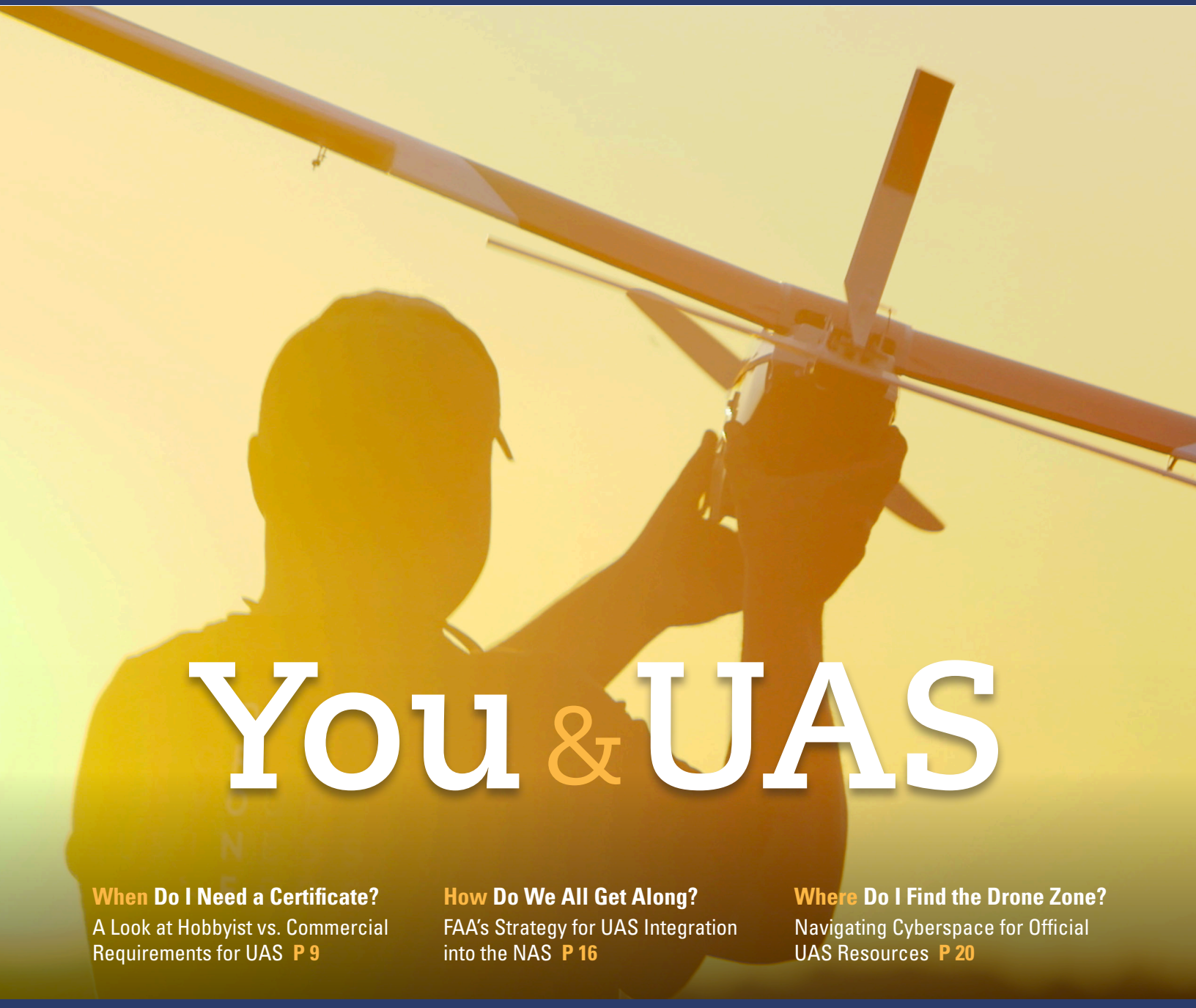
FAA Safety BRIEFING

May/June 2017

Your source for general aviation news and information



You & UAS

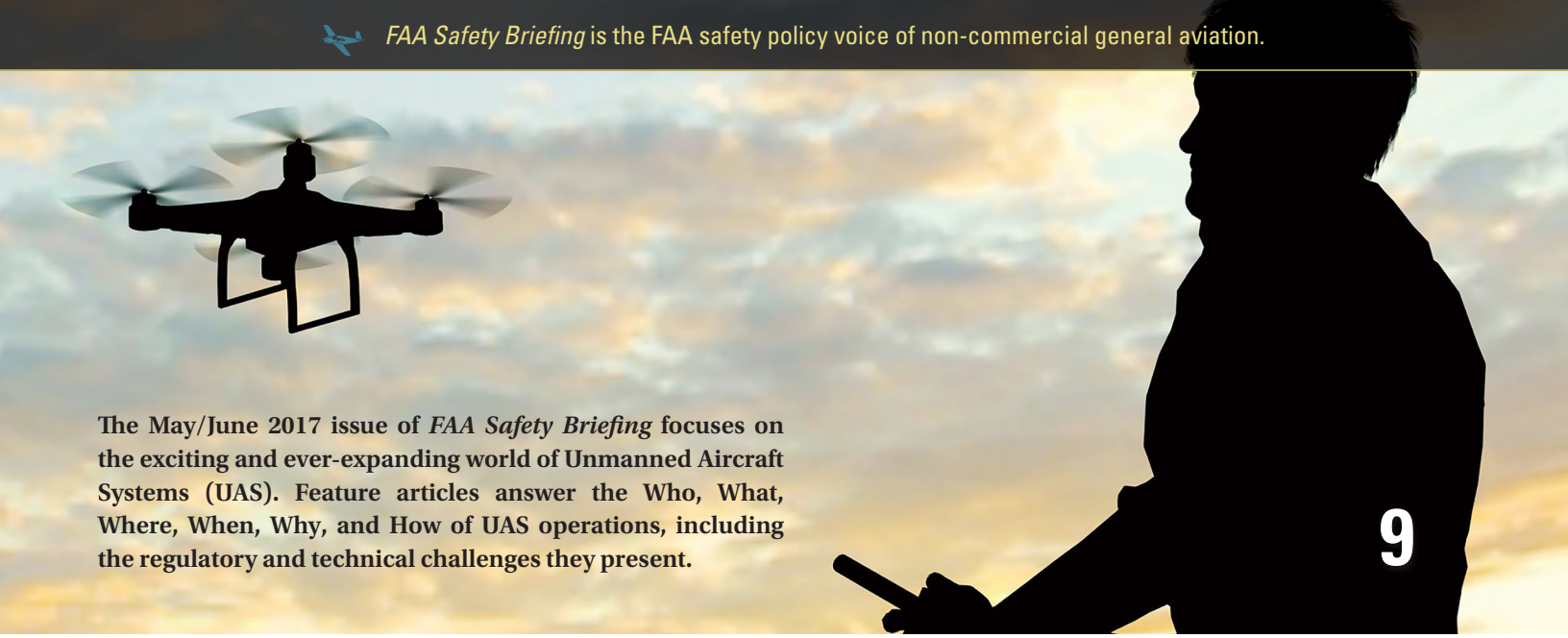
When Do I Need a Certificate?
A Look at Hobbyist vs. Commercial Requirements for UAS P 9

How Do We All Get Along?
FAA's Strategy for UAS Integration into the NAS P 16

Where Do I Find the Drone Zone?
Navigating Cyberspace for Official UAS Resources P 20

Federal Aviation Administration

faa.gov/news/safety_briefing
@FAASafetyBrief



The May/June 2017 issue of *FAA Safety Briefing* focuses on the exciting and ever-expanding world of Unmanned Aircraft Systems (UAS). Feature articles answer the Who, What, Where, When, Why, and How of UAS operations, including the regulatory and technical challenges they present.

Features

Departments

JOHN DUNCAN
DIRECTOR, FLIGHT STANDARDS SERVICE

Step by Step

You don't have to look very hard to notice that Unmanned Aircraft System (UAS) operations are rapidly increasing in number, technical complexity, and sophistication. This expansion has created a number of regulatory and technical challenges for the FAA and its parent organization, the Department of Transportation (DOT).

Here's the goal: regulatory agencies need to fully integrate UAS into the National Airspace System (NAS) in a way that allows UAS to safely and harmoniously operate side-by-side with manned aircraft, occupying the same airspace and using many of the same air traffic management systems and procedures. As with any journey, getting from the current state to the desired destination, is best accomplished gradually.

Getting Started

The integration of UAS started and, to a large extent, continues with practices that largely rely on operational segregation to maintain the safety of the NAS. Because there is a great deal we don't know about UAS, incremental introduction through these "accommodation" practices were the most logical place to start to ensure that we maintain the safety of people and property both in the air and on the ground.

One of the earliest steps was the selection of several UAS Test Sites in 2013 to conduct UAS research and help us ask the right questions. Another important step was the promulgation of the first two FAA rules specifically for UAS:

- In December 2015, we published an Interim Final Rule on Registration and Marking Requirements for Small Unmanned Aircraft (14 CFR part 48). This rule applies to UAS weighing over 0.55 pounds (250 grams) and under 55 pounds.
- In June 2016, we published the Small UAS regulation (14 CFR part 107). This rule, which became effective on August 29, 2016, enables the conduct of routine civil small UAS operations within visual line-of-sight (VLOS) over unpopulated areas.

Building Blocks

Security: Having completed these basic rules, the FAA is now engaged in expanding UAS operations. A key step is ensuring we are doing so in a safe and secure manner. We are working this year with industry and our security counterparts in government to develop standards and rules that will allow electronic identification and tracking of UAS at the local law enforcement level, and establish a process for property owners and those who oversee critical infrastructure to restrict flight over those properties.

Enhanced Operations: This year, the FAA will be working on an amendment to part 107 that will allow operations over people under certain operational conditions, as well as open opportunities for night operations and swarming.

Full Integration: While these activities offer a significant improvement over the initial case-by-case authorization process, they are still a form of "accommodation" rather than integration. That's why the Flight Standards Service and other FAA entities are actively exploring options for getting to full integration of UAS operations. That means refining our existing regulatory framework to accommodate operations for unmanned aircraft and any other aviation innovations.

Integration Strategies and Tools

To accomplish these goals, the FAA is supporting parallel efforts in research, outreach, standards development, and planning. These efforts involve a wide range of players, to include other federal agencies, industry, and the operator community working to overcome technical, regulatory, and operational challenges. To name just a few:

- Ensuring that a UAS can maintain a safe distance from other aircraft.
- Performance-based standards to ensure safety, efficiency, and reliability.
- Policy questions including physical and cyber security.

Clearly, we have a lot to do – and that is in addition to continuing our standards, certification, and continued operational safety work for manned aircraft operations. But we have made a solid start toward the ultimate goal of full integration of UAS into the NAS.

FAA SAFO Covers Proper Procedures for ADS-B Out Equipment Testing

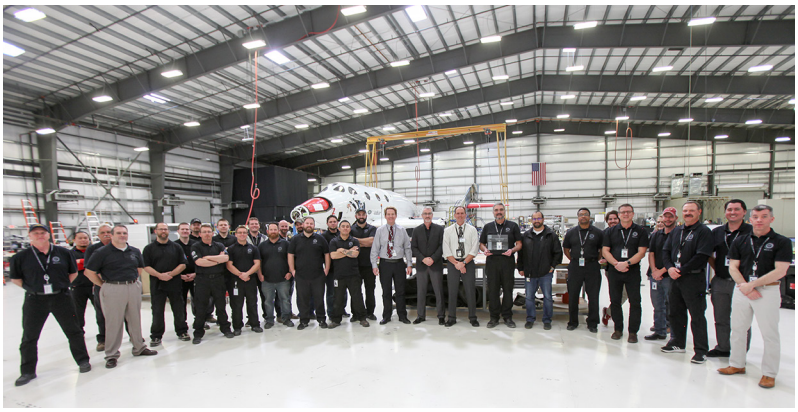
The FAA recently issued a Safety Alert for Operators (SAFO) that informs personnel involved with ground testing of aircraft ATC transponders, and ADS-B Out equipment, about the importance of adhering to proper test procedures, and the hazards associated with improper testing. The FAA has received reports of transponder and ADS-B Out system ground test events in which information, including simulated altitude, was transmitted from the test aircraft and received by aircraft in flight. The FAA recommends that anyone performing these tests evaluate the adequacy of their procedures and adhere to proper test procedures to prevent uninhibited system transmission that may affect ATC operations, or airborne aircraft.

For more information on this SAFO, go to http://1.usa.gov/2mpwLpy.

Commercial Space Operator Earns AMT Diamond Award

For the first time, an FAA-licensed commercial space operator earned the agency's Aviation Maintenance Technician (AMT) Diamond Award of Excellence. Virgin Galactic had 100 percent of its 33 mechanics receive an individual William (Bill) O'Brien AMT Award in 2016.

The AMT Awards Program is managed by the FAA Safety Team (FAASTeam). In October 1991, FAA Flight Standards Service's Aircraft Maintenance Division determined there was a need for an incentive program to encourage AMTs and employers to participate aggressively in available initial and recurrent maintenance training/courses. Through the AMT Awards Program, the FAA recognizes eligible technicians and employers by issuing awards to those who receive, or promote and foster, initial and recurrent training.



The FAA is aware that the employer bears the short-term loss of employee productivity and other costs associated with training. To increase the incentive for management to fund training under the award program, the FAA also recognizes employers who take a proactive role in training their technical workforce.

The program has several levels, or phases, of recognition for both AMTs and their employer. AMTs obtain an FAA Certificate of Training upon successful completion of the program requirements. Employers can obtain a Gold or Diamond Award of Excellence yearly depending on the percentage of their employees receiving awards.

For more information, go to www.faasafety.gov/AMT/amtinfo.

General Aviation Survey Needs Your Help

The 39th annual General Aviation and Part 135 Activity Survey (GA Survey) for reporting is now underway. As always, your participation is important. If you receive an invitation to participate, please respond, even if you did not fly your aircraft in 2016. The GA Survey is the FAA's primary source of information about the size and activity of the general aviation and on-demand part 135 fleet. Previous years' survey results can be found at http://1.usa.gov/24QSfh7.

Please be assured that your responses are kept confidential. The information collected will be used only for statistical purposes and will not be released in any form that would reveal an individual participant. Tetra Tech is an independent research firm that conducts the survey on behalf of the FAA. You can contact them with questions at 1-800-826-1797 or via email at infoaviationsurvey@tetratech.com.

Easy Automated Alerts

The FAA Flight Service DUATS II web portals 1800wxbrief.com and duats.com provide advanced tools tailored to optimize your flight planning, deliver pilot weather briefings, and monitor new or

modified adverse conditions. Plain language and interpretation tools are available to help describe weather conditions essential to the safety of your flight. Email and text messages deliver the alerts prior to takeoff and cockpit satellite communications devices receive updates while in-flight.

Register to receive automated alerts and updated weather briefings for your flight, and get automatic notifications when conditions change between the time of filing your flight plan and departure or arrival time. This capability allows you to file early, and receive an email or text if the flight plan route or departure time weather and aeronautical information change. Stay informed on your mobile device when new or adverse conditions arise, such as a severe weather forecast or observation, an airport closure, Notice to Airmen, or a Temporary Flight Restriction.

Automation available gives you the control to:

- Activate and close a Visual Flight Rules (VFR) flight plan online or with an interface app on a mobile device;
- Receive a notification for Instrument Flight Rules (IFR) when your flight plan was delivered and accepted;
- Receive new or modified adverse conditions from the time you file until the time your flight plan is closed;
- Receive a reminder to close your flight plan and the ability to close it by merely clicking a link or replying to the email reminder; and,
- Benefit from enhanced search and rescue in an emergency such as faster response times and reduced search area.

Remember, only pilots who register get automated alerts. Find out more about these free online features at www.1800wxbrief.com and www.duats.com, or check with your third-party provider to make easier, safer flight decisions.

New FAASTeam Safety Video Series

A new "Let's Take a Minute for Safety" video series of short general aviation safety messages is produced by FAA Safety Team (FAASTeam) volunteers from Southern California. It covers loss of control safety enhancement topics and use of the FAASafety.gov website.

Safety Enhancement Topics

May: AOA and V_{MC} Training
Learn more about how Vmc training and Angle of Attack can help prevent loss of control accidents in the event of a power loss.

June: Startle Response
Training and preparation can help pilots manage the startle response and effectively cope with unexpected events.

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

U.S. Department
of Transportation

**Federal Aviation
Administration**

ISSN: 1057-9648
FAA Safety Briefing
May/June 2017
Volume 56/Number 3

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

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

CONTACT INFORMATION

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

Comments or questions should be directed to the staff by:

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

SUBSCRIPTION INFORMATION

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

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

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

Take a safety minute and check out the playlist on the FAA's YouTube channel. Go to http://bit.ly/2n1te2E to watch.

AC Update Pending for Part 141 Pilot Schools

There is an update pending to the Advisory Circular (AC) for part 141 pilot schools. Since the last update in 1993 to AC 141-1, Pilot School Certification, there have been several amendments to part 141 of Title 14, Code of Federal Regulations (14 CFR). The events of 9/11 also required a change involving training of foreign nations.

The FAA understands that because the AC was not up-to-date, it has caused confusion — and in some cases, misapplication of part 141. The public comment period was scheduled to close April 3, so the new AC should be published soon.

This is an exciting time for part 141 pilot schools and provisional pilot schools.

MICHAEL BERRY, M.D.
FEDERAL AIR SURGEON

Remotely Fit for Flight

One of our core missions in the Office of Aerospace Medicine is determining if airmen are fit for flight. We do this through our medical certification process. If you meet the standards established for the class of medical certificate you are applying for on the day of your exam, you are issued a medical certificate. This often leads to the mistaken impression by airmen that they only have to be medically fit to fly at the time of their physical examination every X number of years (depending on the class of medical certificate).

This is a common misunderstanding, but in reality, your personal medical certification, or self-assessment of medical fitness, should take place before every flight. This is clearly established by 14 CFR section 61.53, which prohibits airmen from flying if they "know, or have reason to know, of any medical condition that would make them unable to meet the requirement of their medical certificate," or, for flying operations that do not require a medical certificate, "knows or has reason to know of any medical condition that would make the person unable to operate the aircraft in a safe manner." This regulation also says the same thing about taking medications that would be disqualifying. So it's better to think of medical certification as similar to pilot certification. Every two years you are required to have a flight review conducted by a CFI, but before every flight, you're expected to make sure your skills are up to task for the flight. In this analogy, the Aviation Medical Examiner (AME) is like your CFI. The AME provides an independent review every so often to back up your regular review before every flight.

How Does this Apply to Remote Pilots?

Part 107, the commercial small UAS (sUAS) operating rule, contains a regulation very similar to 14 CFR section 61.53. Section 107.17, Medical Condition, prohibits operation of a sUAS by any person if he or she knows, or has reason to know, that he or she has a physical or mental condition that would interfere with the safe operation of the sUAS.

So what does this mean for a remote pilot?

It means that the burden of medical certification or assessment of medical fitness falls entirely on you, the pilot. No doubt many pilots are just fine with this compromise. But what should you consider when self-certifying? A good place to start would be the same place I would recommend to a manned aircraft pilot, the I'M SAFE Checklist: Illness, Stress, Alcohol, Fatigue, and Emotion.

The I'M SAFE checklist is a great tool to use before every flight, manned or not. By evaluating each factor honestly, you can develop a good snapshot of your fitness for flight at that time. But what about more general health issues? How should remote pilots accomplish their medical fitness self-assessment?

Resources for the "Remote" Pilot

Places a remote pilot, or any pilot for that matter, can look for guidance is Chapter 17 of the *Pilot's Handbook of Aeronautical Knowledge* (https://go.usa.gov/xXGmD), and Chapter 8 – Medical Facts for Pilots in the Aeronautical Information Manual (AIM), (https://go.usa.gov/xXGmk). While some of the content isn't relevant to a remote pilot (hypoxia isn't nearly as much of a concern, just to cite one example) concepts relating to pilot impairment, vision, and fatigue are still very pertinent. The FAA Guide for Aviation Medical Examiners is also a great place to look at how the FAA deals with certain conditions and medications. While the AME Guide is designed for doctors, it is also a great resource for pilots. It is freely available on the FAA website (https://go.usa.gov/xXGmu). Since the AME Guide is developed for manned flight, some content is not entirely applicable for a remote pilot, but it's a good place to start.

Some Advice

So how would I recommend a remote pilot evaluate their medical fitness to operate an aircraft? When considering the medical fitness of a manned aircraft pilot, we focus on potential causes of incapacitation, both subtle and sudden. Any condition or medication that can cause a loss of consciousness or a degradation of mental function should be treated as potentially disqualifying. Just as with a manned aircraft, your primary concern should be protecting those on the ground and other National Airspace System (NAS) users. Beyond that, I suggest you focus more on the mental and vision aspects of impairment than on the physical ones. The physical environment of a UAS operation is generally less demanding than that of a manned aircraft, but factors like decision making, reaction time, and attention are every bit as critical. Vision is also very important, because keeping your UAS separated from other traffic can be more of a visual challenge in many cases than manned aircraft see and avoid.

Ask Medical Certification

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

Q1. I am a licensed FAA Private Pilot who has undergone a medical procedure known as a drug infusion system pain plant pump within my abdomen. The pump contains 30.0 mg/ml of morphine with a drip dose of 10.123 mg/day. The refill interval is 112 days. Does this medical situation preclude passing any further Class 3 medical exams? This is a very miniscule amount of drug application.

A1. Yes, use of morphine is medically disqualifying. The reason your dose is miniscule compared to oral dosing is that you are absorbing the drug directly into your system rather than having it first pass through the stomach and then liver where a significant portion of the oral dose is wasted.

Q2. If cataract surgery is performed and the result is 20/20 vision, are you still eligible for a Class II Physical?

A2. You would be eligible for a Class 2 medical certificate 1-3 months after surgery, as long as your visual acuity is stable, and there are no complications such as residual glare. We would need to see the operative report and a current status report from your eye surgeon, as different types of lenses require different follow-up. Use of unifocal, non-accommodating intraocular lenses is not acceptable.

Q3. Hello, I was diagnosed with large B cell, non-Hodgkin's lymphoma cancer. I underwent an aggressive chemotherapy treatment with no radiation or surgery. I had just passed my first class medical a month before finding the cancer. As of two weeks ago my final PET scan showed that I was in complete remission and cancer free. I was never told that I couldn't fly, but I had dismissed myself nevertheless. I had heard unofficially that cancer was not a disqualifying condition but the treatment was. What procedure should I proceed with to obtain my first class medical? It has been over seven months since my first class medical examination. I was a week and a half away from taking my multi engine ATP checkride. And now I would like to get back at it so I can get on with my flying career.

A3. Thank you for making the appropriate decision not to fly while undergoing cancer treatment. You should see your AME for a new, first class medical exam and bring the following to your appointment: all records of your lymphoma diagnosis and treatment, your final PET scan results, and the current status report from your treating physician. Your AME will need to defer this exam, but after your initial special issuance, usually your AME will be authorized to issue in the future as long as your condition remains unchanged.

Q4. I have had open-heart surgery, a triple bypass, I was out of the hospital in three days and have had a near record recovery. I am taking Carvedilol, Rosuvastatin, and aspirin as a blood thinner. I am in excellent health and am in cardiovascular rehab and doing very well. My heart surgeon said everything looked really good inside and that I was just heredity-disposed to blockage. My cardiologist said if I hadn't taken such good care of myself, I would have had this surgery 10 years ago. Since I have had all of this corrected and am leading a healthy lifestyle, what are my chances of passing a class III medical, and what would I be looking at for renewal if I were to obtain one?

A4. Even with "near record recovery," the risk for complications remains high during the first six months after surgery. That is why we recommend a six-month observation period before seeking special issuance certification. You will need to provide your medical records, to include your cardiac catheterization films (digital format), and a nuclear stress test at six months. It sounds like your chances are excellent for special issuance.

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

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

SUSAN PARSON

The Dawn *of* Drones

Why We All Need to Care about UAS

Photo courtesy Drone360 magazine, Drew Halverson

I am always fascinated by the diversity of opinions and reactions to change, especially to advances in technology. Such diversity is particularly apparent in aviators' reaction to the advent of Unmanned Aircraft Systems (UAS), more commonly (and easily) known as "drones."

It seems to me that pilots generally fall into one of three camps when it comes to opinions on drones.

The Doomsayers

> *There's been resistance to every new technology that's ever been introduced. When books came out hundreds of years ago, there were complaints that it would destroy the oral tradition. Some of those fears were justified, but it didn't stop the rise of the written word. And books have proven to be incredibly useful.* — Jeremy Stoppelman
>
> *Once upon a time, sound was new technology.* — Peter Jackson

In the case of UAS, those in the "doomsayer" department want nothing to do with drones, and they make dire predictions about several aspects of this technology:

Safety. Some of today's hangar flying conversations now include concern about the "likelihood," or even the "inevitability," of a mid-air collision with a mis-flown or, worse, a "rogue" drone. It's not hard to imagine any number of dire scenarios, everything from drone collisions with a family-laden GA aircraft to a large passenger airliner.

Possible? Anything is *possible*, but likelihood is a different matter because of the great care that safety professionals in this agency are putting into the development of regulations for the safe integration of UAS into the National Airspace System (NAS). The FAA investigates every single report of a possible drone collision with manned aircraft but, as of this writing, the FAA has not confirmed a single instance in which this scenario actually occurred.

Privacy. Drones do have the potential to invade privacy at an entirely new level. As I watched someone's drone buzzing around my neighborhood on a recent trip to Arizona, I realized how easy it would be for its pilot to drop in uninvited on my patio dinner party. While some people argue that privacy is passé in the era of share-all social media, it's fair to say that drones do bring a different dimension to privacy concerns. It is possible to opt out of social media and, if you are sufficiently motivated, to minimize your cyberspace presence. There is, however, no way the average individual can control the trajectory of a drone with a Peeping Tom pilot.

These issues are very real to all of us, and the FAA is working with other organizations and federal agencies engaged in recommended privacy guidelines.

Job loss. There are plenty of assertions that "real" pilots fly airplanes, along with plenty of predictions that drones will eventually put "traditional" pilots in the same category as dinosaurs. If that occurs, it's still likely to be some distance in the future. Also, bear in mind that even as new technologies make current occupations obsolete, they generally create job possibilities we can't even imagine today.

The Dozers

Once a new technology rolls over you, if you're not part of the steamroller, you're part of the road.

— Stewart Brand

If you look at the various strategies available for dealing with a new technology, sticking your head in the sand is not the most plausible strategy.

— Ralph Merkle

Nobody would accuse me of being a technophobe or a Luddite, but I confess to being among the dozers. I certainly don't see drones as harbingers of doom, and I do see and appreciate the many useful applications of UAS in myriad aspects of modern human activity.

That said, I count myself amongst those who take a yawning "meh" view of drones. I took the online course and eventually I will probably get a Remote Pilot certificate, but I was hardly the first in line for that credential. Similarly, I have merely paged past the ubiquitous advertisements for drones and, at most, paused only briefly in front of storefront drone displays.

As with virtually every technology that has emerged in the history of human activity, people do adapt and assimilate new tools. They then use these new tools to do not only old things in new ways, but also to do all kinds of new things that old technologies could never accommodate.

In defense of myself and my fellow drone dozers — you know who you are! — I hasten to emphasize that there's nothing wrong with lack of interest in actual drone flying, or in choosing to invest my flying dollars in aircraft that still need me to occupy one of the front seat positions. What we dozers do need to do, though, is to acquire and maintain appropriate situational awareness of drone developments. We should also make an effort to get better acquainted with enthusiastic drone drivers who, after all, share the thrall that the sky holds for anyone who flies.

The Dazzled

I'm interested in things that change the world or that affect the future and wondrous, new technology where you see it, and you're like, 'Wow, how did that even happen? How is that possible?'

— Elon Musk

Every time a new technology comes along, we feel we're about to break through to a place where we will not be able to recover. The advent of broadcast radio confused people. It delighted people, of course, but it also changed the world.

— James Gleick

I often joke that I am bilingual in English and Airplane, which is a language, a culture, and even a distinct way of life. In a similar way, there are aviators (including at least one member of the *FAA Safety Briefing* team) who are "bilingual" in their enthusiastic operation of both manned aircraft and drones.

The dazzle of drones has also drawn a whole new group of people into the aviation world, pilots who are the mirror image of those whose interest (at least for now) is limited to manned aircraft. Those dazzled by drones for both their recreational and practical uses may soon outnumber the ranks of "traditional" pilots. As of this writing, the FAA registry has issued an astonishing 52,000 Remote Pilot certificates. The number of registered drones in the FAA's Aircraft Registry already surpasses the number of registered manned aircraft. Again as of this writing, there are more than 750,000 registrations for unmanned aircraft, and only 209,000 registered manned aircraft.

The Denizens

If these numbers conjure thoughts of the Star Trek Borg's "prepare to be assimilated" domination of the universe, it may be for good reason. As with virtually every technology that has emerged in the history of human activity, people do adapt and assimilate new tools. They then use these new tools to do not only old things in new ways, but also to do all kinds of new things that old technologies could never accommodate.

As is also typical, people will adapt in different ways and at different speeds: while many of the "dazzled" took a direct leap into drones, others (like me) take a more deliberate course through the continuum of adaptation.

Regardless of your current "camp" or your pace and position on that continuum, the most important thing to remember is that we are all pilots, denizens of the same NAS who share the delight, the privilege, and the responsibility the sky gives to us all. Let us all act accordingly.

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

Learn More

FAA UAS Portal
https://www.faa.gov/uas

JAMES WILLIAMS

When Do I Need a Certificate?

A Look at Hobbyist vs. Commercial Requirements for small UAS

Last year, the FAA launched its long awaited Small Unmanned Aircraft System (sUAS) regulations with the new Title 14 Code of Federal Regulations (14 CFR) part 107. The immediate response from the UAS (more popularly called drone) community was: Do I need a part 107 Remote Pilot certificate for my operation? For the majority of us, the answer was: it depends, but probably no. For others, the answer is a clear yes. Here is a quick look at when you need a certificate and when you don't. We will also offer some tips for each type of operation.

Just For Fun

For the majority of those who fly drones as a hobby, part 107 doesn't change anything. You need to meet the applicability of part 101 and follow the basic guidelines outlined below, but as long as you don't want compensation (compensation is a complex issue — for more information see the article referenced later) and can meet the guidelines, no certificate is required.

The basic guidelines state that you:

- Register your UAS
- Always keep your UAS within sight
- Fly at or below 400 feet AGL (or higher if permitted by approved, community-based model club guidelines)
- Never fly near other aircraft, especially around airports
- Never fly over people
- Never fly over stadiums or sports events
- Never fly near emergency response events
- Never fly under the influence
- Always be aware of surrounding airspace and airspace requirements

For further advice on flying for fun, we turn to Ken Kelley, the FAA Safety Team's (FAASTeam) Lead for UAS Outreach. "The most common mistake we see with new, small UAS (sUAS) users is that they get their new sUAS, charge it up, and go fly without knowing if they are near an airport or what the regulations and local statutes say about sUAS flights," Kelley explains. "Another issue is that all sUAS must be registered with the FAA prior to any outside flight operations. This is why I always recommend that people just starting out first go straight to faa.gov/uas, then try to locate a local model aircraft or UAS club in their area," Kelley says. This is more than just good advice. If you're a hobbyist and not operating under part 107, Federal law requires you to operate within the safety guidelines of nationwide community-based organization. Kelley also notes that these clubs can be a great resource since they

Under part 107, a UAS may not fly above 400 feet unless it is operating near a structure like this windmill. In that case, a UAS may be operated within a 400 foot radius of the structure, including its uppermost limit.

are familiar with both model aircraft/UAS operations and your local area. "They can point you toward good flying spots, make suggestions that could improve your skills, and tell you where you shouldn't be flying to avoid trouble." It's important to remember that regardless of whether you hold a remote pilot airman certificate or not, you're still a pilot operating in the National Airspace System (NAS) and that comes with important responsibilities.

So What's the Big Deal with 107?

Part 107 really is a pretty big deal. While you can operate under part 101 or part 107 as a hobbyist, compensation is one of the bright lines that kicks you out of the hobbyist category altogether and almost exclusively into part 107. But more generally, anything that takes the purpose of your flight from fun or hobby to "a job" could put you into part 107 even if there is no direct compensation. Before part 107, compensation or any kind of work resulted in a number of implications and challenges, including the need for an exemption to several FAA regulations. This led to a significant number of people looking to skirt these regulations. I've lost count of the number of times I saw statements like the following in online communities:

But more generally, anything that takes the purpose of your flight from fun/hobby to "a job" could put you into part 107 even if there is no direct compensation.

"It's legal to sell your drone photos without an exemption if you just charge your client for the CD/USB drive, and not the photos."

No, it's not.

The FAA has spent considerable time and effort defining compensation, so agency attorneys are very familiar with the methods used as work-arounds. For a more in-depth discussion of compensation and specifically how it affects non-commercial pilots, see the article "Come Fly with Me …" in the Sep/Oct 2010 issue of FAA Safety Briefing at https://go.usa.gov/xXCjZ.

With part 107, though, there is a clear and relatively easy path to operating a small UAS for compensation or hire without the need to go through the exemption process. Here are the basic rules for operating under part 107:

- Must hold a remote pilot certificate
- Drone must be less than 55 pounds and registered
- Must not operate within Class B, C, D, or surface level E airspace
- Must keep aircraft in sight (visual line-of-sight)
- Must fly under 400 feet or within 400 feet of a structure
- Must fly during the day
- Must fly at or below 100 mph
- Must yield right of way to manned aircraft
- Must not fly over people
- Must not fly from a moving vehicle

If this list looks familiar, that's no accident. Just as with the hobbyist guidelines, these rules allow reasonable freedom of operations without

compromising the safety of the NAS or requiring permission from the FAA in the form of an exemption.

When is Part 107 Insufficient?

Part 107 was always intended as a starting point, designed to allow as much as possible without compromising safety. In the longer term, the plan is to expand what is possible through full integration of UAS into the NAS. In the short term, though, the FAA established a part 107 waiver team to receive applications from operators to allow safe operations under specific conditions when a part 107 regulation is waived. When evaluating a waiver application, the FAA considers the specific operation, operator, and circumstances. This approach makes it possible to allow operations that would otherwise contravene the regulations. Here are the sections of part 107 that may be waived:

- Operation from a moving vehicle or aircraft (§ 107.25)*
- Daylight operation (§ 107.29)
- Visual line of sight aircraft operation (§ 107.31)*
- Visual observer (§ 107.33)
- Operation of multiple small unmanned aircraft systems (§ 107.35)
- Yielding the right of way (§ 107.37(a))
- Operation over people (§ 107.39)
- Operation in certain airspace (§ 107.41)
- Operating limitations for small unmanned aircraft (§ 107.51)

**No waiver of this provision will be issued to allow the carriage of property of another by aircraft for compensation or hire.*

As long as the FAA determines that the operations listed above can be conducted safely, the agency can issue a Certificate of Waiver for that operation. As an example, let's say you have a client who wants aerial photos of a property at night. Section 107.29 does not permit this operation, but it may be possible to accommodate the operation under specific conditions (i.e., conduct some training on nighttime illusions, have an anticollision light installed, etc.).

When you are considering applying for a waiver, you need to remember that some sections of part 107 are not waivable. It is possible that there may be other solutions to allow your operation such as an authorization. But you need to ask, not guess.

When Does It Apply to Me?

Even if you are not receiving compensation, a hobbyist may still find it useful to have a remote pilot certificate. If a friend offers a few bucks for you to take some pictures of his house, you don't have to worry about it. Or if another friend wants to compensate your drone-facilitated inspection of her home's roof with a nice dinner out, you won't have to decline. If you decide you want to use your UAS in your business, no problem.

It's never a bad idea to expand your knowledge and your aviation repertoire, and the remote pilot certificate is a pretty easy way to do that and perhaps enjoy the bragging rights that come with any new certificate or rating.

Or, you could just follow the lead of famous mountaineer George Mallory, who chose to climb Mount Everest "because it's there."

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

Here are a few questions to help you decide when you need a certificate.

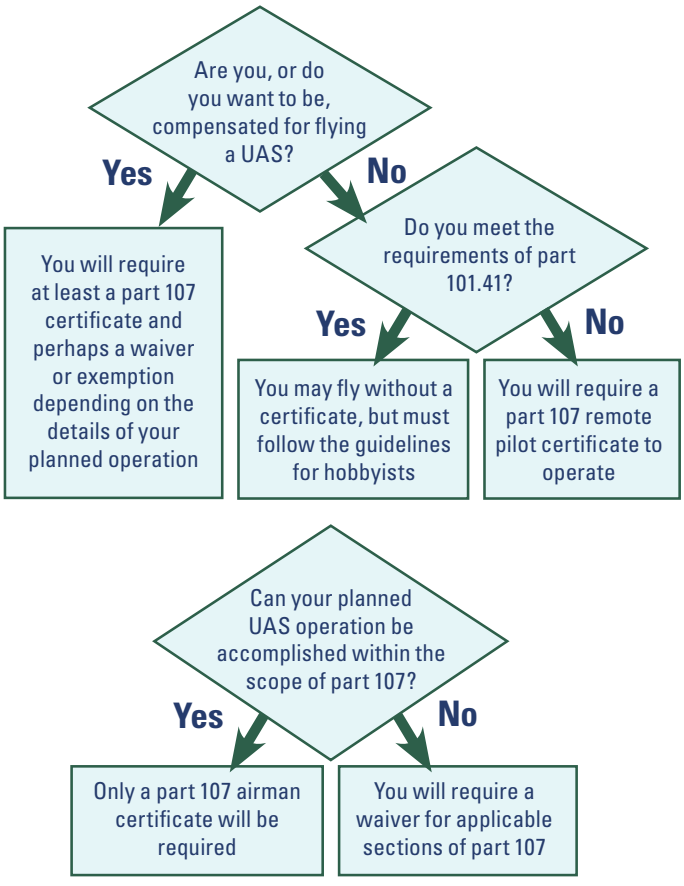
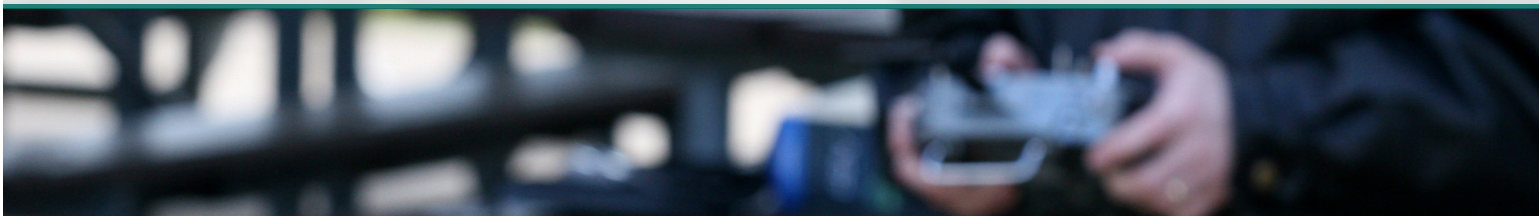


Photo courtesy Drone360 magazine, Drew Halverson

JENNIFER CARON

Who's Behind UAS?

A Look at Drone Support, Programs, and Initiatives in the FAA



It was a cold, but quiet day in April. I was carefully running a pre-flight on my Kitfox two-seater, when suddenly an intense, whirring hum pierced the air — like a swarm of angry bees freshly disturbed from their nest. A small, X-shaped aircraft appeared on the horizon. Its furiously spinning fans propelled it ever forward. It was quick and agile, like a Hornet jet fighter, as it swept across my aircraft and crash-landed near me. When I bent down to carefully examine the now silent, alien object, my suspicions were confirmed — it was a DRONE!

Join me as I explore how to address this incident, and help introduce you to all the many drone support mechanisms, programs, and initiatives in the FAA that exist for the benefit of operators, and the public.

Who You Gonna Call?

Did you know that sightings of drones near or around airports and other aircraft now exceed 100 reports per month? In 2016, there were approximately 1,800 reports of drone sightings, compared to 1,200 reports in 2015. If you see a drone, officially known as an unmanned aircraft system (UAS), operated in an unsafe manner, call local law enforcement immediately. State and local law enforcement agencies are often in the best position to deter, detect, and immediately investigate unauthorized or unsafe UAS operations.

LEAP Into Action

After I contacted my local police department to report the drone, law enforcement arrived on scene. As it turns out, the operator never showed up to claim the drone. I was convinced that he, or she, could not be found. However, I was happy to learn that my local law enforcement officials can coordinate with local FAA field offices to address these safety issues. See the article, "Drone Dragnet" in this issue for more details.

The officer on scene inspected the registration number on the drone, and contacted the local FAA Law Enforcement Assistance Program (LEAP) special agent to verify the registration, which in turn led to the operator's identification.

Own the Drone

In December 2015, the FAA collaborated with industry stakeholders to develop a registration process for small UAS. An Agency-wide effort, that included policy offices in Flight Standards and multiple support organizations like the Office of Information & Technology, developed the registration process for UAS.

Aircraft registration provides a means to associate an unmanned aircraft weighing more than 0.55 pounds, with its owner. It ensures that operators know that they are responsible for the safe operation

of their aircraft. To date, over 750,000 small UAS owners have registered, including more than 40,000 in the last two weeks of December 2016.

Operate Safely

Thanks to the registration process, the operator in my drone incident was located. From there, the local LEAP agent coordinated with the local FAA field office, known as a Flight Standards District Office (FSDO), to assign an aviation safety inspector (ASI). ASIs are experts on aviation regulations and safety standards, and take the lead on investigating UAS accidents or occurrences, other aviation safety issues, or any complaints reported to the FSDO.

In this case, the actions of the drone operator were not intentional. Unaware that an airport was within five miles, she failed to notify the airport operator and traffic control tower. She didn't realize she was doing anything wrong.

If there's no accident or deliberate violation of a regulation, then the FAA uses compliance actions with the UAS operator to address the safety concerns. The ASI worked to educate the drone operator on how to safely operate UAS in the National Airspace System (NAS), including instructions to avoid flight near manned aircraft, and to always fly within visual line-of-sight.

"You must always fly your UAS safely," says Jeff Riff, Aviation Safety Inspector in the FAA's Flight Standards District Office in Houston, Texas. "Even though the UAS is piloted from the ground, any incident that occurs is handled in the same way it would be handled for a manned aircraft, with a pilot on board," Riff explains.

Drone Rules

Growing concern about reports of UAS flying near airports and manned aircraft highlighted the need to educate users about how to operate UAS safely, and as soon as possible, preferably before they began operating small UAS in the NAS.

Building on the successful launch of the online registration system, the FAA adopted a similar approach of engagement and collaboration with industry stakeholders in the development of 14 CFR part 107, the set of operating rules for small UAS.

Part 107, developed and regulated by the FAA, and the General Aviation and Commercial Division, provides basic rules for operators and achieves two goals. First, part 107 minimizes the risks to other aircraft, and people and property on the ground; and second, the rule provides the UAS industry, and operator community with the flexibility to innovate, since UAS technology is evolving at a rapid pace.

Drone Knowledge

Part 107 introduces the Remote Pilot Certificate, specific for UAS operations. An individual can obtain a certificate by passing an aeronautical knowledge test at an FAA-approved testing center, or those with a current, non-student part 61 airman certificate may complete an online UAS training course in lieu of the knowledge test. Approximately 24,000 applicants have taken the Remote Pilot Knowledge Exam, and over 91% have passed.

The FAA is actively engaging in public education and outreach efforts to further enhance user knowledge. Outreach campaigns such as "Know Before You Fly," and the B4UFly mobile app promote the safe operation of UAS. B4UFLY (www.faa.gov/uas/where_to_fly/b4ufly) is an easy-to-use smartphone app that helps UAS operators determine whether there are any restrictions or requirements in effect at the location where they want to fly.

The FAA's Safety Team (FAASTeam) promotes UAS safe operations and members serve as a key link to the public, providing education on flight safety, participating in UAS industry meetings, and serving as resources at drone enthusiast groups and aircraft hobby clubs. The FAASTeam is the FAA focal point for UAS, and General Aviation safety outreach and education.

Drone Waivers and Authorizations

Part 107 also allows operators to apply online for waivers to specific sections of the rule and for authorizations to fly in controlled airspace. The FAA has issued over 2,200 airspace authorizations since publication of the rule. Waivers can be issued provided the operator demonstrates in their application that their proposed operations may be conducted safely. The General Aviation and Commercial Division has issued over 400 waivers for small UAS operations under part 107, including the pre-recorded drone light show featured during halftime at this year's Super Bowl.

Efforts such as this expansion of permissible UAS operations would not be possible without the UAS policy and support offices throughout the Agency, whose dedicated staff and resources support these activities.

UAS Teamwork

The UAS Oversight and Compliance Focus Team (OCFT) serves as a crucial link between the field

and FAA policy offices. It provides a single point of contact for field personnel, providing advice and support for the clear and consistent implementation of policy. It also collects feedback and input from the field to advise policy offices on guidance improvements. Members of the OCFT have extensive UAS experience, are well versed in operational safety, and provide UAS regulatory and technical expertise.

"In a nutshell, the OCFT's job is to make sure that the field ASIs, and FAA policy offices, are in harmony," explains Al Brunner, Aviation Safety Inspector, and the lead for the OCFT.

"For example, if the field needs support to interpret or apply a UAS policy, the OCFT will clarify it and ensure the policy is consistently applied throughout the field. Or, if the policy has gaps or problems and is not serving the public as it should, the OCFT will step in and inform the policy offices on how best to adjust the policy where needed," says Brunner.

As the FAA moves forward with UAS integration into the NAS, it continues to involve all stakeholders in framing challenges, prioritizing activities, and developing solutions.

The FSDOs and the OCFT members were on hand as resources for the public who, in most cases, just got a new UAS and wanted to know how to fly it safely and legally. "We made sure that every FSDO across the United States received 100-percent of our support, and that they knew how to implement the new part 107 rule for UAS commercial use," said Brunner.

UAS Integration

Serving as a focal point for external stakeholders, the FAA's UAS Integration Office is also a connecting point among the FAA offices working UAS issues. It streamlines the UAS community's interaction with the FAA, and it provides UAS stakeholder input to the FAA policy offices. It also collaborates with offices FAA-wide to develop strategies for enabling UAS operations and integrating UAS into the NAS.

The UAS Integration Office gathers input from many groups such as UAS manufacturers, UAS industry and trade associations, UAS technical organizations, academic institutions, and research and development centers. The Office collaborates with federal government security agencies such as the Department of Homeland Security and the Department of Defense.

"Federal, state, and local entities are all engaged, and we cannot solve these challenges alone. The expertise and collaboration of industry stakeholders is key for the safe integration of UAS into the NAS," explains Emanuel Cruz, Management and Program Analyst in the FAA's UAS Integration Office.

The UAS Integration Office also supports external stakeholders by supporting industry in forums and events. For example, it has supported events with the National Association of Realtors and the International Association of Amusement Parks and Attractions, among others, to provide information on how these industries can conduct operations safely within the current regulatory framework.

UAS Test Sites and Research

The FAA is also supporting its UAS test sites in conducting critical research. Research and development activities include flight tests, modeling and simulation, technology evaluations, risk assessments, and data gathering and analysis.

These activities provide the FAA with critical information in areas such as Detect and Avoid, UAS Communications, Human Factors, System Safety, and Certification, all of which enable the Agency to make informed decisions on safe UAS integration.

To keep pace with the rapid increase in the number of UAS operations, and to pave the way for the full implementation of beyond visual line-of-sight operations, the FAA is working with NASA and industry to develop a UAS Traffic Management System. See the article, "How Do We All Get Along," in this issue for more on this initiative.

Research under the Focus Area Pathfinder Program explores extended visual line-of-sight operations for increased usage of UAS in agriculture crop monitoring in rural areas.

Another Pathfinder Program explores beyond visual line-of-sight operations, in rural or isolated areas, and the "see and avoid" challenges presented in the use of UAS for rail system infrastructure inspections.

Programs, Partnerships, and Initiatives

The FAA also continues to work closely with industry partners on several programs, partnerships, and initiatives. For example, the FAA partners with organizations like the Academy of Model Aeronautics (AMA) and the Association for Unmanned Vehicle Systems International (AUVSI). The AMA promotes the development of model aviation, and AUVSI is devoted to advancing the UAS and robotics community.

The FAA partnered with AMA and AUVSI to establish "Know Before You Fly," an educational campaign to inform UAS users how to fly safely and responsibly. Working with these two groups, the

FAA developed the B4UFly mobile app, mentioned earlier in this article. Input from these partnerships prompted the FAA to include key features in the app, such as interactive airspace maps to enhance the UAS operator's situational awareness.

In March of this year, the FAA and AUVSI hosted the annual FAA UAS Symposium. This gathering provided stakeholders the opportunity to meet with government and UAS industry representatives to discuss the intersection of privacy and preemption, harmonizing international regulations, and the array of new safety and security risks associated with increased UAS operations. A resource center provided attendees with one-on-one technical support on authorizations, waivers, and part 107 requirements.

Drone Advisory Committee

The FAA is taking the same partnership approach with the creation of the Drone Advisory Committee (DAC). Comprised of a mix of CEO/COO level leaders from key unmanned aircraft and manned aviation stakeholders, including the RTCA, Inc., and chaired by Intel CEO Brian Krzanich, the DAC helps to create broad support for an overall UAS integration strategy and vision. Members represent the wide variety of UAS interests, including industry, research, academia, retail, and technology.

The first DAC meeting was held in September 2016, and its members have already started to work on assisting the FAA in two key areas: identifying the roles and responsibilities of those operators, manufacturers, and federal, state, and local officials related to drone use in populated areas; and determining what the highest-priority UAS operations are and how to enable airspace access to conduct these operations.

Unmanned Aircraft Safety Team

Continuing the partnership with government and industry, FAA Administrator Michael Huerta announced the creation of the Unmanned Aircraft Safety Team (UAST) at the White House Drone Day this past August. The group, which includes a wide variety of stakeholders from the drone and aviation industries, as well as government, will use UAS operational data to identify safety risks, and then develop and voluntarily implement mitigation strategies to address those risks.

"The UAST is based on the very successful Commercial Aviation Safety Team (CAST) and General Aviation Joint Steering Committee (GAJSC)," explains Derek Hufty, Management and Program Analyst in the UAS Integration Office, and FAA member of the UAST. CAST and the GAJSC recommendations from both groups have significantly improved traditional aviation safety. The FAA expects the UAST will do the same for UAS.

Moving Forward

The drone industry offers limitless possibilities for jobs and new business opportunities, and drones are captivating people around the world. As the FAA moves forward with UAS integration into the NAS, it continues to involve all stakeholders in framing challenges, prioritizing activities, and developing solutions.

Almost every policy and support office within the Agency serves as a resource to learn how, and where, to operate this new technology safely, and legally, for the benefit of operators of all aircraft — manned and unmanned.

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

UAS Hobby Clubs and Associations

UAS hobby clubs and owners associations serve as great resources for UAS hobbyists and UAS commercial operators. Hobbyist groups such as the AMA, and UAS groups such as the AUVSI and Drone Owners and Pilots Association (DROPA) are significant, not only because they provide an opportunity for UAS operators to share their passion for flying, but also because they provide a "lessons learned" community for operators to educate each other. Traditional manned aviation groups, such as the Aircraft Owners and Pilots Association (AOPA), have also created membership options for drone pilots.

Learn More

Check out the UAS tools and study materials on the FAA website at
http://www.faa.gov/uas

Participate in many of the FAA Safety Team's online safety courses and seminars at
www.faasafety.gov

Find your local Flight Standards District Office (FSDO)at
https://go.usa.gov/xXCRc

Visit the FAA's UAS Programs at
http://www.faa.gov/uas/programs_partnerships

All Images Provided by NASA

How Do We All Get Along?

A Look at the FAA's Strategy for UAS Integration into the NAS

TOM HOFFMANN

As of March 7, 2017, there were more than 750,000 drone registrants in the United States. Although most of the drones that are being operated are of the small hobbyist variety, that number has now more than doubled the number of piloted aircraft registered with the FAA, and forecast models say that we could well reach the 7 million mark by 2020. When you couple that with recent data indicating a continued uptick in potential drone sightings among pilots, there is a reasonable concern among pilot groups, particularly general aviation (GA), about what the future holds for an all-inclusive strategy for manned and unmanned aircraft sharing the same National Airspace (NAS). So, how do we all get along?

If you'll indulge my analogy for a moment, I tend to see the relationship between unmanned aircraft systems (UAS) and manned aircraft operators in the NAS not unlike that of a sibling rivalry. I have a brother five years my senior, so growing up in his shadow wasn't without some hardship. My brother was a good kid, but like most "kids," he had his quirks. My pragmatic parents dealt with these issues as most parents probably would do; strict guidelines where needed, a little tough love here and there, but always an eye towards supporting his happiness and success. I suppose they thought they had the whole parenting thing figured out. Until I came along that is, causing stress, worry, and grey hairs in all new ways.

As the newcomer, I got the expected recycled toys and hand-me-down clothes (plaid pants and all!) But I'm sure it didn't take long for my parents to notice that the similarities between my brother and me stopped after our last name and that prior parenting styles might require a bit of a reboot. That was evidenced in our starkly different priorities, tastes, and eventual paths in life. Despite this, my brother and I always shared (and still do) an underlying level of respect for each other. Sure, we fought and disagreed and were territorial about our things, but at the end of the day, we always had each other's back. We were a team, and happily we remain so today.

All in the Family

To a degree, the same familial bonds exist in the NAS; there may be multiple players with different desires, skills sets, and priorities, but there's a sense of mutual respect in knowing we're all part of the same aviation team. Along those same lines, the FAA realizes that a one-size-fits-all approach to managing safety and efficiency in the NAS has little chance of being effective. That has proven evident with the relative newcomer to the family, UAS, which brings a renewed level of excitement and entrepreneurial spirit to the aviation community, but whose vastly different operating requirements, performance limitations, and mission mindsets often contrast with the traditional mold of NAS operations. When you add in the current volume of UAS operations and their skyrocketing growth rate, there's an even greater urgency to ensure we're proactive with developing a successful plan to accommodate NAS users of all shapes and sizes.

So how do we build an air traffic system that accomplishes this challenging goal? That accounts for the operational needs of everything from a Boeing 787 transcontinental flight, to an AgEagle RX60 scouting for parasites in a Kansas wheat field? And that is consistent with the NAS' existing regulatory framework, yet flexible enough to accommodate "who knows what" in the future? The adage about how to eat an elephant comes to mind here.

The good news is that the FAA's hard work on developing a comprehensive rule to allow for the commercial use of small UAS (14 CFR part 107) is helping to lay the groundwork for a more inclusive type of system. When developing the rule, which became effective in August 2016, the FAA focused intensely on ways to not bottleneck or burden industry, but at the same time ensure that risk to others was properly mitigated. This essentially helped carve

out some specific low-altitude airspace to allow greater freedom for both hobbyist and non-hobbyist types of operations, provided they follow the specified operating parameters (e.g., daytime operations, under 100 mph, within line of sight, etc.) and meet the necessary certification requirements. The rule also codified the FAA's enforcement authority in part 101 by prohibiting model aircraft operators from endangering the safety of the NAS.

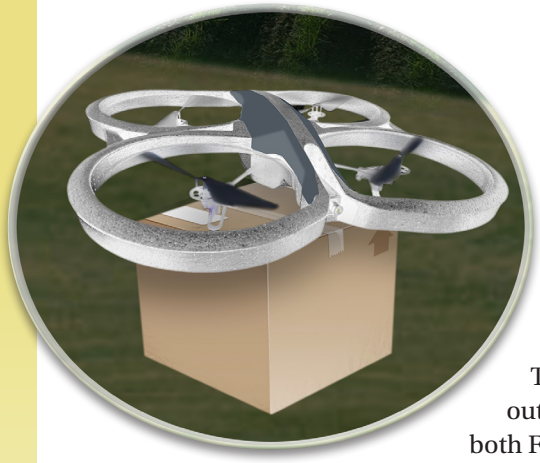
The rule also took into account the rapid evolution of small UAS technology by including a waiver provision for those who can provide an acceptable level of safety for activities that go beyond the basic requirements in part 107. For those operations outside uncontrolled airspace, an online authorization request is available for Class B, C, D, and certain parts of E airspace.

Although an exact definition is still being developed, UTM is widely regarded as a system that will rapidly and safely enable large-scale small UAS operations, together with other NAS users, in low altitude airspace.

Not Your Father's NAS

With the part 107 regulation under its belt, the FAA is now well-positioned to gather data and operational experience that can assist with the integration of higher risk operations. These first steps will likely bear the fruit needed for further integration and additional rulemaking, and will also contribute to the development of a UTM, or UAS traffic management system. UTM is widely regarded as a system that will rapidly and safely enable large-scale small UAS operations, together with other NAS users, in low altitude airspace.

The FAA's leading partner in UTM development is NASA, which has a proven track record in autonomous systems and air traffic management. A joint effort between the two aeronautically aligned agencies was formally outlined in a Congressional mandate via Section 2208 of the FAA Extension Act of 2016. The Act stipulates that the FAA, in coordination with NASA, must develop a UTM system pilot program by early 2017 along with regular status and progress updates.



To establish the framework necessary to achieve those goals, the FAA and NASA have developed a Research Transition Team (RTT). The RTT lays out a clear plan of action for both FAA and NASA and serves as a basis for consistent communications and engagement with the broader public and UAS community. As its name suggests, the goal of the RTT will be to transition any technological outputs and prototype systems developed during the research process to the FAA for consideration and potential implementation. The RTT targets 2019 for this transfer to take place. NASA also plans to share results and specifications of the UTM research platform to industry stakeholders as appropriate along the way.

To help keep the team on track and focused on the appropriate areas and activities, the RTT is split into four subgroup areas of research: concepts, data, sense and avoid (SAA), and communications/navigation. In addition to their respective deliverables, the subgroups are also expected to perform interdependent research to provide each other with input and feedback in a collaborative fashion.

We Have the Technology

"There are a lot of moving targets, but our research goal is to have a holistic vision of UTM operations," says Jarrett Larrow, an aerospace engineer with the FAA's Flight Technologies and Procedures Division and co-coordinator of the SAA and Comm/Nav subgroups for FAA. With more industry-leaning and operator compliance objectives to sort out, Larrow's teams are faced with a wide array of challenges, including the familiar "here today, gone tomorrow" lifecycle of many technological breakthroughs.

"Sense and avoid technologies are out there, but they're evolving every day — getting smaller, better, and more capable," says Larrow. Even defining what SAA is and should be capable of to support UTM is a concept the team is still wrestling with. Considered one of the linchpins for successful UTM, SAA technology represents the "eyes and ears" of UAS operators in what will likely be a predominantly autonomous system. "We need to be open-minded toward what solutions industry can propose to ensure they don't hit other aircraft or structures," says Larrow, hinting at the balance they must strike with not being overly prescriptive with an individual type of SAA technology or performance metric.

Larrow also cites the variability of operators and UAS platforms as another major challenge. "We have to eventually accommodate everything from garage-built models to complex package delivery aircraft, so we need to be sure there's a good understanding of the required capabilities. We made a good first step with part 107."

The good news for addressing these and the myriad other concerns is the vast number of partners from industry, government, and academia that are involved with developing an operational UTM. At last check, NASA had 65 partners listed on its website that provide vehicles or other subsystems to test UTM technologies. Among them are some names you might recognize: Amazon, Google, Lockheed Martin, and Uber (see the full list here: https://go.usa.gov/xXxHk).

"It's this significant involvement with industry that helps set our RTT apart from others," says Sherri Magyarits, an FAA engineering research psychologist and co-coordinator of the Concept & Use Cases UTM RTT Working Group. "These various partners and stakeholders are helping to define and validate use cases and operational needs, and are participating directly with flight tests and demonstrations."

Case in point: NASA has already engaged with all six of the FAA's UAS test ranges in Alaska, North Dakota, Nevada, New York, Texas, and Virginia to flight test UTM technology. Most recently, researchers at the Nevada test site flew — and tracked — five drones at the same time beyond the pilot's visual line of sight from Reno-Stead Airport. Each drone accomplished a separate simulated task, including looking for a lost hiker, covering a sporting event, monitoring wildlife, and surveying environmental hazards.

These types of demonstrations are directly in line with the scalable platform model used by the RTT to gradually incorporate complexity into the testing environment. This "build a little, test a little" strategy moves UTM through a spectrum of low risk, low density remote operations, to higher density urban environments that require interaction with manned aircraft and employ more complex beyond visual line of sight (BVLOS) techniques.

"Tests like these will help build the foundation for managing much greater amounts of drone traffic in the coming years," said FAA Administrator Huerta at this year's Consumer Electronics Show in Las Vegas. Huerta further commented that these flight tests are

something that "the FAA and industry both have key roles to play in the integration process. Neither of us is going to solve all of the challenges flying solo."

Security Deposit

Moving forward with a comprehensive UTM plan must also take into consideration security concerns. The FAA is working concurrently with several government agencies and third party technology firms to develop methods of detecting, identifying, and mitigating unauthorized or "rogue" UAS operations in and around airports or other critical infrastructure. Prototype detection systems have been developed and successfully tested at several U.S. airports including Atlantic City, Denver, and JFK. Findings from these tests will help guide future standards for drone detection systems at airports nationwide and potentially feed into the construct of a larger overall UTM system.

This work is part of the FAA's Pathfinder Program for UAS Detection at Airports and Critical Infrastructure and is also reinforced by the FAA Extension Act of 2016. Rob Pappas, Manager of the Program and Data Management Branch of the FAA's UAS Integration Office explains that the while some Pathfinder research parallels and supports UTM efforts, much of their work is of a more immediate nature driven by environmental and economic security concerns with illicit UAS use. "There is a real need to accelerate methods that are directly focused on protecting national critical infrastructure and keeping the NAS operating safely and reliably," says Pappas.

Out of Sight, But Not Out of Safety

So what will UTM ultimately look like? Will there be human intervention, or will it be strictly autonomous? And how will GA be able to stay actively informed of UAS whereabouts? Two notional scenarios NASA is exploring include a portable model that would move between geographical areas, and a persistent model that would provide continuous coverage for a specific area. Neither of these solutions would require human monitoring of every vehicle. Instead, operators would use data to make inputs only when initiating, continuing, or terminating a UAS flight. Since UAS operators would be inherently more reliant on a robust data exchange to authenticate themselves and declare their intentions, that same data can be used to better inform GA about precisely where and how these UAS will be operating.

"This type of system can provide finer precision of expected UAS operations," says Larrow. "I can envision where there is more than just a generic charting symbol or a blanket 30-mile NOTAM warning GA pilots about UAS activity. Instead, there could be a one-mile corridor during a specific time frame identifying expected UAS traffic, along with the notional track." According to Larrow, it would behoove UAS operators to use this additional information and their capability to share it since it could help to expedite their safe integration into the NAS. It would also behoove GA pilots to get involved early and make sure they have the capabilities to know where these operations are occurring.

Considered one of the linchpins for a successful UTM, SAA technology represents the "eyes and ears" of UAS operators in what will likely be a predominantly autonomous system.

Onward and Upward

While there are still many questions and concerns to address, overall progress on UTM remains on target. The FAA and NASA's unique interaction with industry users and operators is a new paradigm for collaborative teamwork and is proving to be an important catalyst for the creative and forward-thinking ideas that will be required to move UTM from the drawing board to reality.

As with any new addition to a family, change is inevitable. But with the right mindset, this change can be a bridge to improvement and innovation and lead to a NAS that works better for everyone.

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

NASA's concept for a possible UTM system would safely manage diverse UAS operations in the airspace above buildings and below crewed aircraft operations in suburban and urban areas.

Photo courtesy Drone360 magazine, Drew Halverson

PAUL CIANCIOLO

Where Do I Find the Drone Zone?

Navigating Cyberspace for Official UAS Resources

The World Wide Web is a big place. Navigating from point A to point B through the internet can be trickier than old-fashioned dead reckoning. Your starting point is simply faa.gov/uas. We're here to help, so let's chart a path to unmanned aircraft bliss.

Identifying Your Drone

Even if you just want to tootle around the skies with your new drone or remotely controlled model airplane, you still need to know a few things before flying outside. The first thing, is knowing how and where to register your drone with the FAA if it weighs more than 0.55 pounds — or 8.8 ounces or 250 grams — depending what units of measure you prefer. This includes anything attached or carried.

If your UAS weighs more than 55 pounds, or you don't meet the requirements to register online, then scroll down the registration website to the N-number section. The link there will take you to more guidance.

Unmanned Aircraft Registration
Website: registermyuas.faa.gov
Phone: 877-396-4636 (M-F, 10am to 6pm Eastern)
Email: UASregistration@faa.gov

When registering online, it's important to know if you will be flying for fun, which means you are not receiving any compensation — even indirectly such as a taking pictures of a house in support of your real estate business. When you are flying under model aircraft rules, you use the same UAS registration number for all of your model aircraft. Any other type of UAS operation requires that each unmanned aircraft have a unique registration number. Let's take a look at the different types of flying.

Flying for Fun

If you are strictly flying for recreational or hobby purposes, you must operate in accordance with the *Special Rule for Model Aircraft* found in section 336 of Public Law 112-95, and adopted in regulation under part 101 of Title 14, Code of Federal Regulations (14 CFR). Everything you need to know to fly safely and within the law is outlined in FAA Advisory Circular 91-57A, *Model Aircraft Operating Standards*.

A common question about operating under model aircraft rules stems from operations by educational institutions and community-sponsored events. As long as the operator is not compensated or any compensation received is not directly nor incidentally related to the operation of the aircraft, it is allowed under model aircraft rules. Students may conduct model aircraft operations at an accredited educational institution so long as the faculty member's manipulation of the model aircraft controls is incidental and secondary to the student's. See the legal interpretation for more information.

Of particular note, though, you do need to be aware of any Temporary Flight Restrictions (TFRs) issued in your vicinity. These can pop-up at any

time, and they may restrict model aircraft and other types of flying.

You also need to know if you are within five miles of an airport, which includes a heliport or seaplane base and may be public or private use. One way to review the airspace you are using is to download a VFR Aeronautical Chart for your area. On the *Flight Information* website, click on *Aeronautical Charts* and look under *Digital Products*, which is where you will see a *Downloads* area. It includes a user guide to help you learn to read the chart. Click on *VFR Raster Charts* and then *Sectional Chart Index* to determine which chart to download.

An easier way to determine proximity to an airport is to use an app. The FAA provides the free B4UFLY app in the Apple Store and Google Play.

Another great resource is the *Know Before You Fly* educational campaign. It was established by the Association for Unmanned Vehicle Systems International (AUVSI) and the Academy of Model Aeronautics (AMA) in partnership with the FAA to educate prospective users about the safe and responsible operation of UAS.

Remember that just because you can buy a drone doesn't mean you can fly it anywhere, or for any purpose. If flying just for fun, then make sure to register and operate in accordance with model aircraft rules.

AC 91-57A, *Model Aircraft Operating Standards*
1.usa.gov/2lUkwBf

Educational Use of UAS Legal Interpretation
1.usa.gov/2ms0tvI

TFR Listing
tfr.faa.gov

Flight Information (Aeronautical Charts)
aeronav.faa.gov

Know Before You Fly
KnowBeforeYouFly.org

Flying for a Purpose

We all know that flying is fun! If you want to fly for money or beyond what the model aircraft rules allow, then you need to become a FAA certificated remote pilot. There are two ways to do that.

If you are a *current* 14 CFR part 61 pilot, then you have the option to take the short route because you already possess certain aeronautical knowledge. You start by taking the *part 107 sUAS Course* on FAASafety.gov, which anyone can take for educational purposes. It's important to save a copy of the completion certificate, which you will need to upload to the Integrated Airman Certification and Rating Application (IACRA) website in order to apply for your remote pilot certificate. This document is separate from your other pilot certificate(s).

All other remote pilot applicants must first take the Remote Pilot Knowledge Test at an FAA-approved knowledge testing center. To see the list of testing centers, go to the *Airman Testing* webpage under *Training & Testing* on faa.gov. Click on *Knowledge Testing* and look for the commercial testing center list in order to make an appointment to take the test. A study guide for taking the test is available on the *Airman Testing* page. It is called the Remote Pilot — Small Unmanned Aircraft Systems Study Guide (FAA-G-8082-22). The guide also provides a list and links to additional resources.

The testing process for both types of remote pilot applicants is outlined in its own guide, which is called the Remote Pilot Knowledge Test Guide (FAA-G-8082-20). It is best found by typing the name in the search bar at faa.gov. After passing the knowledge test or completing the online course for current pilots, you must apply for your remote pilot certificate through the IACRA website.

FAASafety.gov Part 107 sUAS Course
1.usa.gov/2lUK5C3

Integrated Airman Certification and Rating Application (IACRA)
iacra.faa.gov

Airman Testing
faa.gov/training_testing/testing

Remote Pilot — Small Unmanned Aircraft Systems Study Guide (FAA-G-8082-22)
1.usa.gov/2mZz0os

Remote Pilot Knowledge Test Guide (FAA-G-8082-20)
1.usa.gov/2nfe8Wn

Flying as Remote Pilot in Command

As a certificated remote pilot, you fly under the rules of 14 CFR part 107. You can find the regulations online at eCFR.gov. Select *Title 14* from the dropdown menu, and then click on *part 107*.

Specific sections of 14 CFR part 107 may be waived, and flying in other than Class G airspace can be authorized. To do that, you need to visit the *Request a Waiver/Airspace Authorization* webpage. It is very important to ensure that requests are correctly completed, and that they include the purpose of operation and method by which the proposed operation can be safely conducted.

If you have an accident, you are required to report it within 10 days to the FAA if it resulted in serious injury, loss of consciousness, or more that $500 in property damage (excluding your UAS). This is accomplished on the Report an Accident (part 107) webpage or at your local Flight Standards District Office (FSDO).

To ensure you are operating within the appropriate rules, be sure to read Advisory Circular 107-1, *Small Unmanned Aircraft Systems*.

Electronic Code of Federal Regulations (CFR)
eCFR.gov

Request a Waiver/Airspace Authorization
faa.gov/uas/request_waiver

Report an Accident (Part 107)
faa.gov/uas/report_accident

FSDO Map
1.usa.gov/1baedlO

AC 107-2: Small Unmanned Aircraft Systems
1.usa.gov/2mGQW6s

If you have a general question, comment, or complaint about UAS, you can email UAShelp@faa.gov or call 844-FLY-MY-UA.

The FAA is working to streamline the faa.gov/uas website later this summer to enhance usability, so stay tuned — but it is still your one-stop-shop for all official UAS resources.

It may seem like we're droning on here with a list of links, but these resources answer the majority of questions that come into the FAA. The process of earning your remote pilot "wings" is the number one concern from citizens, but as explained here, you may not need that if flying under model aircraft rules for recreational/hobbyist purposes. Our goal is to safely integrate UAS into the airspace with manned aircraft, and we want to ensure that everyone can fly in the NAS.

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 public affairs officer with Civil Air Patrol.*

Checklist

SUSAN PARSON

Becoming a Remote Pilot

So, you've decided that you want to fly small Unmanned Aircraft Systems (sUAS). Now what?

The first step is to visit the FAA website's "Become a Pilot" page for prospective small UAS pilots, who are more properly called remote pilots. Here's the overview.

First-Time Pilots

Start by verifying that you meet the basic requirements, which include being at least 16 years of age, having the ability to read, speak, write, and understand the English language, and being in a physical and mental condition that will allow you to safely operate a small UAS.

Next, you need to pass the initial aeronautical knowledge test. The standards for this exam are established in a document called the Airman Certification Standards (ACS) for the Remote Pilot-small UAS certificate. This ACS has five sections: Regulations, Airspace Classification and Operating Requirements, Weather, Loading and Performance, and Operations. Each major section of the ACS is divided into Tasks that cover topics such as:

- Applicable regulations relating to small unmanned aircraft system rating privileges, limitations, and flight operation
- Airspace classification and operating requirements, and flight restrictions affecting small unmanned aircraft operation
- Aviation weather sources and effects of weather on small unmanned aircraft performance
- Small unmanned aircraft loading and performance
- Emergency procedures
- Crew resource management
- Radio communication procedures
- Determining the performance of small unmanned aircraft
- Physiological effects of drugs and alcohol
- Aeronautical decision-making and judgment
- Airport operations
- Maintenance and preflight inspection procedures

Each ACS Task lists references that contain the material you need to know but, to make things easier for first-time pilots, the FAA has developed a Small UAS Study Guide.

You can use the FAA's sample knowledge test to familiarize yourself with the kind of questions you can expect to see.

When you are ready, schedule your knowledge exam with one of the FAA's authorized Knowledge Testing Centers — and use the web page material to ensure that you take all the proper documentation.

After passing the test, apply for your certificate by using the FAA's electronic Integrated Airman Certificate and/or Rating Application system (IACRA) to complete Form 8710-13. The system will send your application to the TSA for a security background check, and then you will receive an email confirmation with instructions on how to print your temporary remote pilot certificate. You will later receive your permanent remote pilot certificate in the mail.

Current Pilots

If you already hold an FAA pilot certificate and meet the requirements for a flight review, the first step to getting your Remote Pilot-Small UAS certificate is completing the online part 107 small Unmanned Aircraft Systems course (ALC-451), which is available at www.FAAsafety.gov. Since you already have a pilot certificate, this course focuses on topics specific to sUAS.

After you complete the course, complete FAA Form 8710-13. You will need to have a FSDO, an FAA-designated pilot examiner (DPE), an airman certification representative (ACR), or an FAA-certificated flight instructor (CFI) validate your identity and sign your application. While a CFI can accept your application, only a FSDO, a DPE, or an ACR can actually issue your temporary remote pilot-sUAS certificate on the spot. The good news is if you submit your application to a CFI via IACRA, you will receive an email with a link to download a temporary certificate in just a few days. As with other certificates and ratings you have earned, you will receive your permanent certificate in the mail later on.

If you have other questions about UAS, the FAA website's UAS page also includes a set of FAQs along with lots of other helpful material.

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

CHRIS HUEBNER

What's It Like to Fly a Global Hawk

U.S. Navy photo by Kelly Schindler

A First Person Account of Large UAS Operations

Back when I was a P-3 *Orion* pilot flying for the U.S. Navy, I often wondered what it would be like to have a reliable autopilot and Selective Calling System (SELCAL) on oceanic crossings, instead of hand-jamming the yoke for hours while straining to hear ARINC through the squeals of the HF radios. Flying naval aircraft that lacked several technological capabilities most commercial aircraft have enjoyed for decades, I would often hear the phrase — "we fly yesterday's technology into tomorrow," or, "the P-8 is coming, and it will have all of that fancy stuff."

Years later while working for the FAA, I often thought about my Navy days and wondered if I missed my opportunity to use cutting edge technology in naval aviation. Then, in November of 2014, I received a recall to active Navy duty. My orders stated that I would be trained and qualified as an Unmanned Aircraft System (UAS) Mission Commander (MC) flying the Navy's inventory of RQ-4A *Global Hawk* unmanned aircraft (UA) in support of Operation Enduring Freedom.

Although the *Global Hawk*, often regarded as an Air Force hand-me-down, maintained the running joke that "the Air Force gets the best stuff," I viewed the recall as an exciting opportunity to have a glimpse into "tomorrow's technology." I wanted to learn as much information and detail about UAS operations as I could, like all aviators who strive to continuously improve, in hopes of using that knowledge upon my return to the FAA.

It was an eye-opening experience, and I'd like to "chair fly" with you as I share a few of my lessons learned and takeaways from this unique experience. I believe that the risk-based approach and best practices that I am about to describe are scalable and applicable to both part 107 remote pilots and hobbyists, since a *Global Hawk* is a large UAS.

One word of caution: since I am a naval aviator at heart, be forewarned: many acronyms lie ahead!

A Foundation of Trust

Pilots learn from early training that the principles of "trust, but verify" are necessary in aviation. The *Global Hawk* is a High Altitude Long Endurance (HALE) aircraft that operates Beyond Visual Line of Sight (BVLOS). Sophisticated data links must be used for its command and control (C2). I was skeptical at first about UAS and the level of reliance entrusted to technology and automation. It was not a quick or easy transition for me to relinquish some control to the systems that I had to trust, but could not always verify.

Over 100 missions later (the majority of which were not in the National Airspace System), I am now a true believer in UAS technology. Let me explain how I got to this point.

UAS are amazing assets with capabilities that are often unmatched by manned aircraft. However, they come with their share of unique challenges. The first challenge that I noticed is the distributed nature of UAS, especially in BVLOS operations. Personnel and equipment are geographically spread out and separated. The Launch and Recovery Element (LRE) may not always be co-located with the Mission Control Element (MCE). LRE pilots preflight the aircraft and prepare it for the flight without the Mission Commander ever seeing or touching the aircraft. Crew briefs and maintenance records reviews occur via online messaging and telcons. This makes standardized communications and information sharing a top priority, since everyone can't physically see the aircraft that will be accepted for flight. The principles of Crew Resource Management (CRM) and standardized turnover briefs are vital during long missions with multiple personnel changes.

Staying a Step Ahead

Thorough mission planning and proper preparation are keys for successful UAS operations. UAS crews must focus on weather forecasts and the possible impacts to the mission profile, C2 performance, flight range, endurance, and landing limitations. Forecasted landing conditions also drive the need to constantly update divert options. High levels of system automation require detailed preflight checks of navigation systems, waypoints, and flight controls. Flying a UAS, especially a BVLOS UAS, involves staying "ahead of the aircraft." This philosophy complements the planned contingency profiles of the UAS. The contingency profiles lead to predictability for both the crew and air traffic controllers in knowing how the unmanned aircraft should respond in certain abnormal situations.

The human-machine-interface with BVLOS unmanned aircraft creates certain challenges, especially with Command Directed systems that create a "human-*on*-the-loop" setup, as opposed to a "human-*in*-the-loop" structure. Instead of traditional pilot inputs for direct control of the jet, the UA relies on commands via software and datalinks to manipulate the control surface servos. It becomes a series of "click and enter" vice "stick and rudder" inputs. The pilot sends a command (up link) to maneuver and then waits for confirmation (down link) that the UA accepts the command to begin maneuvering. At times it feels more like managing the aircraft instead of actually flying it. Long-haul airline pilots can probably relate to this.

High levels of automation can lead to complacency, so it is important to stay engaged. Every command and input requires a mental check of "where should the UA go, where could the UA go, and where is the UA going?" Pilots don't like surprises during flight, so it is important to know the capabilities and the limitations of your UAS.

I learned to expect the unexpected and to always have a backup plan. It was a paradox of sorts in my mind in that I was flying this sophisticated equipment that is so advanced, yet my mindset was very similar to that of a student pilot during single engine primary training. I felt like I was back in a Cessna 152 constantly searching for a suitable landing area and always having a plan in case of a malfunction.

It Takes a Village …

Unmanned aircraft crews, unlike manned crews, cannot rely on all sensory inputs. The UA crew depends on a "heartbeat" between the control station and the UA to confirm that the C2 link is still alive. Health and monitoring reports via telemetry and system status pages replace traditional cockpit instrumentation. This is another example of reliance on automation and the associated relinquishment of some pilot control without a verification method. The component causing a warning light or fault code in flight cannot be visibly checked. This makes it difficult to determine if fluid levels are dropping due to bona fide leaks or because of some other system or software issue. UAS crews leverage CRM by using all available resources. Usually the resource is external to

I found it interesting that some flights can require 25 people or more to fly an aircraft with no one onboard.

NASA Photo

the ground control station, like a live weather picture from an internet source. Sound Aeronautical Decision Making (ADM) is necessary to determine the best course of action since some decisions get made with limited amounts of corroborating information.

I also found it rather interesting that some flights can require 25 people or more to fly an aircraft with no one onboard. I observed new support personnel positions and functions that I was not accustomed to seeing. A team has to physically start the jet's engine and do diagnostic tests prior to a ground control station being able to interface with the UA. Another team may be needed to tow the jet to the runway. Personnel crew a chase vehicle to closely monitor takeoffs and landings in a sterilized line of sight (LOS) environment. All of these moving pieces and parts take place in areas of aerodromes that do not typically have ground personnel present or vehicle movements in close proximity to aircraft.

High levels of automation can lead to complacency, so it is important to stay engaged. Every command and input requires a mental check of "where should the UA go, where could the UA go, and where is the UA going?"

The aerodromes and controllers make every effort to integrate UAS, but some segregation still exists. The most notable of which involves dedicated climb and descent sectors of airspace in the terminal environments. Once cleared to the en route environment, the unmanned jet has to act and respond like a manned aircraft as much as possible in order to ensure an acceptable level of safety for all airspace users. Being unmanned is transparent to most en route controllers during transits, since we use the same communication frequencies as the other air traffic in that airspace. I never got used to entering "0" for persons on board (POB) on the flight plan, and it took a lot of practice for me to remember to include a good contact phone number in the remarks section. The phone number served as a backup for Air Traffic Control in the event of lost communications. I never saw communication performance as an issue. The multiple control links were available, reliable, and they had great integrity. These robust links protected us from the possible adverse effects of prolonged transmission latency in a BVLOS environment.

The last challenge I want to mention is configuration management. The nature of UAS operations offers a variety of options for control stations during all phases of flight. This adds an element of complexity when troubleshooting malfunctions. If one control station has faults or errors, it can be replaced with another available station. This swap can occur while the UA is on the ground or with an in-flight "handoff" to another control station. If the error is still present after the swap, then the issue is probably with the UA and not the control station. It is extremely important to have tracking methods and established controls based on equipment identifiers. There has to be a protocol that accounts for the location and use of every piece of equipment in the overall system since so many pieces are interchangeable. This process becomes even more important during inspections and required maintenance.

As you can see, I am a huge proponent of UAS. It is my hope that you can use some of the techniques and strategies outlined here for addressing challenges associated with your own UAS flights and ensuring that these challenges do not grow into hazards that introduce unacceptable levels of risk for other airspace users or for persons and property on the ground.

This is an exciting and evolutionary time for global aviation. So I can't help but ask, "Will these unmanned systems be the new norm in aviation?" Only time and the regulations will tell. In the meantime, I am extremely grateful for the opportunity to use my UAS experience, along with the expertise of others, to help shape the regulatory landscape for UAS in the National Airspace System.

U.S. Air Force Photo by Staff Sgt. Andy M. Kin

Chris Huebner is an Aviation Safety Inspector and UAS Subject Matter Expert in the General Aviation Operations Branch (AFS-830). He is a Lieutenant Commander in the U.S. Navy Reserve assigned to the Navy's first MQ-4C Triton squadron.

DRONE DRAGNET

PAUL CIANCIOLO

UAS Guide *for* Law Enforcement Officials

Photo courtesy Drone360 magazine, Drew Halverson

For law enforcement officials, the question of how to respond to a drone flying in the park versus nefarious or dangerous flying is not as black and white as opening up the "ticket book" and looking up a citation. Depending on an array of facts and circumstances, there are a host of federal, state, and local laws and regulations that need to be considered.

Existing statutory (United States Code) and regulatory (Code of Federal Regulations) rules do not permit state and local governments to regulate aircraft flight operations, aviation safety, or efficient use of the airspace. The Air Commerce Act of 1926 gives exclusive sovereignty of U.S. airspace to the federal government. Responsibility to ensure the safety of all operators in the National Airspace System (NAS) falls to the FAA, and citizens have a public right of transit through the NAS where not prohibited. When developing regulations and standards, the FAA must take all NAS users into account, and that includes unmanned aircraft systems (UAS) and their operators.

The FAA is working to integrate UAS into the NAS, but UAS operations today pose a number of safety and security challenges. Coordination between the FAA and local law enforcement is essential, because we have different, but complimentary, roles. Law enforcement officers on the ground are in the best position to deter, detect, immediately investigate and, where appropriate, pursue enforcement actions to stop unauthorized or unsafe drone flights. It's important to note that a civil action taken by the FAA does not impact any criminal enforcement action taken by federal, state, or local law enforcement.

The FAA's role is in safety assurance. As a matter of policy, however, the FAA's compliance philosophy starts not with enforcement action, but rather by seeking to educate individual UAS operators about how they can fly safely under current regulations and laws. However, enforcement action will be taken for those who are unwilling or unable to comply with regulations.

In addition, state and local governments are enacting their own specific laws regarding the operation of UAS. Flight operations may also violate more broadly applicable laws such as assault, criminal trespass, or injury to persons or property. These statutes are available to law enforcement officers in order to take immediate action with respect to hazardous situations.

If you are a first responder and you are wondering about how best to proceed with respect to drone operations, this article is for you. It's also a good read for any UAS operator to better understand law enforcement's role in drone operations. Let's take a look at some of the details of this responsibility.

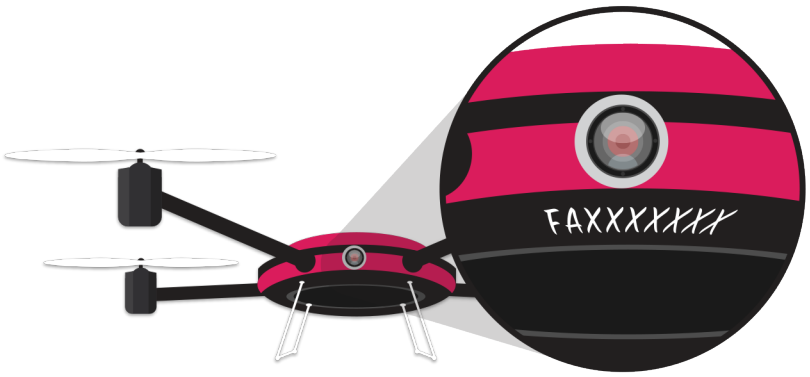
Registration Check

All UAS weighing more than 0.55 pounds (8.8 ounces), including everything onboard or attached, are required to be registered and marked before flown outdoors (14 CFR section 48.15). In addition, the law (49 USC section 44103(d)) requires the operator to make the certificate of registration for the aircraft available for inspection when requested by a representative of the United States Government, or by any state or local law enforcement officer.

Law enforcement officers also have a right to inspect the registration number and review the accompanying Certificate of Aircraft Registration, which the UAS pilot must carry in paper or electronic form. The unique FAA-issued registration number begins with either "N" or "FA," and it must be readily visible on the aircraft. The N-number is generally used for aircraft weighing more than 55 pounds. Anyone with access to the internet can verify an N-number by using the N-number lookup on faa.gov. The FA-number is generally used for small UAS (sUAS).

If a law enforcement officer needs to verify a FA-number, they need to call their local FAA Law Enforcement Assistance Program (LEAP) special agent. (To inquire about who your jurisdiction's LEAP agent is, send an email to LEAP@faa.gov.) FA-numbers issued for model aircraft only are issued to the individual operator, and a single FA number covers all aircraft owned by that hobbyist. All other registration numbers are specific to the aircraft. As of March 2017, there were nearly 750,000 UAS registrations, and 92 percent of those are for hobbyist use.

As stated before, the FAA starts with counseling and education but, if enforcement is required, the FAA may assess civil penalties of up to $27,500 for failure to register a UAS, including model aircraft. Criminal penalties include fines of up to $250,000 and/or imprisonment for up to three years.



Aircraft Use Check

"But officer, it's just a toy." It may be a toy, but it is also a civil aircraft. Under 49 USC section 40102(a)(6), an aircraft is "any contrivance invented, used, or designated to navigate or fly in the air." The FAA defines an aircraft as "a device that is used or intended to be used for flight in the air" under 14 CFR section 1.1. Title 14 further defines that a model aircraft is an unmanned aircraft that is:

- Capable of sustained flight in the atmosphere;
- Flown within visual line of sight of the person operating the aircraft; and,
- Flown for hobby or recreational purposes.

Under Public Law 112-95 section 336 (amending 49 USC), Congress makes it clear that the FAA has the authority under existing regulations to pursue legal enforcement action against persons operating model aircraft when the flight endangers the safety of the NAS. The same law requires that the model aircraft:

- Be flown strictly for hobby or recreational use;
- Be operated in accordance with a community-based set of safety guidelines and within the programming of a nationwide community-based organization;
- Limited to not more than 55 pounds unless otherwise certified through a design, construction, inspection, flight test, and operational safety program administered by a community-based organization; and,
- Be operated in a manner that does not interfere with, and gives way to, any manned aircraft.

Photo courtesy Drone360 magazine, Drew Halverson

When a model aircraft is flown within five miles of an airport, the law also requires the operator to provide the airport operator and the air traffic control tower (if present) with prior notice of the operation.

Pilot Check

Model aircraft operators do not require a "license" (pilot certificate) to operate as long as they are flying within safety guidelines and using a model aircraft as previously described.

If flying for more than recreation (i.e., flying for compensation or hire), the UAS operator must be a certificated remote pilot and operate according to 14 CFR part 107. The minimum age for a remote pilot certificate is 16. A certificated UAS operator must carry the certificate, which is a plastic card with a

unique certificate number and personally identifiable information. Upon request by law enforcement, a UAS pilot may voluntarily present their certificate to show that they are allowed to fly under part 107 sUAS rules; however, they must show their certificate to a representative of the FAA according to 14 CFR part 107.7.

As of March 2017, there are approximately 52,000 people certificated by the FAA to fly UAS commercially in the U.S.

Airspace Check

Model aircraft flying is permitted as long as the operator follows hobbyist aircraft rules and a community-based set of flight safety guidelines. However, if they are flying within five miles of an airport, they must notify the airport operator and the airport air traffic control tower if available. Notification doesn't mean asking for permission, but if a model aircraft is operated when advised not to, and it endangers the safety of the NAS, the operator is subject to enforcement action. If you are unsure whether the operation is within the five mile restriction of an airport — including heliports and seaplane bases — you can use the FAA's B4UFLY smartphone app to check (see our Angle of Attack department for more). Also note that some hobbyist groups may have established a mutually-agreed upon operating procedure with the airport operator and air traffic control tower when flying from a permanent location within five miles of that airport.

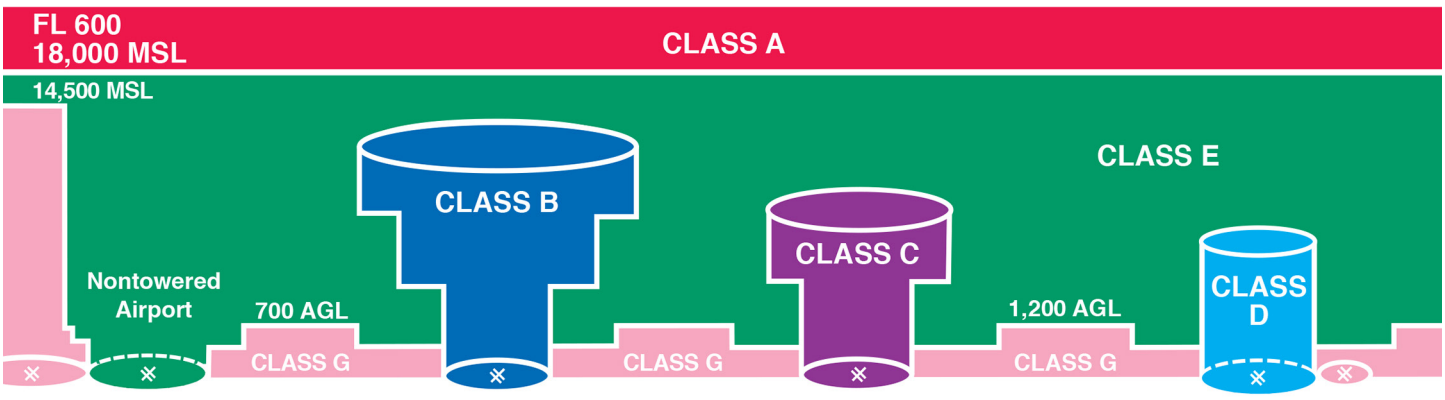
While the 5-mile limitation is not imposed on part 107 operators, they are restricted to flying in Class G airspace. However, the FAA can issue a waiver to allow flying in Class B, C, D, and E airspace. The operator must apply through an online process at faa.gov that involves proving the purpose of operation and method by which the proposed operation can be safely conducted. As of March 2017, more than 2,000 airspace waivers have been granted. If the remote pilot holds such a waiver, he or she must carry it during UAS operations. Referencing a VFR aeronautical chart (aeronav.faa.gov) to determine the classification of your local airspace is also useful.

If a UAS is flying in airspace where it is not authorized or poses an imminent safety issue, it should be reported to one of the FAA's 24/7 Region Operations Centers (ROC). (See the "LE Reference Card" link at the end of this article for contact information.) If a drone is seen from the cockpit, report it to ATC.

Location Check

The FAA sometimes issues Temporary Flight Restrictions (TFRs) — including for model aircraft operations. Some TFRs are actually permanent, such as those around the Washington DC capital region and Walt Disney World. Other TFRs are issued for VIP security, around major sporting events, and after natural disasters. You can check for the presence of TFRs by going to tfr.faa.gov or opening the B4UFLY app.

U.S. Airspace Classes at a Glance



NO DRONE ZONE

The U.S. National Park Service also prohibits UAS launching, landing, or operating a UAS from, or on, lands and waters it administers. You may also have state or local prohibitions.

To assist with awareness of TFRs in the UAS community, the FAA often uses a "No Drone Zone" social media campaign in advance of events driving that TFR.

Safety Check

In general, an unsafe UAS operation may look like:

- Aircraft out of operator's visual line-of-sight;
- Flight over 400 feet;
- Flight at night;
- Flight at more than 100 mph;
- Failure to yield right-of-way to manned aircraft;
- Flight over people; or,
- Operating from a moving vehicle.

For model aircraft, community-based flight safety guidelines generally address these issues. For civil UAS operators flying under 14 CFR part 107, these are the FAA's rules that the remote pilot in command must comply with, unless the pilot has a waiver. As of March 2017, the FAA has granted nearly 400 waivers, which must be carried by the remote pilot.

If there is an accident involving a part 107 UAS, the remote pilot is required to report it within 10 days if there is serious injury or loss of consciousness, or if the damage is more than $500, excluding the UAS.

The FAA has the statutory authority to inspect and investigate whether aircraft are in compliance with regulations at any time. A law enforcement officer should gather information and report it to their FAA LEAP agent; however, there may be separate state or local statutes available to law enforcement officers in order to take immediate action with respect to hazardous situations.

Just the Facts

Appropriate data collection during first responses and intra-agency communication help keep all levels of government positioned to both collect and share information that may be of interest to each jurisdiction. This information can include witness interviews, identification of operators, pictures of the location, and notification (through an FAA ROC) to LEAP special agents. Working together, we can help keep the NAS safe for everyone on the ground and in the air — and ensure that both manned and unmanned users can fly safely together.

Paul Cianciolo is an assistant editor and the social media lead for FAA Safety Briefing. *He is a former U.S. Air Force "sky cop," and a rated aircrew member and public affairs officer with Civil Air Patrol.*

Learn More

LE Reference Card:
http://bit.ly/2l8yI9e

LE Guide for Unauthorized UAS Ops:
http://bit.ly/2liBklL

JENNIFER CARON

Drone Maintenance Technician

Aviation Job of the Future?

"Do not follow where the path may lead. Go instead where there is no path and leave a trail."
— Ralph Waldo Emerson

Let's take a trip back in time — Kitty Hawk — when the Wright Brothers first took flight, and the "third man," Charles "Charlie" Taylor, became the first powered aircraft mechanic in history. Just imagine you're a witness — a bicycle mechanic like Charlie was — watching on the sidelines in awe, as the manned aircraft takes off into the sky. Back then, would you be thinking Charlie's a genius? An innovator? Or a "nut job?!?" I know if it were me, I would be thinking — "job of the future!"

Flash forward to 2017 — and drones (aka UAS) are the new aircraft, unmanned, sweeping the horizon. Imagine now in real time — you're an AMT, watching in amazement as drones become increasingly popular.

Are YOU the next Charlie Taylor — for drones?

Background

Whether you're flying for fun or for money, the excitement and awe of unpacking a drone is very similar. Fresh out of the box, the shiny new drone is packed with all the bells and whistles needed to take flight. There are assembly instructions, start-up directions, and a few troubleshooting tips. But, in most cases, one important thing is missing — how to maintain it, and how to fix it when it breaks.

Chapter 7 of FAA AC-107-2, *sUAS Maintenance and Inspection*, provides guidance for UAS operations https://go.usa.gov/xXBzZ. A helpful preflight inspection checklist is included to ensure the aircraft is in a condition for safe operation.

However, the maintenance for small UAS is up to the manufacturer. AC-107-2 states that all manufacturer scheduled maintenance instructions should be followed. There is no 14 CFR part 43 requirement for UAS maintenance, prescriptive or otherwise.

There are a couple of reasons for this situation. First, part 107, the small UAS rule for commercial use, is a performance-based rule, it is not a prescriptive rule that specifies what actions need to be done, and in what manner. Second, a UAS is not a certificated aircraft. It does not have type design requirements.

Because drone technology is evolving quickly, the FAA recognized that prescribing a certificated requirement on drones would diminish the agency's adaptability to create an environment where emerging technology can be safely and rapidly introduced.

Is There a Need?

As drones become more and more of "the" thing to fly these days, and with drone sales soaring each year, who's gonna maintain or repair these remotely-piloted aircraft?

I'm not talking about hobby, dime-a-dozen drones that are inexpensive, and easily replaced with a trip to the electronics store. "As you go further down in cost, it's almost not worth it to do the maintenance or get it repaired," explains Cyrus Roohi, Management and Program Analyst in the FAA's UAS Integration Office. "You can just go and get another one."

"On smaller drones, repair involves circuit board work. Unless you know how to solder a new motor in, for example, you're sending it back to the manufacturer to change out whatever is wrong on the board," says Roohi. That's the reason why most manufacturers do not include maintenance or repair manuals.

The Need Exists

If we're talking about the "Hawker 4000s" of the drone world — drones that start at $80,000 and up — that's where the need arises for maintenance and repair. Take, for example, drones used by the entertainment industry, sports stadiums, government, and law enforcement. These drones, still within the weight limitations of part 107, have intricate avionics, airframes and powerplants, software networks, GPS systems, and pricey cameras attached. The demand is growing. Thanks to the part 107 rule for commercial use, the general public is purchasing these top-of-the-line drones for business pursuits in real estate, photography, pipeline and rail inspections, security, and more.

There will be a need for qualified technicians who understand the details of aviation, and how a computer network runs, to service remotely-piloted aircraft.

Unless you have deep pockets, it's not advisable to just fly and toss these high-end drones when something breaks or stops working. Many upscale drones do come with full, highly detailed maintenance manuals including step-by-step instructions,

and photo guidance. "But most operators do not have the skill set to perform these types of repairs or maintenance functions," observes Roohi.

In the majority of cases, operators themselves cause the need for repair. Generally, the operator is not fully familiar with the UAS platform, its capabilities, and how all of its systems function. For example, drones can fly in different modes, such as fully automatic, manual, or altitude hold. "Most operators fly their drones in one mode only, and they don't know which mode to switch to in order to recover the aircraft from an emergency," Roohi explains.

More often than not, this leads to crashes and incidents, and to a need for UAS repair. When these high-end commercial drones become inoperative, the business owner is motivated by finances to get the aircraft up and running quickly.

Photo courtesy Drone360 magazine, Drew Halverson

Qualifications Needed

Predictably, there will be a need for qualified technicians who understand the details of aviation, and how a computer network runs, to service these aircraft. The military already employs maintenance technicians for its unmanned aircraft vehicles (UAVs), and the forecast is growing for technicians to maintain and repair the high-end UAS that operate under part 107.

"These top-of-the-line drones have intricate systems, airframes, and avionics that need to be taken apart and put together in a certain way," explains Roohi. He specifies that drone maintenance and repair require not just mechanical skills, but also an IT background, especially for drones that operate on a computer network. Technicians need to understand how a network operates, and how it communicates with ground control stations as well.

Roohi also points out that high-end drones are running onboard flight recorders. "A UAS technician could need to remove the memory card, read the telemetry, process it on a computer, plot charts depicting what the operator commanded the aircraft to do versus what the aircraft did, to diagnose and resolve the repair issue," Roohi explains. He notes that a drone technician needs to be computer and software savvy.

Job Growth and Future Potential

The job potential and growth is real, and most believe the UAS industry will grow exponentially. Just consider companies that look to use drones for package delivery. Theoretically, they will need thousands of UAS to meet delivery deadlines not only in the U.S., but around the world.

Even for the smaller, cheaper UAS, "Mom and Pop" drone repair shops could spring up, just like the now nearly defunct TV repair shops, popular back in the day.

The possibilities are vast. As more and more companies identify and create the need for UAS, the need for UAS technicians will flourish as well.

I ask again – are YOU the next Charlie Taylor for drones?

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

TOM HOFFMANN

The Inside Scoop on B4UFLY

For over a year now, the FAA's free B4UFLY app has been helping improve safety and situational awareness for unmanned aircraft system (UAS) operators throughout the country. As of late February, nearly 180,000 smartphone users have downloaded this easy-to-use app (available in both the iTunes App Store and Google Play Store) which gives users clear information on where they should and should not fly their drones. B4UFLY is designed with simplicity in mind, and focuses more on hobbyist drone operators who may not be as familiar with national airspace restraints and restrictions, and where there might be conflicts.

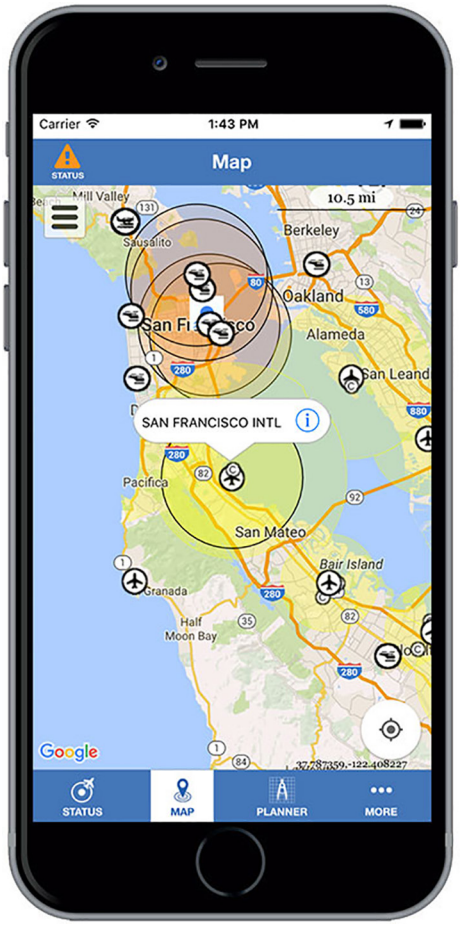
For those new to B4UFLY, or who would like a refresher on its features, allow me to break it down.

After downloading and opening the app, you will see four main tabs across the bottom of the screen. The app defaults to the Status page, which uses your phone's location services to show a flight status at your current location. The four possible options include: 1) Flight Prohibited; 2) Warning — Action Required; 3) User Caution — Check Restrictions; and, 4) Data Unavailable. Tap the "More Status Information" button for more specifics about your location. The restrictions depicted may be based on airspace types, proximity to airports, temporary flight restrictions (TFRs), or other federal laws and regulations. If restrictions exist, the app will specify and provide further details applicable to your area. It is important to note that any remote pilot can use the B4UFLY app, however some of the information and warnings provided may not apply to those operating for work or hire under 14 CFR part 107.

Next is the Map page, which shows a real-time overlay of airports and flight restrictions in your immediate area. If you only want to see certain restrictions, like controlled airspace boundaries or TFRs, the settings button at the top of the screen allows you to toggle layers on or off and customize your view. A search bar on the map screen also lets you search and save other areas on the map.

The Planner page lets you check flight requirements and restrictions for a future flight in your choice of location. Just select the location, date, and time and hit "Start."

Finally, the More page provides a list of helpful UAS resources and regulatory information, as well as a mechanism for providing feedback on the app.



That last point is important, as the FAA relies on feedback to make changes and enhancements that can improve the user experience for B4UFLY. This is especially true when it comes to airport data. Occasionally, an airport that closes may still appear on the map, so please be sure to report any of these instances you might come across. The FAA is working to improve this feature, and is making bug fixes and other changes that will improve the functionality and display capability of the map. Another planned enhancement based on user feedback and expected soon will be a more explicit notification of what type of airspace you're operating in, (i.e., Class B, C, D, etc.).

For more information, see the FAA's B4UFLY page at www.faa.gov/uas/where_to_fly/b4ufly/ and FAQ page at https://go.usa.gov/xXCvC.

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

Vertically Speaking

GENE TRAINOR

Collision Avoidance

Reports like those below from the FAA's regional operations centers come in almost daily to the Fort Worth-based Rotorcraft Directorate:

On January 16, a helicopter pilot reported from Hawaii that a drone, or unmanned aircraft system, was spotted next to the aircraft. Three days later, a helicopter pilot reported that a drone was spotted 1,300 feet above the ground near the Jefferson Memorial in Washington, D.C. The next day a police helicopter near St. Louis spotted a drone about 1,200 feet from the ground.

Sometimes helicopters are prevented from taking off due to drones operating nearby. News reports have surfaced about helicopters being grounded for 45 minutes at Cook Children's Medical Center in Fort Worth, Texas, or being grounded during firefighting efforts in California, and other parts of the West, because airborne drones have made helicopter takeoffs too dangerous.

Also in California, a police helicopter rescue crew had to suspend a mission in January to save a man who fell off a coastal cliff because a drone was in the area. After the drone was removed from the scene, the helicopter crew resumed its rescue mission. The drone operator was arrested for impeding first responders at an emergency scene.

Medical, news, police, agricultural, and firefighting helicopters are particularly vulnerable because they often must fly low (less than 400 feet above the ground) over highly populated areas or over areas or events that people want to photograph or view remotely. The risk for collisions increases because of the nature of these high workload flights.

FAA regulations restrict the use of commercial drones above 400 feet above ground and beyond visual line of sight. Hobbyists have more flexibility. In every case, FAA rules prohibit drones from engaging in careless and reckless operations. Regrettably, that rule is sometimes ignored despite potential criminal and civil penalties that can range from $21,000 to $231,000 each time a drone operator interferes with an emergency operation.

"I think we all know that the regular operators we've interacted with over the last several decades are people who know aviation. They know the rules, and they go through specific training that helps get them there," said Jim Stroiney, director of the FAA Enterprise Program Management Service during a recent video interview. "Now we're going to be dealing with a whole set of pilots and individuals who are hobbyists who may not actually understand all the rules of road."

To help pilots contend with this new reality, the United States Helicopter Safety Team (USHST) (www.ushst.org) has released about 30 suggestions for rotorcraft pilots to help them avoid colliding with drones. They include:

- Use available helicopter lighting to increase visibility to drone operators.
- When climbing, consider a cruise climb that maximizes visibility. Understand that helicopters are particularly vulnerable to a drone strike when they lift off or land.
- Listen closely to radio reports, including on 121.5 MHz, of drone sightings. Pilots should report any drone sightings to the nearest law enforcement agency.
- Conduct a high reconnaissance flight at any off-airport landing locations to provide a visual and aural warning to nearby drone operators.
- Keep airspeeds at or near the best autorotation speed when flying low; flying higher improves safety margins.
- If you need to move quickly to avoid colliding with a drone, be aware that windscreens, jet intakes, and rotor systems are particularly vulnerable to drone strikes. You could actually increase your risks of a strike, depending on how you try to evade a drone.
- If you see an aircraft with non-standard lighting, consider that it might be a drone.
- Maintain greater separation from a drone than might otherwise appear necessary. Be prepared for the unknown.
- Fly predictably so drone operators can better avoid you.

Keeping the skies safe requires vigilance, including reporting any drone collisions or near misses to an FAA Flight Standards District Office (www.faa.gov/about/office_org/field_offices/fsdo) or the appropriate Air Traffic Control facility. Identify and preserve any material evidence of an incident or a rogue drone. Reports help with enforcement and help with creating a database to promote safety with manned and unmanned aircraft operations.

Flight Forum

Certificate Holders vs Exercisers of Privilege

Thanks for the article ["Is it a Certificate, a Rating, or a License?"]. What is the pilot a "holder of?" By that I mean — say you hold an Airline Transport Pilot Certificate (ATP). You let your first class go beyond six months. You can no longer "exercise the privileges of" your ATP. But you can fly as a commercial pilot. Are you now "the holder of" a commercial pilot certificate? Or, "exercising the privileges of" a commercial pilot? Are you a commercial pilot or an ATP???

The same goes for a commercial pilot now flying on a third class as a private pilot, and a private pilot flying on a driver's license as a sport pilot. My take is you are the "holder of," but are "exercising the privileges of ..." You are ALWAYS the holder of the highest certificate you have qualified for.

As a practical application, a sport pilot is not permitted to fly in Bravo airspace without an endorsement. But what if he is a private pilot who CAN fly in the Bravo, but is exercising the privileges of a sport pilot. Does he need a logbook endorsement??? Thanks in advance.

— Bob

Great questions, Bob. You are correct that you are always the holder of the higher-level certificate. You may, however, just be exercising the privileges of a lower one. A person who holds a U.S. driver's license and a recreational pilot certificate or higher with a category and class rating may exercise sport pilot privileges and operate any LSA in that category and class in Class B airspace, without getting the endorsement specified in Title 14 Code of Federal Regulations (14 CFR) section 61.325. For more detailed information, see 14 CFR 61.303.

Personal Minimums to Personal Processes

Hi Susan - I'm finishing up my prep for an instrument rating, did the FAA online Icing tutorial, and followed the link to your article. Fantastic!! I'm a CFI-Gliders, have my own minima there that took me a long time to develop, but I have a hard time guiding my students on the subject. With a newish ASEL PP, finding my minima in aircraft with spinny things on the front has been similarly tricky. Your article really helps a lot. I've forwarded it to several other pilots already. Thanks a lot. cheers,

— Ken

Hi Ken – Thanks very much for the day-brightening note. I am very glad to know that you found the material useful. Like you, I found it challenging to develop (even understand) personal minimums at first. I wanted to share what I had figured out so it could help fellow pilots get there faster. Thanks again, and all the best with your flying and teaching.

Hitting the Mark

Congratulations, excellence would best describe your quality bi-monthly aviation magazine. I look forward to each issue for the informative articles on aeronautical safety, education, relevant airport and airspace news and viewing the outstanding photos and illustrations in each issue. In my opinion; your dedication makes this the best aviation publication in our industry.

Best wishes for the new year,

— Steven

Thanks so much for the feedback, Steven. It's very encouraging to hear that we're hitting the mark.

Facebook Comment of the Month

Two pieces of advice learned from my dad when I asked how he survived WWII flying what many called a death-trap airplane: "First of all," he said quietly, "when I'm around an airplane, I'm never in a hurry. And if you haven't left the ground yet, sometimes the best thing to DO is DON'T." Took me awhile to appreciate the full meaning of that, but it served me well later.

— Bill

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 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 e-mail SafetyBriefing@faa.gov.

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

SUSAN PARSON

From Kitty Hawk to Global Hawk

Aviation is proof that — given the will — we can do the impossible.

— Eddie Rickenbacker

Many years ago, I had the privilege of attending one of Washington's big black-tie aviation awards dinners. I have long since forgotten both the award and the recipient, but I do remember that dinner as my introduction to the music of Ken Dravis.

I am generally not partial to the genre of country music but, as a family member has wryly observed, "Susan will like *anything* connected to aviation." It turns out that Dravis is not only a country singer/songwriter, but also a pilot. So, naturally enough, I went home that night with a CD (remember those?) of his "Hooked on Flight" album, which now lives in my iTunes library along with his two later flight-focused albums.

Drones are already allowing us to do old things in new ways, and opening the door to doing new things we couldn't previously even imagine.

As we worked on this UAS-themed issue of *FAA Safety Briefing*, I couldn't help recalling the words to what is perhaps my favorite song from "Hooked on Flight." In a thoughtful piece called "Kitty Hawk," Dravis imagines how the Wright Brothers might react if they could see how far aviation has come since that windy December day at Kitty Hawk:

In time it all came together/It was you who led the way

Your eyes would fill with wonder/If you were here for just a day

We're a long, long way from Kitty Hawk …

Um, yes. We are indeed a long, long way from aviation's modest beginnings, having not only gone to the moon — another line in the song — and filled the skies with airplanes longer than any of the Wrights' first flights, but also moved well into the dawn of the drone era.

As I pondered the incredible Kitty Hawk-to-Global Hawk trajectory of technological progress, I was sufficiently curious to compare a few of the structural and performance characteristics, summarized in the chart below.

Quite a difference, isn't it?

While it doesn't mention drones, filmmaker Brian J. Terwilliger's lovely "Living in the Age of Airplanes" documentary is relevant to this Kitty Hawk-to-Global Hawk reverie of mine because it offers a splendid sense of appreciation of just how much aviation has changed virtually everything about our world — where we can go, what we can buy, what we can do.

It seems that each and every day, we see still more glimpses of just how profoundly the era of UAS will similarly transform our lives. As I observed elsewhere in this issue of the magazine, drones are already allowing us to do old things in new ways, and opening the door to doing new things we couldn't previously even imagine.

It's a fascinating thing to watch, and I feel blessed and privileged to live not just in the age of airplanes, but in the age of aviation and all the transformative potential it holds. I hope you do as well.

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

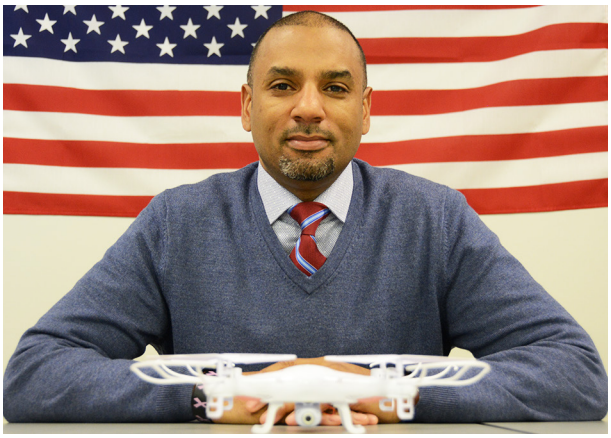
	Kitty Hawk (Wright Flyer)	Global Hawk (RQ-4)
Wingspan	40.3 ft	130.9 feet
Length	21.1 ft	47.6 feet
Weight	605 lbs (empty)	14,950 lbs (empty)
Range	120 feet (first flight)	12,300 nautical miles
Powerplant	4 cylinder engine with two contra-rotating propellers turning at 350 rpm	RR-North American F137-RR-100 turbofan engine
Power	12 hp at 1150 rpm	7,600 foot pounds (thrust)
Speed	30 mph (top speed)	310 knots
Crew	One person	Three remote crewmembers

PAUL CIANCIOLO

FAA Faces

Everette Rochon

Part 107 Policy and Implementation Lead, General Aviation and Commercial Division



Aviation Safety Inspector (ASI) Everette Rochon is one of those rare D.C. natives. He was born in the nation's capital, but he grew up in various locations around the globe as a military dependent and calls Virginia *home*. As a kid, he remembers his career Army officer father taking him to various airshows at nearby military bases, which is what sparked his interest in aviation.

"By high school, I decided on a career in aviation," he explains. "I planned to attend Embry-Riddle, but I also knew from friends and mentors that the military was a common route to a pilot seat."

He went the military route.

"The excitement of naval aviation and beauty of Annapolis attracted me to the Naval Academy," he notes. "It was a life-changing decision."

After graduating from the U.S. Naval Academy, Everette attended flight school as a naval flight officer and was selected to crew the Lockheed S-3B *Viking* as a navigator/weapon systems operator. The *Viking* is a four-seat, carrier-based jet used for undersea and surface warfare, electronic warfare, and aerial refueling missions.

He developed his "love of aviation safety" while assigned as the squadron's safety/standardization officer, (more on that shortly). After a stint at the Pentagon as a Navy foreign liaison and White House social aide, he decided to pursue a civilian career flying for the airlines.

"Because I lacked the required pilot in command time for the airlines, I attended a professional pilot course outside of Orlando, obtained my civil ratings, and served as a flight instructor until I was hired by Atlantic Coast Airlines operating as United Express," he said. "United Express transitioned to Independence Air. After a hopeful run of a few years, Independence Air folded due to the post 9/11 environment and fierce airline competition."

On a positive note, that gave Everette more family stability. He worked as a defense contractor on Air Force flight simulators and flying hour programs. He later applied for work with the FAA's General Aviation and Commercial Division as an operations ASI.

"I always saw the FAA as the pinnacle of aviation safety work."

He served as the manager of the Commercial Operations Branch until he was asked to lead the part 107 small unmanned aircraft systems (UAS) rulemaking team two years ago.

"The publication of the part 107 final rule for non-hobby UAS was a monumental achievement for the agency. I had an opportunity to work with a team of the smartest and most professional people in the FAA to make it happen."

Now Everette is the part 107 policy and implementation lead for Flight Standards. He sees one of the challenges facing the integration of UAS into the airspace is defining integration itself.

"We're learning that the term integration means different things to different people. It could mean expanding UAS operations, which are still segregated from manned operations, or it could mean full integration of operations where manned and unmanned aircraft share the same airports and airways on a routine basis," he explains. "Safely enabling full UAS integration in the NAS needs three things: emerging technology, a flexible regulatory framework, and FAA-industry collaboration."

Everette is a current flight instructor, and he loves flying the Cirrus SR20 through the skies of Virginia. He is excited to be with the FAA during the growth and transformation of the UAS industry. In particular, he sees that the commercial uses of UAS can transform aviation and transform society. The possibilities for UAS are limitless.

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 public affairs officer with Civil Air Patrol.*

U.S. Department
of Transportation

**Federal Aviation
Administration**

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

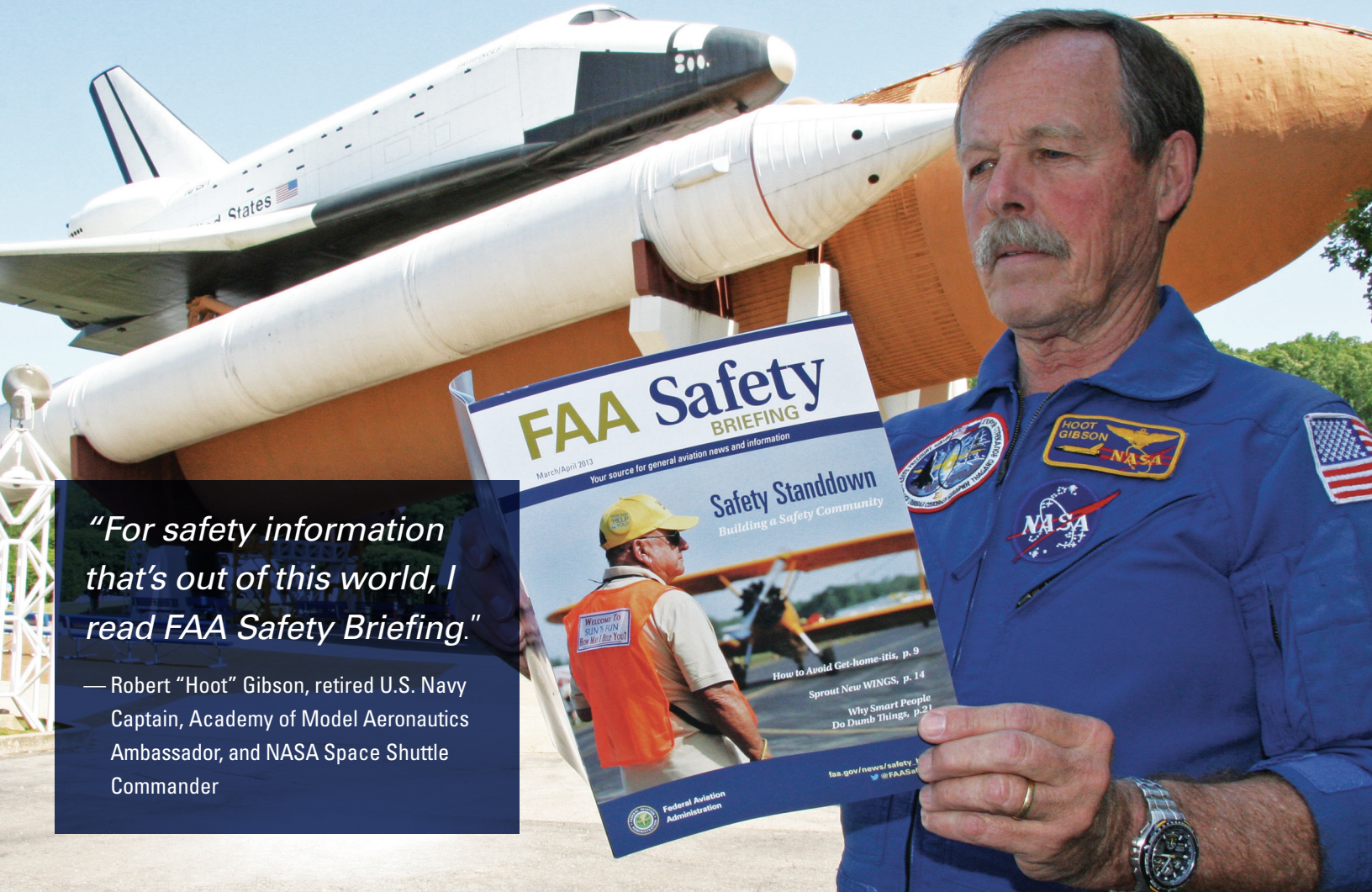
FORWARDING SERVICE REQUESTED

Official Business
Penalty for Private Use $300

faa.gov/news/safety_briefing

faa.gov/news/safety_briefing **@FAASafetyBrief**

Look Who's Reading FAA Safety Briefing



"For safety information that's out of this world, I read FAA Safety Briefing."

— Robert "Hoot" Gibson, retired U.S. Navy Captain, Academy of Model Aeronautics Ambassador, and NASA Space Shuttle Commander