

FAA Safety BRIEFING

November/December 2017

Your source for general aviation news and information



In Celebration of Simulation — Improving Flight Safety One Byte at a Time [p 7](#)

The A-Z of ATDs — Sorting the Lot of Flight Simulation Devices [p 9](#)

The Future is Now — Flight Standards Service Realigns [p 26](#)



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The November/December 2017 “Sim City” issue of FAA Safety Briefing explores the exciting world of flight simulation technology and its evolving impact on aviation safety. Feature articles focus on the many flight simulation options now available to pilots, as well as how simulation can improve efficiency, efficacy, and overall flight safety.



Features

- 7 In Celebration of Simulation** Improving Flight Safety One Byte at a Time
by Susan Parson
- 9 The A to Z of ATDs** Sorting the Lot of Flight Simulation Devices
by Tom Hoffmann
- 14 Link Trainer to Desktop to Redbird** The Evolving Role of Flight Simulation
by William E. Dubois
- 18 Navigation Know-How** Using Simulation to Try It Before You Fly It
by Susan Parson
- 20 Do You Suffer from Push-to-Talk Phobia?** Improve Your Aviation Communication with Virtual Reality
by Jennifer Caron
- 23 A Virtual Plan for the Real World** How Simulation Can Help You Mitigate Risk
by James Williams
- 26 The Future is Now** Flight Standards Service Realigns
by John Duncan

Departments

- 1 Jumpseat** – an executive policy perspective
 - 2 ATIS** – GA news and current events
 - 5 Aeromedical Advisory** – a checkup on all things aeromedical
 - 17 Checklist** – FAA resources and safety reminders
 - 28 Nuts, Bolts, and Electrons** – GA maintenance issues
 - 29 Angle of Attack** – GA safety strategies
 - 30 Vertically Speaking** – safety issues for rotorcraft pilots
 - 31 Flight Forum** – letters from the Safety Briefing mailbag
 - 32 Postflight** – an editor’s perspective
- Inside back cover FAA Faces** – FAA employee profile

The Leading Edge

During this year's EAA AirVenture in Oshkosh, I marked the milestone of more than 50 years since my first solo. I made that flight in a very basic airplane. I still like flying that way in my Titan Tornado LSA, but just a glance around the grounds of events like AirVenture illustrates how much the aviation training world has changed. Even the most basic airplane might have some fairly sophisticated avionics. In addition, flyers now have access to equally sophisticated training tools and technologies. As the magazine team discusses in this "Sim City" issue of *FAA Safety Briefing*, these include a variety of simulation and "augmented reality" options that, if used correctly, can accelerate the overall training and learning process — especially the acquisition of critical skills like risk management.

Augmented Reality

Effective risk management requires situational awareness and, thanks to the winners of the 2017 EAA Founder's Innovation Prize competition, GA pilots may soon have access to a terrific new augmented reality (AR) tool. (If you're not yet familiar with that term, AR uses technology to superimpose a computer-generated image on the user's view of the real world, thus creating a composite — or "augmented reality" — image.) A team comprised of northern Virginia high school students Thomas Baron, Justin Zhou, and Max Lord developed an AR technology concept that uses a wing-mounted sensor pod to transmit airspeed and angle of attack on a head-mounted display. Called the "Remora System," this display enables the pilot to continuously monitor these important values at all times, and without looking at the panel during critical phases of flight.

Remora started as a high school class project, building from Thomas Baron's experience as a student pilot with precise airspeed standards instilled by his ex-Navy pilot father. With advice from last year's EAA Founder's Innovation Prize winner, the Remora System team made their first visit to Oshkosh as one of five finalists selected from more than 70 submissions. Each team in the finals had ten minutes to present its concept to a distinguished panel of judges, who followed up with five minutes of challenging questions.

Final Five

The Remora System prevailed, but the rest of the final five also presented concept technologies relevant to this issue's focus area:

Second prize winner Andy Meyer's Aural Cuing System seeks to prevent loss of control events by using a small box to provide aural cues that, as the name suggests, change as the aircraft approaches attitudes that could lead to loss of control. The Aural Cuing System works from a small box that can be mounted anywhere in an aircraft.

The Solar Pilot Guard developed by ex-astronaut Mike Foale got third place. Using a wing-mounted device, the Solar Pilot Guard sends differential pressure measurements to a neural network processor specifically programmed to the aircraft type. This form of artificial intelligence "understands" the aircraft's energy states and gives the human pilot voice cues to help prevent loss of control.

Fourth place went to the Buzz Ball concept technology developed by Ethan Brodsky. In this concept, the pilot gets tactile (buzzing) seat feedback from a sensor and processor package that can identify uncoordinated flight. The Buzz Ball gives left or right seat feedback to prompt correct pilot action.

Though more traditional in approach, fifth place winner Henry Vos' How Not to Fly proposal would modify the airspeed indicator display to help the pilot avoid flying in the caution (yellow arc) or red (never exceed) regimes.

We All Win

It was a privilege to see these innovative technologies and meet some of the final five inventors at AirVenture. While they are all deserving winners, I have to conclude that such developments — as well as those still to come through this competition and the new part 23 regulations — make us all winners in the safety realm. Congratulations to this year's winners for their leading edge contributions to aviation safety.ch developments — as well as those still to come through this competition and the new part 23 regulations — make us all winners in the safety realm. Congratulations to this year's winners for their leading edge contributions to aviation safety.



VFR 'Not Recommended' Research Underway

FAA's weather technology in the cockpit researchers are currently evaluating Visual Flight Rules (VFR) not recommended — or VNR for short — in order to make the statement more effective for pilots. The VNR statement is an advisory that flight service station specialists use during weather briefings when the forecast includes weather phenomena that may prevent visual flight conditions.

The goal is to make VNR more objective, descriptive, and standardized to provide pilots with justification for the statement. According to a recent AOPA survey, 68 percent of pilots believe it would be helpful to receive a VNR statement with a web briefing.

The objectives of this study are to determine:

- How a pilot and specialist assess the VNR status;
- How a VNR statement from a specialist affects a pilot's decision; and,
- How the provision of the flight category (see chart) affects a pilot's decision.

The test plan involves pilots, meteorological experts, and weather briefing specialists. The subject matter experts will establish the correct responses to a series of adverse weather scenarios using basic weather information, and present it to the test group. Participants will then use a checklist to select items that contributed to their flight category decision. If VNR, participants will indicate how confident they are of their decision using a scale of low, medium, or high. The specialist and pilot decisions, along with

reasons for their decisions, will identify whether there are ways to make the VNR statement more objective and thus enhance its safety benefits.

Also, as part of the move to self-assisted flight services, understanding how each group arrived at the VNR decision may enable automation to better support VNR decisions and deter pilots from flying into risky conditions in the future.



NTSB Forum: Runway Incursion Safety Issues, Prevention, and Mitigation

There are over 50 million IFR/VFR takeoffs and landings every year in the National Airspace System (NAS). For the most part, each is conducted with the high level of safety and efficiency that has become synonymous with operations in the NAS. Every once in a while, however, those operations can creep a little bit too close to one another and possibly interfere with the safe execution of a flight or landing. When this happens on the ground, it is typically the result of a runway incursion (RI), which is the incorrect presence of an aircraft, vehicle, or person

CATEGORY	CEILING		VISIBILITY
Visual Flight Rules VFR (green sky symbol)	greater than 3,000 feet AGL	and	greater than 5 miles
Marginal Visual Flight Rules MVFR (blue sky symbol)	1,000 to 3,000 feet AGL	and/or	3 to 5 miles
Instrument Flight Rules IFR (red sky symbol)	500 to below 1,000 feet AGL	and/or	1 mile to less than 3 miles
Low Instrument Flight Rules LIFR (magenta sky symbol)	below 500 feet AGL	and/or	less than 1 mile

Explanation of VFR/IFR flight category conditions

on the protected area of a surface designated for the landing and takeoff of aircraft.

After trending steadily downwards throughout the early 2000s, the yearly RI rate has gone stagnant with the NAS averaging around 2,000 RIs a year, over the last six years. Sixty-eight percent of all RIs are pilot deviations and of those, 80 percent involve GA aircraft. In order to remain proactive and gain insight into why progress has slowed, the NTSB held an informal forum in last September. The forum was specifically designed to discuss the underlying issues surrounding runway incursions. Subject matter experts from the FAA, AOPA, the Air Line Pilots Association International (ALPA), individual airline Aviation Safety Action Program (ASAP) managers, EUROCONTROL, NASA, and various international airports authorities were brought together to exchange ideas and establish new collaborations.

For more information and to view a recorded webcast of the forum, check out [ntsb.gov/news/events/Pages/2017-ri-FRM.aspx](https://www.ntsb.gov/news/events/Pages/2017-ri-FRM.aspx). Content will be held in an archive for up to three months post forum.

New Certification Rule for Small Airplanes Becomes Effective

The final rule overhauling airworthiness standards for general aviation (GA) airplanes officially went into effect on August 30. This rule is expected to enable faster installation of innovative, safety-enhancing technologies into small airplanes, while

reducing costs for the aviation industry.

With these performance-based standards, the FAA delivers on its promise to implement forward-looking, flexible rules that encourage innovation. Specifically, the new 14 CFR part 23 revolutionizes standards for airplanes weighing 19,000 pounds or less and with 19 or fewer passenger seats by replacing prescriptive requirements with performance-based standards coupled with consensus-based compliance methods for specific designs and technologies. The rule also adds new certification standards to address GA loss of control accidents and in-flight icing conditions.

The new part 23 also promotes regulatory harmonization among the FAA's foreign partners. This harmonization may help minimize certification costs for airplane and engine manufacturers, and operators of affected equipment, who want to certify their products for the global market.

Safety Alert Highlights Incorrect Airport Surface Approach and Landings

On August 18, the FAA issued a Safety Alert for Operators (SAFO) that highlights the importance of employing best practices for successful approaches and landings to the correct airport and runway. The SAFO referenced an incident that occurred last July at San Francisco International Airport where a commercial airliner mistakenly lined up for approach on a taxiway and overflew other airliners that were

Safety Enhancement Topics

November: Engine Maintenance & Performance

Understanding the scope and safety benefits of Flight Data Monitoring (FDM) tools.



December: FADEC

Understanding the benefits of equipping with a Full Authority Digital Engine Control.



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



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awaiting takeoff clearance. Although SAFO 17010 addresses some mitigations specific to air carrier flight crews, there are several key takeaways for GA pilots as well.

The SAFO covers five main focus areas to help you improve safety: keeping a stabilized approach, proper use of technology, crew resource management, utilizing all available resources, and being ready for a go-around. The SAFO stresses pilots review airport diagrams and Notices to Airmen (NOTAMs) as well as use approach navigational aids under both VMC and IMC conditions. To view the SAFO, go to go.usa.gov/xRFn5.

NTSB Does Not Recommend Flying on Empty

Better fuel management by aviators could prevent an average of 50 GA accidents a year, according to the NTSB's safety alert, 'Flying on Empty,' issued last August. Within the category of fuel-related accidents, fuel exhaustion and fuel starvation continue to be leading causes. From 2011 to 2015, an average of more than 50 accidents per year occurred due to fuel management issues. Fuel exhaustion (running out of gas) accounted for 56 percent of fuel-related accidents while fuel starvation (where gas is present, but doesn't reach the engine) was responsible for 35 percent of these accidents.

Running out of fuel or starving an engine of fuel are highly preventable. An overwhelming majority of NTSB investigations of fuel management accidents (95 percent) cited personnel issues such as use of equipment, planning, or experience in the type of aircraft being flown as causal or contributing to fuel exhaustion or starvation accidents. Equipment issues contributed to just five percent of fuel management accidents.

The NTSB safety alert, available at 1.usagov/2xS5yCP, highlights several investigations relating to fuel exhaustion and starvation and offers several preventive measures pilots can take.

Photo by CAP Col. Jane Davies



The Limits of Simulation

In these pages, we explain the virtues and limitations of simulator training. Simulators are profoundly valuable when it comes to training and certificating airmen for flying abilities. So why don't we allow them for the assessment of neurocognitive impairments that can accompany conditions like traumatic brain injury, stroke, Transient Ischemic Attack (TIA), ADHD/ADD, substance abuse/dependence, and depression/SSRI medication use? That question and many other neurology policy questions prompted a meeting of the FAA's neurologist consultants to review and update the FAA's medical certification policy regarding many neurologic conditions. Participants also pondered whether brain imaging and a neurological clinical exam, along with a simulator evaluation, would be sufficient to detect significant neurocognitive deficits.

In both cases, the answer was no.

Why Sims Don't Work

It's not that we don't see the value of simulators. It's just that even the best multi-million dollar simulators are still poor instruments to measure subtle cognitive impairment in a pilot. One of our experts, Chris Front, Psy.D., is an aerospace clinical psychologist and GA pilot who has examined this issue. The research is quite clear that specific functions of the brain are critical to pilot performance. These include perceptual-motor abilities, spatial abilities, processing speed, and in particular, "executive functions" such as logical and flexible problem-solving, attentional skills, working memory, sequencing abilities, and so forth. These factors are very predictive of pilot performance in general and in determining what, if any, deficits exist in an individual airman.

So how do flight simulators do in isolating and testing executive functions? Not well, and the problems can't be solved by simply improving simulator fidelity. The first, and largest, problem is data. In order to have a valid test, we need what's called normative data. Normative data is used to show what performance to expect from the population so we have a measuring stick against which to evaluate the people we are testing. To determine whether there is a deficit, you must first define what a normal reading is. To have a valid simulator test for a neurocognitive deficit, therefore, we would need normative data for every simulator we would want to use. Compiling and maintaining such a database

would be virtually impossible.

This issue leads to problem two, novelty. In order to best test the brain's executive functions, you need novel scenarios. Anyone who has experienced more than a few simulator checks would probably agree that the scenarios presented in the simulator are not exactly novel. Even assuming we could create a novel simulator check, we would then need to collect normative data regarding each scenario. The novelty of the scenario would likely be short lived, because pilots quickly get "the gouge" and test validity would soon evaporate. There are other issues that also disqualify simulators for medical evaluation, but these are two of the most difficult ones.

What Does Work?

As Dr. Front noted, research has clearly identified the neurocognitive functions most closely aligned with flight performance. During the 1980s, the FAA contracted for the development of a specialized test to measure these functions. The result was CogScreen-Aeromedical Edition (CogScreen-AE), a computer-administered test that assesses elements such as attention, memory, visual-perceptual functions, sequencing functions, logical problem solving/executive functions, psychomotor speed and coordination, and simultaneous information processing abilities. CogScreen-AE is also "normed" on pilots (large commercial airline, and regional carrier) rather than the general population.

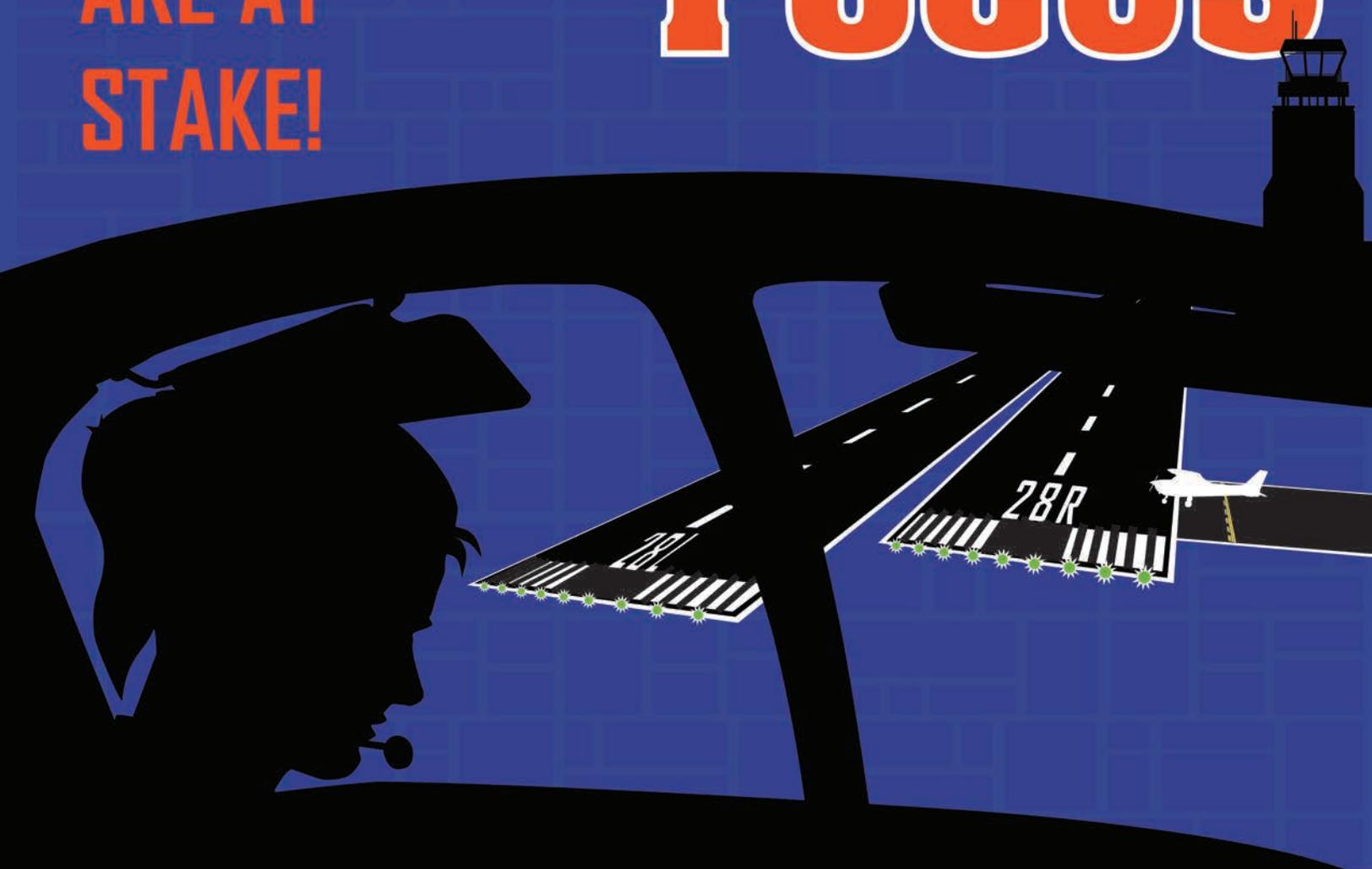
In testing against Flight Data Recorder (FDR) data overseas (where the laws allow such research), CogScreen-AE was determined to be highly predictive of airline pilot performance. It has also been shown to be highly effective in detecting neurocognitive deficits that could impact flight safety. In 2013, the FAA added GA pilot normative data (meaning that individual performance can also be measured against that of other GA pilots).

While simulation is an exceptional tool for training purposes, the bottom line is that neuropsychological assessment that includes CogScreen-AE is a far better tool for determining a pilot's Aeromedical fitness status.

Even the best multi-million dollar simulators are still poor instruments to measure subtle cognitive impairment in a pilot.

Look. Listen. Focus.

LIVES
ARE AT
STAKE!



- **IT CAN HAPPEN TO YOU:** When flying a condensed traffic pattern that doesn't allow you to accurately visualize the runway, you may accidentally land on the wrong runway than originally cleared for.
- **THE FIX:** Fly a standard pattern unless you are very familiar with the airport. Don't feel intimidated by ATC, if it's a maneuver you're not comfortable performing, just say "unable."



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



IN CELEBRATION OF SIMULATION

Improving Flight Safety One Byte at a Time

Photo by Tom Hoffmann

In his 2008 book, *“Outliers: The Story of Success,”* author Malcolm Gladwell posits that one thing high achievers in any field have in common is adherence to the so-called 10,000-hour rule. Based on a study by Florida State University professor Anders Ericsson, this “rule” holds that success in a given activity is based not so much on talent, but rather on lots of practice.

It would be wonderful if we could all log 10,000 hours of actual flight time, but that’s probably not feasible for those who fly for recreation or personal transportation. However much we might want to, most GA pilots have neither the time nor the resources for that level of activity.

Enter the simulation option.

The air carrier world’s long and well-documented use of simulation for training and checking clearly demonstrates both the benefits and the value of this approach. Fortunately for all of us, today’s simulation technologies provide a myriad of low-cost opportunities — everything from smartphone apps to motion-capable training devices — for GA pilots and mechanics to strengthen their knowledge and skills.

To that end, we devote this “Sim City” issue of the *FAA Safety Briefing* magazine to raising awareness of the range of simulation options, and explaining how you can use them to enhance both training and the “in real life” flying you do after certification.

Here’s the overview:



Certification

Air carrier pilots have long been able to use sophisticated full-motion simulators for training, certification, and checking in commercial airliners of all sizes. Indeed, many passengers might be astonished to know that they are flying — safely — during a fully-qualified pilot’s first time at the controls of the real airplane.

That level of simulation capability and credit is not yet available to pilots training for certification in typical GA aircraft. Still, today’s aviation training devices (ATDs) offer many opportunities to learn basic and advanced skills and earn log-able time in an effective and cost-efficient way.



Aviation

In both the VFR and IFR operating environments, aviation is very procedure-oriented. Whether for learning the basic skills and procedures you need to master for a new airplane or simply getting more practice with those you already use, simulation technologies can help you maintain and even enhance your ability to aviate — that is, maintain precise control of attitude, altitude, and airspeed.

Today’s simulation technologies provide a myriad of low-cost opportunities — everything from smartphone apps to motion-capable training devices — for GA pilots and mechanics to strengthen their knowledge and skills.

✦ Navigation

With an ever-expanding range of airborne navigation technologies, handheld and desktop simulation products can help you safely learn both the mechanical “knobology” and the content organizational scheme of your major moving map navigator. We’ll also take a look at how simulation can allow you to practice flying planned routes and procedures long before you line up on the departure runway.

📶 Communication

While it may be an exaggeration to say that pilots fear the microphone more than anything else, the jargon-rich chatter and patter of aviation can be intimidating not only to newcomers, but also to veteran pilots unaccustomed to the rapid-fire pace of ATC communication. Happily, pilots can use a number of simulation options both to master the fundamentals and foster fluency in “AviationSpeak.”

💡 Mitigation

Perhaps the best-known use of simulation technologies is in safely acquiring, perfecting, and

maintaining the procedures and skills needed to successfully handle inflight emergencies. Using simulation for risk management — i.e., identifying hazards, assessing the level of risk, and developing mitigation measures — can also help you prevent actual emergencies.

In addition to the many real benefits it offers, simulation can be downright fun: it lets you experience events you can’t feasibly or safely do in the actual airplane, and it keeps you immersed in our collective favorite subject regardless of weather or aircraft availability.

So join us in this journey through Sim City. Read on! ✈️

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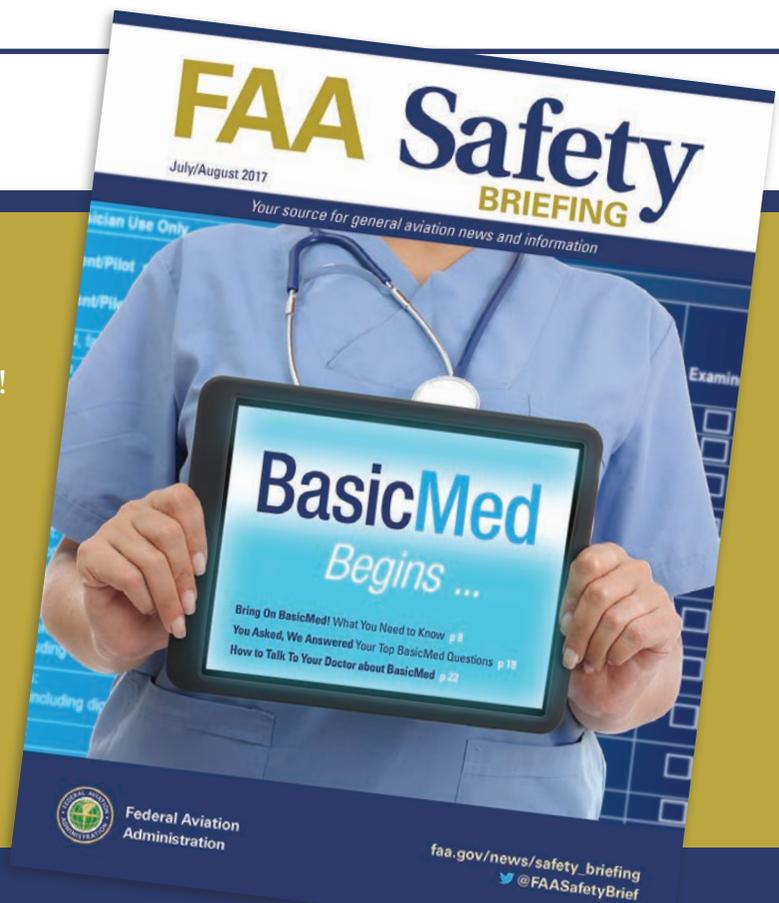


Photo by Tom Hoffmann

The A^{to}Z of ATDs

Sorting the Lot of Flight Simulation Devices

BY TOM HOFFMANN

Whether you're a baby-boomer aviator or a millennial pilot-in-training, chances are you've spent some quality time at flight level "0" learning how to be a better pilot. I'm referring to flight simulation devices which, from the very dawn of aviation, have been instrumental in helping pilots hone their flying skills, practice the impracticable, and attain an intimate familiarity with their aircraft — all without the high costs or risks associated with flying. The benefits are undeniable, which is why the FAA is working to help more airmen benefit from this safety enhancing technology. Look no further than the FAA's revised regulations on the topic in recent

years. In addition to providing some welcome flexibility on training allowances towards certification, revisions have introduced us to a new and more logical lexicon for categorizing these flight training devices.

While the news is generally good for those seeking to rely more on their aircraft's "electronic twin" for gaining experience and training credit; the options, features, and corresponding limitations for these ground trainers do require some attention to ensure you're getting the most out of what they can offer. The following are some tips to help you navigate the world of "Sim City."

Simulation Classification

The FAA categorizes aviation ground trainers into three main categories: *full flight simulators*, *flight training devices*, and *aviation training devices*. This article will focus on the latter category, as they are the most directly applicable to the general aviation training environment. However, having a general understanding of the former two categories is also important to have a more complete picture of the role of flight simulation training, especially if you plan to pursue more advanced training or have your eye on getting a type rating.

FFS: We'll start first with the heavy hitters: flight simulators — or more accurately — full flight simulators (FFS). These more capable (and more expensive) training devices are required to have motion and visual capabilities. FFSs are sub-categorized into four levels, A through D, with Level D being the most sophisticated and having the most requirements, including six degrees of motion and realistic cockpit sounds. All levels of FFSs are objectively evaluated against airplane specific validation data (typically aircraft flight test data) to ensure that the FFS's aerodynamics, flight controls characteristics, and ground handling characteristics represent a specific make, model, and series of aircraft. An FFS is often a "type" specific platform. It's because of this that pilots can use a FFS to earn a type-rating without flying the actual aircraft. Many FAA-approved part 142 training centers use FFSs to train professional pilots for type ratings and to deliver the recurrency training required by regulation and insurance companies.

FTD: The next category is flight training devices, or FTDs. These devices are designed to represent a specific aircraft configuration and, depending upon the FTD's qualification level, may include an enclosed cockpit and realistic visual references. They are not always motion capable, but are sophisticated enough to provide training in preparation for commercial and airline transport pilot certificates, as well as other ratings. You can find specifics on these allowances in figure 1, page 12.

FTDs are very popular with aviation-oriented universities and colleges. The airline industry also uses these devices extensively to train new hires or provide for upgrades (First Officer to Captain) and transition training (e.g., B-737 to B-747 aircraft), or for recurrency training. FTDs are sub-categorized into Levels 4 through 7. Levels 4, 5, and 6 apply to

fixed wing devices, while Level 7 applies to helicopters. Incidentally, Levels 1 through 3 apply to older devices that are either no longer supported, grandfathered, or were recategorized elsewhere (some become ATDs, which we'll cover next).

Please note that Full Flight Simulators and FTDs (collectively called Flight Simulation Training Devices - FSTDs) come under the guidance, evaluation, and approval of the FAA's National Simulator Program (NSP) in Atlanta and are regulated under 14 CFR part 60, *Flight Simulation Training Device Initial and Continuing Qualification and Use*. For more on the NSP, see the article "Better than Real" on page 20 of the Sep/Oct 2011 issue of FAA Safety Briefing at go.usa.gov/xRt5g.

The Next Generation of ATDs

That brings us to our final category, the Aviation Training Device or ATD, which is by far the most common option for GA flight training. In 2008, the FAA adopted Advisory Circular (AC) 61-136, *FAA Approval of Aviation Training Devices and Their Use for Training and Experience*, which helped reclassify and redefine standards for what were previously Level 1-3 FTDs and personal computer ATDs (PCATDs). The AC did so by introducing two new terms, the Basic ATD (BATD) and the Advanced ATD (AATD), along with providing corresponding performance standards and user guidelines. The AC also describes that policy and approvals for ATDs resides with the FAA's General Aviation and Commercial Division and provides a clear outline of how these devices are to be evaluated and approved.

BATD: But let's start by first understanding the difference between BATDs and AATDs. Though similar to a PCATD, a BATD generally has more enhanced hardware and software features that allow the FAA to authorize it for certain training and proficiency "credits." These credits are limited to private pilot certification as well as instrument rating and currency



Basic Aviation Training Device (BATD)

requirements. However, please note that a BATD cannot be used for an Instrument Proficiency Check (IPC). (See figure 1 for details on credit allowances)

Appendix 2 of the now revised AC 61-136A contains all of the specific design criteria needed for a BATD to be approved for use. For example, with regard to airplane control requirements, BATDs must include:

- A self-centering displacement yoke or control stick that allows continuous adjustment of pitch and bank.
- Self-centering rudder pedals that allow continuous adjustment of yaw and corresponding reaction in heading and roll.
- Throttle or power control(s) that allows continuous movement from idle to full-power settings and corresponding changes in pitch and yaw, as applicable.
- Mixture/condition, propeller, and throttle/power control(s) as applicable to the aircraft represented.
- Controls for certain items that are applicable to the category and class of aircraft represented, like wing and cowl flaps, gear handle, pitch trim, etc.

In addition, pilots must be able to see, feel, and operate the controls for all the previously mentioned equipment in the same manner as they would in the actual aircraft, including the switches and indicators on the instrument panel. Control input responses must also be similar to real-life and are not allowed to appear to lag in any way. If the BATD is using electronic displays, it must render images that are clearly legible and don't appear to jump or lag relative to a control input.

In a nutshell, then, all displays and controls in the BATD must reflect the dynamic behavior of an actual aircraft. For example, if you change the flap setting, or the cyclic control, the appropriate changes in flight dynamics must be registered and reflected on all of the applicable displays and indicators in the BATD similar to how that actual aircraft would respond. Even the aircraft performance parameters (e.g., cruise speed, stall speed, max climb rate, etc.,) must be comparable to the representative aircraft. It may seem like a tall order to meet these requirements, but the good news is that today's high-end and relatively low-cost computer options are usually more than capable of providing the processing

horsepower needed to meet these demands.

AATD: As its name implies, you'll notice that there are higher standards for Advanced ATDs, along with design criteria that call for a more realistic aircraft look-and-feel.

First off, an AATD must meet all BATD-approval criteria, as well as incorporate additional features and systems fidelity that significantly exceed that of a BATD. Among those provisions include incorporating ergonomics "representative" of a category and class of aircraft flight deck, a GPS system with moving map display, a two-axis autopilot (if standard equipment), an independent visual system capable of rendering realistic VFR and IFR conditions, a separate instructor station, and the ability to simulate all emergency procedures that have a checklist in the POH or flight manual.



Advanced Aviation Training Device (AATD)

AC 61-136A contains a complete list of the additional criteria for an approved AATD. These enhanced features allow the FAA to authorize an AATD for training and proficiency "credits" toward the private pilot, commercial, flight instructor, and airline transport pilot (ATP) certificate, as well as the instrument rating and instrument proficiency check. (See figure 1 for details on credit allowances)

Approved for Use

It's important to note that before a pilot can use an ATD for flight training credit, specific to a certificate or rating, the device must first be issued an FAA letter of authorization (LOA). LOAs are valid for five years and specify the amount of credit a pilot may earn for training and experience requirements. This

While the news is generally good for those wanting to rely more on their aircraft's "electronic twin" for gaining experience and training credit, the options, features, and corresponding limitations for these ground trainers do require some attention to ensure you're getting the most out of what they can offer.

Figure 1 - Simulation Training Allowance Chart

	Allowances Under 14 CFR	BATD	AATD	FTD	FFS
		<i>Basic Aviation Training Device</i>	<i>Advanced Aviation Training Device</i>	<i>Flight Training Device</i>	<i>Full Flight Simulator</i>
		Maximum Credit for Minimum Requirements			
Private Pilot Certificate	Part 61	2.5 hrs	2.5 hrs	2.5 hrs	2.5 hrs
	Part 141	5.25 hrs	5.25 hrs	7 hrs	7 hrs
Instrument Rating	Part 61	10 hrs	20 hrs	20 hrs	20 hrs
	Part 141	8.75 hrs	14 hrs	14 hrs	17.5 hrs
Combined Private Pilot Certificate & Instrument Rating	Part 61	20 hrs	20 hrs	20 hrs	20 hrs
	Part 141	17.5 hrs	17.5 hrs	17.5 hrs	24.5 hrs
Commercial Pilot Certificate	Part 61		50 hrs	50 hrs	50 hrs
	Part 141		24 hrs	24 hrs	36 hrs
Flight Instructor Certificate	Part 61				
	Part 141		1.25 hrs	1.25 hrs	2.5 hrs
Instrument Flight Instructor Certificate	Part 61				
	Part 141		0.75 hrs	0.75 hrs	1.5 hrs
Airline Transport Pilot Certificate	Part 61		25 hrs	25 hrs	25 hrs
	Part 141		6.25 hrs	6.25 hrs	12.5 hrs

NOTES:

1. This chart excludes training center allowances under 14 CFR part 142.
2. The hours specified in the chart for 14 CFR part 141 pilot schools have been converted from percentages relative to the minimum experience requirements specified in the regulations.
3. Some ATD allowances are provided as part of the required letter of authorization (LOA). See 14 CFR section 61.4 (c).

is important because the regulations do not specifically address airplane ATD allowances for all pilot certification requirements. The LOA will provide for this. (See 14 CFR section 61.4 (c))

To receive this LOA, all ATDs must go through a rigorous approval process. It starts with developing what's known as an approved Qualification and Approval Guide or QAG. This QAG document serves as the basis for approval and includes a detailed description of all components, functions, capabilities, and possible configurations for the training device.

A manufacturer requesting an ATD approval will send this QAG along with a request letter to the FAA. If both are found acceptable and pass an initial audit, the FAA will then schedule and conduct an on-

site operational evaluation of the device. If the ATD passes, the FAA will issue the LOA and an approved QAG to the manufacturer. If a manufacturer later modifies an approved ATD, a revised QAG must be resubmitted for approval.

Regulatory Relief

Recognizing that technology continues to evolve and improve, the FAA is constantly on the lookout for ways to permit increased usage of ATDs in GA pilot training. Just last year a regulation change increased the maximum time that may be credited in an ATD toward experience requirements for an instrument rating under part 61 (20 hours for AATD and 10 for BATD) and provided an allowance of 25 percent and

40 percent of creditable time for BATDs and AATDs respectively toward an instrument rating under part 141. This revision also eliminated the need to wear a view-limiting device when logging instrument time in an ATD.

With another new rulemaking effort in the works, expected in December 2017, the FAA proposes to allow pilots to accomplish instrument currency pilot time in a FFS, FTD, or ATD without an instructor present to verify the time, as well as allow ATD time to accomplish instrument currency requirements to be identical to the tasks and requirements described for an aircraft, FFS, or FTD. Currently, pilots using an ATD to accomplish IFR experience (currency) requirements must perform additional tasks and must log three hours of time in addition to performing six approaches, holds, and intercepts within the previous two months before a flight as required under 14 CFR section 61.57 (c)(3). To see the proposed rule, go to go.usa.gov/xRt5Q.

“These changes are designed to help pilots save time and money, as well as take advantage of the unique training opportunities ATDs can offer,” says Marcel Bernard, an FAA aviation safety inspector with the General Aviation and Commercial Division and the ATD National Program Manager. But Bernard is quick to point out that there is no prohibition on additional use of these devices for training. “What few people realize is that although the maximum hours credited towards your certificate total is fixed, logging additional hours may in fact assist you with being more prepared for the aircraft portion of your training, and potentially allow you to finish closer to the actual minimum flight hours specified in the regulations for a particular certificate or rating.”

To help illustrate this point, let’s say you need 35 hours of flight training under a part 141 school to get a private pilot certificate. You can get credit for 5.25 of those 35 hours in a BATD. But let’s say you go beyond that. Maybe you even log 35 hours in the BATD. That might seem like a lot, but that extra time in a lower cost ground trainer may actually help you stay on target with the remaining 29.75 flight hours required. So even if you wound up having 35 hours of aircraft time and 35 hours of BATD time, that’s still way less total flight time (and cost) than what the average student pilot acquires while pursuing a private certificate — which is about 75 hours.

“Let’s not forget the advantages of using an ATD,” adds Bernard. “You can still ‘fly’ when the weather is bad, and practice emergency procedures

and other difficult maneuvers that are risky to accomplish in the aircraft. Additionally, when a student is struggling with a particular concept or task, flight instructors in an ATD have the unique ability to hit the pause button, reset the trainer for the procedure or task, and provide extra guidance and encouragement which is difficult to do in the confines of a noisy, crowded, and busy aircraft.”

The Future of Flight Simulation

As with all things in aviation, change is inevitable, and the ATD arena is hardly an exception to that rule. “One of the features I’m most excited about — and which has shown significant improvement in recent years — is with cockpit visuals,” says Bernard. “The visuals in today’s ATDs have never been so good. They really put you in the zone of actually flying in the aircraft.”

Another up-and-coming area for ATD and FSTD technology is virtual reality, boasting much broader visuals and 3-D imaging. Evidence of VR’s growing popularity can be found at events like FlightSimCon, which at this year’s convention in Hartford, Conn., touted several trainers using VR goggles. While integrating VR technology into an approved ATD is still a ways off, its potential is extremely exciting for the industry.

Whether you’re an aviation novice, or experienced veteran, here’s the bottom line: Using aviation training devices is effective, efficient, and provides pilots and instructors with a superior learning and training environment. But more importantly, these instruments are proving themselves to be true catalysts for a safer NAS.

If you have questions on ATD regulations, policy, or guidance, or if you seek to incorporate an ATD into your flight training program, please read AC 61-136A and, as needed, contact your local Flight Standards Office for further assistance. 

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Learn More

FAA Advisory Circular 61-136A
go.usa.gov/xnx4P

Final Rule for ATD Credit for Pilot Certification
go.usa.gov/xnx4d



LINK TRAINER

to

DESKTOP

to

REDBIRD

Photo by Tom Hoffmann

The Evolving Role of Flight Simulation

Gear up. I ease the yoke back and flick my eyes across the panel. All good. My left hand is wrapped around the yoke, my right is curled around the throttles. I love twins. The runway drops away beneath me and I soar across the far threshold. 100 feet up ... 200 feet ... 300 ... BAM! The yoke snaps up. The artificial horizon spins. The plane cartwheels right. Red lights flash, dials spin. I've lost an engine! I wrestle the yoke to the left, grappling with the plane, fighting the asymmetry of drag and thrust. I frantically scan the gauges. Too low. Too slow. No time to try to restart. But I am not putting this thing down in the trees! The yoke is heavy, seven tons of concrete. My arm is straining to hold it. Pain ripples though my shoulder. Trim! I spin the solid metal wheel at my knee. The altimeter is spinning down. I'm running out of sky ...

That was back in 1983. I saved the plane, limping it up into the pattern and back around for a landing. The only injury a pulled muscle in my chest from fighting the heavy controls.

And during those frantic, terrifying minutes I completely forgot I was in a flight simulator. Yep. I was sitting on the ground the whole time, enclosed in

an old ATC 810, in a classroom at Aims Community College. In those days, flight simulators weren't much compared to what we have today — no movement, no simulated view outside the frosted windows — but the box-like 810, as well as a squadron of desktop simulators arranged on long tables in front of folding chairs, helped my classmates and me become aviators more safely, and more cheaply, than if we'd been learning all of our lessons in real airplanes.

And that's exactly what Ed Link was thinking in 1927 when he invented the world's first practical flight simulator.

Beginnings

In his early 20s, Link got bitten by the aviation bug but faced a problem as old as aviation, one that continues to this day: His aspirations were greater than his wallet. Recognizing his problem wasn't unique, he saw a business opportunity. Working part-time in the basement of his father's piano and organ factory he began to build what he called a Pilot Trainer.

The result was something that resembled a stubby-winged toy airplane on a moving stand. Powered by an electric pump and organ bellows, the

truncated airplane would pitch up and down and bank from side to side in response to control inputs, mimicking the movement of a real airplane. Link's invention was far from being a success. He sold more Pilot Trainers to amusement parks as coin-operated carnival rides than he did to flight schools as aviation training devices.

But the next generation of Ed Link's Pilot Trainer would change the world.

In 1933 Link added a hood and an instrument panel to his trainer, transforming it from a device that taught basic movements to a machine for safe, affordable instrument flight training — and a new industry was born.

Link's first big sale, for six trainers, was to the U.S. Army Air Corps in 1934. The Corps had taken over the air mail in the wake of a contract-award scandal — called the Air Mail fiasco in the press of the day — but the Corps was ill-equipped to do so. The Army Air Corps was a daylight, fair weather outfit at the time. In 78 days of carrying the mail, the Corps suffered 66 major accidents, and lost 13 crewmembers. The brass knew they had to get up to speed with instrument flight and the Link trainer was the just the ticket.

In the years that followed, Link's simulator business grew, but the Link Trainer wouldn't come fully into its own until it went to war.

World War II

Called the "blue box" by servicemen in World War II, the iconic ANT-18 Link Trainer was used to develop the instrument flying skills of over half a million allied servicemen. Ironically, it also helped train many of the Japanese pilots who attacked Pearl Harbor: Ed Link's second customer, back in 1935, was the Japanese Imperial Navy.



Photo by Tom Hoffmann

This WWII model Link Trainer was dubbed the "Pilot Maker."

The World War II version of the trainer was no carnival ride; it was a full-fledged flight simulator. Driven by multiple sets of air-driven bellows assemblies, the simulator rotated on all three axes, and could simulate pre-stall buffeting, spins, and even landing gear over speeds. A separate instructor's desk served to control the simulator and recorded the student's success over an aviation chart.

So sophisticated was the trainer, and so large was its impact, that in the summer of 2000, it was recognized as a Historic Mechanical Engineering Landmark by the American Society of Mechanical Engineers, who noted it was "among the first mechanical devices used to simulate actual processes."

Link sold more than 10,000 simulators during World War II. Following the war, Link's company continued to make simulators for the military, including devices for high-performance aircraft, and they even built the lunar lander simulator for the Apollo missions to the moon.

Link is still in the simulator biz today as a division of L3 Technologies, making a portable helicopter simulator for the army that fits into two 53-foot tractor-trailers. But its products never gained traction with the general aviation market. That void would be filled by a whole different kind of flight simulator.

When Simulators Stopped Moving

In the 1970s and 80s, ATC Flight Simulator Company filled community colleges and flight schools with the iconic table top ATC-610 and 710 general aviation simulators to teach instrument flight skills to new pilots, and to help existing pilots stay proficient on their instrument skills.

These flight simulators looked like instrument panels that had been surgically removed from well-equipped general aviation trainers and wrapped in plastic cases. While they looked airplane-like — featuring the classic six pack, navigation instruments, radios and transponders with adjustable knobs, engine monitoring instruments, throttle-mixture-prop controls, and even working mag switches — and were more precise than any simulator that came before, they certainly didn't feel airplane-like. I can still remember sitting in a folding chair "flying" one. The optional rudder pedals on the floor kept sliding away from my feet. The humming and flickering florescent lights above reminded me that I was very much NOT

Still, the table top simulator taught me, and thousands of other trainee pilots, the basics of instrument flight safely and economically — which has always been the purpose of a flight simulator since that first one was cobbled together in the basement of the Link Piano and Organ Company.



Photo by Tom Hoffmann

in an airplane. And, of course, it didn't move.

Simulators had lost the link.

Still, the table top simulator taught me, and thousands of other trainee pilots, the basics of instrument flight safely and economically — which has always been the purpose of a flight simulator since that first one was cobbled together in the basement of the Link Piano and Organ Company.

Like the Link company, ATC is still in business today. They sell newer versions of their classic products, now with sophisticated digital imagery for a simulated view of the outside environments — as well as retrofits for their old products — but their simulators are still motionless.

In 2006 a new company called Redbird burst onto the scene with a full motion enclosed simulator for far less than the price of a typical GA training aircraft. The Link was back, and better than ever.

In some ways, the modern Redbird fulfills Ed Link's original vision. Like the simulators of the last seven decades, it is an instrument training platform. But it is so much more. With a worldwide terrain database and 200-degree visuals, student pilots can practice turns-about-a-point over a highway intersection just as easily as they can practice a GPS approach. But most importantly, Redbirds move

like real airplanes. Students feel a simulated atmosphere alive with bumps and jolts in a plane-like machine that moves like the real thing: Redbirds boast 50-degrees of pitch, 60-degrees of yaw, and 40-degrees of roll.

Even without a war, Redbird took the world by storm. With 1,200 of their simulators in place globally, they strengthen and improve aviation skills. The company produces many FAA approved aviation training devices (ATDs) with an available motion system, ranging from the compact MX2 to the cockpit-specific AMS. They also make a full motion helicopter simulator and a specially engineered crosswind trainer that slides back and forth on rails, and banks left and right to help pilots master the tricky stick and rudder skills needed for crosswind landings in strong winds where initial training would be dangerous. The Xwind, as it's called, simulates crosswinds up to 30 knots. And turbulence. And wind shear.

Full Circle

Over the course of seven decades, the flight simulator has come full circle. First it moved. Then it was frozen but made more realistic in other ways. Then it was thawed out again, free to move and now more realistic than ever. It has evolved from bellows to high-end electronics. From a windowless box to a view that rivals the real thing.

At each step in this evolution simulators have helped aviators improve their skills economically and in complete safety. Well ... I guess I should say in near complete safety. After all, I did manage to hurt myself in a simulator once-upon-a-time. But at least I didn't crash the simulated plane that day, nor have I crashed a real plane in the three decades since. That's in part, I think, thanks to my simulator training. Training which let me hone my skills on the edge of disaster — something we simply can't do in real airplanes.

At least not without risking much more than a pulled muscle. ✈️



Redbird's Xwind Trainer simulates turbulence, wind shear, and crosswinds up to 30 knots.

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ATDs in the ACS

If you have ever used the Practical Test Standards (PTS) to train, teach, or evaluate in connection with certification activities, you might recall that the PTS for certain qualifications includes an Appendix called “Task vs. Simulation Device Credit.” In addition to some basic instructions, this Appendix includes a chart that describes which Flight Areas of Operation/Tasks qualify for simulation credit and specifies the required flight simulation device level.

Now take a look at the Airman Certification Standards (ACS), which have replaced the PTS for the private pilot and commercial pilot certificates and the instrument rating for the airplane category. In these documents, as well as in future PTS-to-ACS conversions, the chart is no more. Instead, you will find that Appendix 8 (standard across all ACS documents) offers a detailed text explanation of using flight simulation training devices (FSTDs) and Aviation Training Devices (ATDs) for pilot certification for airplane single-engine, multiengine land and sea.

Why the change? Simply stated, the FAA realized that the PTS-style chart approach is a good example of providing information, but it wasn’t sufficient to fully address the issues at play in using FSTDs and/or ATDs in training, testing, and checking events.

When reviewing the ACS to determine the task and standards that pilot applicants must accomplish, there is no substitute for reading the entire document to ensure that you fully understand the requirements and limitations when using FSTDs and/or ATDs. We cover this topic in detail elsewhere in this issue, but here’s a quick overview of the information you’ll find in ACS Appendix 8.

Use of Flight Simulator Training Devices

According to 14 CFR part 60, a Flight Simulator Training Device is either a full flight simulator (FFS) or a Flight Training Device (FTD). This rule provides specific definitions for FFS and FTD, and prescribes the initial and continuing qualification and use of all FSTDs used for meeting training, evaluation, or flight experience requirements for flight crewmember certification or qualification.

Another regulation, 14 CFR section 61.4, states that each FFS and FTD used for training and credit for any training, testing, or checking requirement must be qualified and approved by the FAA for three things: (a) the training, testing, and checking for which it is used; (b) each maneuver, procedure,

or crewmember function; and (c) its representation of the aircraft. To accomplish the requisite FSTD qualifications, the FAA’s National Simulator Program (NSP) qualifies them as Level A-D FFSs and Level 4-7 FTDs.

In general, FSTDs are used in the air carrier world or for training that is type specific. The FAA permits use of an FSTD for completion of the practical test only when it is accomplished in accordance with an FAA approved curriculum or training program.

Use of Aviation Training Devices

Now let’s look at devices you are more likely to see in the GA training environment. 14 CFR section 61.4(c) states that the Administrator may approve a device other than an FFS or FTD for specific purposes.

Under this authority, the FAA’s General Aviation and Commercial Division approves aviation training devices (ATD) by issuing a letter of authorization (LOA) to an ATD manufacturer. The LOA, which is valid for five years, approves an ATD as a basic aviation training device (BATD) or an advanced aviation training device (AATD). The LOA also specifies the amount of credit a pilot may take for training and experience acquired in the device. Any pilot using ATD time to meet experience or certification requirements should retain a copy of the LOA.

For the definitions, please read Advisory Circular (AC) 61-136A, *FAA Approval of Aviation Training Devices and Their Use for Training and Experience*. AC 61-136A also provides information and guidance for the required function, performance, and effective use of ATDs for pilot training and aeronautical experience (including currency). Please note, however, that ATDs cannot be used for practical tests or to meet minimum experience or training requirements for an aircraft type rating.

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Learn More

Airman Certification Standards

faa.gov/training_testing/testing/acs/

FAA Advisory Circular 61-136A

go.usa.gov/xnx4d



NAVIGATION KNOW-HOW

Using Simulation to Try It Before You Fly It

In the early spring of 1992, my flight instructor sent me out to my favorite airplane in the flight school's Cessna 152 fleet to conduct my first solo cross-country flight. With a carefully-reviewed flight plan and freshly-endorsed logbook clutched in admittedly shaky hands, off I went. Nerves led to an early loss of positional awareness. More baldly stated, I got lost.

For a few minutes, I struggled to match the terrain I saw below to my carefully marked sectional chart. I struggled even more as I tried to use the plane's single VOR indicator to pinpoint my position with cross-radials from two VOR beacons. In a mercifully short time that felt a lot longer than it really was, I settled my nerves, engaged my brain, and figured it out.

A few years later, my instructor silently watched me work my way through the three-leg instrument cross-country flight I needed to meet aeronautical experience requirements for the instrument rating. We flew the entire trip in instrument meteorological conditions (IMC) and, with GPS still unknown outside the military, I used VOR and ADF to navigate and to fly the no-kidding instrument approach procedures needed for every landing.

I carefully prepared for those and many other trips in terms of the available tools and techniques, but today's simulation technologies make that planning seem positively primitive. So in our celebration of simulation, let's take a look at how modern navigation simulation can help you try it before you fly it.

Visual Flight Rules

The most obvious way to use simulation for VFR navigation is to find a flight school that has an

advanced aviation training device (AATD) (see "The A-Z of ATDs" in this issue for more on this topic) and "fly" the route you've planned. You can generally use this option with or without an instructor. Since visuals for navigation orientation and practice are only part of the picture (so to speak), some AATDs can really offer a tiedown-to-tiedown simulation experience.

If you don't have access to this kind of AATD or you simply don't need that much, online options still offer a lot more than I had in preparing for that first solo cross-country. Once you plot your route in one of the many capable aviation apps available for desktops, smart phones, and/or tablets, you can add layers (e.g., satellite view), zoom in, and scroll along the magenta line to pre-fly your route. If you spot some terrain feature or obstacle you would rather avoid, popular flight planning apps let you use your fingertips to adjust the route. If, on the other hand, you are actively looking for a particular feature on the ground, your simulated reconnaissance flight can help you figure out how to spot it more quickly from the sky.

When I was first learning to fly, preflight planning included making an airport chart that included a hand-drawn sketch of the runway(s) and taxiways, FBO location, and important notes made from what we then called the Airport/Facility Directory (now known as the Chart Supplement). A good friend of mine was well known in the student pilot community for the quality and outrageously exquisite detail of his airport diagrams.

To get smarter about the airports to be used on a trip, flight planning apps certainly provide their "vital statistics" and other basic information. To

really get the picture, though, I like using Google Earth to explore the airport and its surroundings. Where available, the 2D and 3D options provide lots of situational awareness — and it's just downright fun to “flightsee” with your fingertips. While working on this article, for example, I have greatly enjoyed navigating over and around favorite airports and aerial routes. With several, I set up a practice “descent” right down to the runway by using my fingertips to gradually advance and zoom in.

It's safe to say we've come a long way from the days of hand-drawn airport diagrams.

Instrument Flight Rules

My instrument training in the mid-1990s began with what now seems like stone-age simulation: hours and hours of using a desktop “simulator” — more properly known as a basic aviation training device, or BATD. BATDs themselves have come a long way in the last quarter century, but even the one I used was highly effective as a procedures trainer. Since instrument flying is all about procedures — both the scanning and flight management procedures used to aviate and the navigation procedures essential to IFR operation — simulation is a fundamental part of most IFR training programs.

Whether you use a more capable ATD or any of the many apps available for desktops, smartphones, and tablets, here are two important ways that appropriate use of simulation can enhance your IFR navigation skills.

First is mastery of onboard navigation devices, both handheld and installed equipment. Fully understanding both the “knobology” (i.e., the mechanical operating scheme) and the content organizational scheme of your navigation equipment is important for any kind of flying, but it is absolutely critical to safe instrument flying. Reading the manual is always an option, but the desktop- or tablet-based navigation simulators most manufacturers offer for their products are usually more engaging — and thus

generally more effective than just reading the operating manual.

Having spent many hours with a variety of computer-based equipment simulators, I can personally attest to their efficacy. To get the most from this kind of simulation, either work from the exercises the manufacturer's manual suggests, or use your own flight plan to master all the basic data entry and content management skills necessary for IFR navigation.

Once you have mastered the basics of your boxes, simulation provides a time- and cost-effective way for you to learn (or practice) both the fundamental principles of IFR navigation and approach procedures, and to master the mechanical procedures required to execute them with your onboard navigational devices. Before you fly, use simulation devices or apps to ensure you know how to enter, edit, and navigate the following instrument procedures:

- IFR flight plan
- SIDs and STARs
- All types of instrument approach procedures (e.g., RNAV(GPS) to LPV, LP, and LNAV minima; ILS, VOR, VOR/DME)
- Holding patterns (both published and randomly assigned)

Familiarity with the airport environment is perhaps even more important in IFR flying than in VFR operation, so the kind of simulated Google Earth reconnaissance flight described earlier is a good idea for IFR trips as well. In addition to “flying” the final approach and landing with your fingertips, map the missed approach point and the missed approach procedure on your favorite flight planning app and, as described in the VFR section, add layers that let you see terrain and obstacles. Use the 2D and 3D options in the Google Earth app to zoom in even further, and make sure you know exactly where terrain and obstacles lie in relation to the MAP route you expect to fly.

Knowledge is Key

You can never know too much about the places you'll fly from, over, around, and to; nor can you ever know enough about the procedures and tools you'll use to navigate to those spots. So make the most of navigation simulation, and always try it before you fly it. 

Since instrument flying is all about procedures — both the scanning and flight management procedures used to aviate and the navigation procedures essential to IFR operation — simulation is a fundamental part of most IFR training programs.



Photo by Tom Hoffmann

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Do You Suffer from Push-to-Talk Phobia?

Improve Your Aviation Communication with Virtual Reality



Content disclaimer: Products and services mentioned in this article, and/or external, non-FAA links within, do not constitute official endorsement on behalf of the FAA.

Do you get nervous or intimidated when talking on the radio or with air traffic control? Don't worry. You're not alone. Just the sheer amount of information you receive from ATC to get an initial clearance can be overwhelming, let alone having to comprehend what the fast-talking controller just said, and then attempt to read back what you "think" you just heard.

Fortunately, thanks to virtual reality, there are online, real-time, controller-to-pilot platforms and software programs that can help you train for aviation radio communications — all in the comfort of your home.

In this article, we'll take a look at three virtual reality platforms that you can use in concert with your home computer or desktop flight simulator, to practice and sharpen your aviation communication skills.

The best part is that the skills you master in your virtual aircraft will easily transfer to your real-life cockpit as well.

First, let's talk about the "push-to-talk phobia."

"Say Again? ... Over"

It's a fact that both student pilots and seasoned aviators have at one time or another experienced what I like to call the "Say What?" syndrome. That's the "huh??" moment that occurs when you can't understand the fast-flowing stream of non-stop aviation lingo blaring from your radio. If you're not familiar with how ATC communicates, it can be very intimidating and downright nerve-wracking to push that thumb down and speak those two humbling words, "Say again?"

Do not be shy about making that request! It is critical for safety. Remember that ATC is working to maintain aircraft separation and keep everyone safe. Controllers would much rather have you request a repeat transmission to clarify the instructions than have you act on the basis of what you think you heard. They want you to get it right.

"What's Our Vector, Victor?"

So how do you learn to "speak ATC" and overcome your fear?

Learning the language of aviation is not unlike learning a foreign language, or any other new skill.

At first you'll be hesitant, but the best way to overcome your hesitation is through knowledge, training, practice, and still more practice. The longer you practice hearing and speaking your new aviation language, the more fluent you will become, and the more confident you will be when speaking on the radio.

“Tower, Request Taxi”

When you first start learning to fly, you learn the phonetic alphabet, phraseology, and then you train and practice radio communications with your instructor. Some instructors make it a priority for students to spend some flight time at a towered field to practice ATC communications during flight, or to view first-hand operations inside the tower.

But that's not your only option these days. Whether you're a student looking for more practice or a certificated pilot who normally operates from a non-towered airport, simulation offers a low-cost way to build your aviation communication skills.

“We Have Clearance, Clarence”

Today's pilots have the opportunity to use a range of simulation tools to learn and practice radio and ATC communication skills under surprisingly realistic conditions. Desktop computer programs are not typically FAA-approved, but the skills you can acquire and improve via “sim city” practice readily transfer to “real life” flying.

Let's take a look at three simulation options for communication.

VATSIM

First up is VATSIM, or Virtual Air Traffic Simulation Network. VATSIM is an online simulation platform that hosts, at no cost, an international network of virtual pilots and controllers so you can practice your “avgeek speak.” Real people from around the world simulate flights with thousands of other users in the real-time airspace, all while using their home computer. Users download and install VATSIM's pilot software to connect up with their home flight simulator software.

The VATSIM network presents a flight environment that's as close to reality as possible without being in the actual cockpit. Here, users simulate real air traffic procedures and radio phraseology using any type of aircraft, airframe, or panel. You can either fly as a pilot using flight simulation software, or direct traffic as a controller.

Pilot-to-controller communication is performed using voice-over-IP (VOIP), or by text message. Controllers and pilots interact real time as you file flight plans, fly to real-life airports, and perform flight following operations. You can learn and practice your aviation phraseology, detect any problem areas that need work, make mistakes, and recover knowing that you're “flying” on the ground without repercussions. The network also features virtual pilot and controller training online.

VATSIM provides an opportunity for students, experienced pilots, and those returning to the cockpit to practice in a fun, non-intimidating environment to increase proficiency and sharpen radio communication skills. VATSIM can be found online at vatsim.net.

Redbird

You may be familiar with Redbird's flight simulators, available at aviation schools and flight training providers. But did you know that Redbird also makes simulators you can use at home?

The Redbird TD simulator is a table top device that you can use to practice your push-to-talk skills from home. The TD operates Redbird's optional Parrot software that simulates controller-to-pilot interaction. Using voice recognition, Parrot learns your voice and speech patterns, and also responds to your commands.

As you perform your flight simulations, Parrot is self-aware, meaning that it knows at all times where your aircraft is located, what type of conditions exist during your flight, and which ATIS to read out based on the parameters you've chosen for your flight or location. The Redbird TD performs as a self-directed, real-time air traffic controller, deciding what instructions, clearances, vectors, etc. you will need for guidance during your simulated flight.

Redbird provides even the most novice pilot with an interactive, non-threatening environment to practice radio proficiency. Visit redbirdflight.com for more details.

PilotEdge

Next up in the genre of simulation tools is PilotEdge. This is a software program that connects your computer-based, flight simulator software to PilotEdge's voice and data network. With a membership plan, serious pilots can practice a wide range of aviation operations such as IFR and VFR flight,

The skills you pick up in your virtual aircraft will easily transfer to your real-life cockpit.

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ATC-initiated holds, transitions through multiple airspace, and emergency procedures.

PilotEdge takes each user's aircraft type, position, heading, etc., uploads it to the servers, and shares that information with the simulators of other virtual pilots nearby. The result is an interactive, real-time display of a shared virtual airspace. You'll see each other's aircraft and have the chance to communicate with other pilots on your frequency.

PilotEdge guarantees ATC coverage and interaction with live, real air traffic controllers (either active-duty FAA air traffic controllers, retired controllers, or enthusiasts) as towered airports are fully staffed and CTAF frequencies are supported at non-towered airports. PilotEdge welcomes pilots who take their flying seriously; but if you misinterpret a call, or read back your clearance incorrectly, live controllers will help you to correct it. If you don't have a strong grasp on ATC communications, PilotEdge features training and workshops as well that can help improve your aviation lexicon. Visit pilot-edge.net for more details.

"Tower, Request Landing"

Whichever simulation tool you decide to fly, all are realistic, fun, and interactive. Most important, though, they provide a non-threatening way to learn, stay sharp, and improve your ability to communicate with professionalism, confidence, and skill.

Simulator use can push the fear out of push-to-talk, and help you practice your way into long-term success in the real world, the next time you key the mic. ✈️

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

Learn More

Aeronautical Information Manual's Pilot/Controller Glossary

faa.gov/air_traffic/publications/media/pcg.pdf

FAA Safety Team (FAAS Team) Radio Communications Phraseology and Techniques

go.usa.gov/xRFvk

AIM – correct phraseology

faa.gov/air_traffic/publications/media/aim.pdf

A Virtual Plan for the Real World

How Simulation Can Help You Mitigate Risk

JAMES WILIAMS

In the early years of aviation, flying was truly dangerous. Even routine training carried significant risk. It was 1929 when we first started to see the use of simulation to gain experience without risking injury or death. The first real step taken toward what we would recognize as a simulator was the Link Trainer. This device allowed pilots to learn instrument skills without experiencing the risks that were involved in early IFR flying. From these beginnings, simulation has advanced to the truly amazing technology we see today. But the concept is constant: gain experience without the risk.

How It Works

In a nutshell, simulators allow us to practice dealing with dangerous or difficult situations without exposure to the risk that would normally accompany them. These include engine-out landings, partial panel in IMC, and critical malfunctions. In the real world, we have to place restrictions on these maneuvers to ensure safety. In the simulator, we don't have to worry about that. Bungled that ILS? No problem. Just a few key strokes put you back at the Initial Approach Fix to try again. In real life, you would have to execute the missed approach and wait for ATC to work you back into the sequence. While there's value in practicing such maneuvers, simulating the task can reduce the amount of time spent learning the basics.

Psychologists have a term for these kinds of highly drilled tasks. "We call them 'overlearned' skills," says Dr. Chris Front, an aerospace clinical psychologist with the FAA's Office of Aerospace Medicine. "These tasks are practiced to the point of mastery. Overlearned skills tend to be maintained under stress because they have become automatic. So, overlearned skills reduce the mental workload during a high stress situation and improve the odds of successfully executing the correct procedures. That's what makes the drilling of those tasks so useful as preparation for an actual emergency. Additionally, overlearned skills tend to be retained during the early stages of cognitive decline such as dementia," Dr. Front explains.

In a nutshell, simulators allow us to practice dealing with dangerous or difficult situations without exposure to the risk that would normally accompany them.

Getting on the Right Level

Fidelity is the term used to describe how close to real something is. In the case of flight simulation technology, there are different categories of fidelity to consider: physical, visual, and what we might call modeling. The physical fidelity has to do with how closely the actual device conforms to the aircraft. In a perfect world, the controls, switches, and layout would look and feel identical to the real world coun-



Photo Copyright Flight Safety International

An example of a high fidelity full flight simulator.

terpart. The fidelity of the visuals is especially important, because vision is the most powerful sense and because it directly impacts how immersive the simulation will be. Modeling is a term that conveys how well the simulation handles the aircraft's character in the virtual world, i.e., does it fly like the real aircraft? The combination of these factors lead to an overall level of fidelity, which basically dictates how "real" the experience is. Which level of fidelity works best for the task at hand?

The snap answer is usually "well, the best one I can get my hands on." But that's not really the case. When I was working on my instrument rating, my flight school had two different Flight Training Devices which, in today's definitions, would be called Advanced Aviation Training Devices (AATD). The school had an older one and a newer, "better" one. Without fail, all of us preferred the older one. In reality, though, the "better" one was pitchier than an early round American Idol contestant. As a result, the theoretically "better" equipment actually offered a worse training experience in terms of learning the basics of instrument procedures because it forced the student to spend too much mental energy trying to keep the aircraft under control, when that energy should have been directed to learning how to execute procedures.

The Case for the Low Road

The bottom line is that what you need in terms of simulation fidelity depends mainly on the aeronautical skill you're looking to sharpen. If the goal is to better understand your avionics so that you don't get confused and distracted while reprogramming a route, then a simple software simulation of the

avionics box is probably a good place to start. With this setup, you are both overlearning the desired skill and reducing the novelty of potential mistakes. Both reduce the mental processing required during any future encounter.

Another good use for low fidelity is in learning basic procedures. When my father was working on his instrument rating in the early 90s, the instructor would bring this odd box to our house. It was essentially an instrument panel with a yoke and throttle controls that he set up on the dining room table. It doesn't get much more low fidelity than looking over the glare shield into the china cabinet. But for learning basic procedures like setting radios, intercepting and tracking, holding, and following a generic approach, the simplicity is brilliant. It allows the student to focus on that task and master it before getting in the airplane.

The Power of Hi-Fi

On the opposite end of the spectrum is the world of full motion simulators with stunning visuals. In the form used by the airlines, these things are so close to the real thing that we use them for certification. Although this type of device comes at a hefty cost, modern technology has helped lower the price of some high fidelity simulators to a point more feasible for GA. Still, they are expensive to buy and operate when compared to lower fidelity options. So assuming your time and money are limited, you probably won't have — or need — unfettered access to this level of simulation.

There are, however, cases — for example, high stress situational training — where immersion and realism matter. Shooting an approach to minimums in a heavy rain storm is beyond reckless, but I'm willing to bet more than a few pilots out there have made a series of unfortunate decisions and found themselves left with that being the best of bad options. I know I have. The experience sapped every bit of mental bandwidth I had. I remember the other pilot who was working the radios asking if I had seen something off the side of the runway after touchdown. I hadn't. It's a quirk of visual processing that as the brain overloads, you will literally not see things that your brain decides aren't important. The best way to improve your performance in such a situation is to practice. In this type of high stress training scenario, higher fidelity is better.

The Wide Middle Ground

For most people, a middle ground level of fidelity is sufficient. The key is to figure out what tasks



Photo by James Williams

This is an example of the primitive pre-ATD devices that were used for instrument training. Technology has rendered them obsolete with dramatic improvement in PC simulation.



Photo by Tom Hoffmann

you want to work on. A good example of the middle ground is computer flight simulation for airport familiarization. During my training days, I would practice cross-country flights on my trusty copy of X-Plane (we were an X-Plane family, not a Microsoft Flight Simulator family). My clunky CRT monitor and joystick weren't particularly good analogues for my Piper *Cadet*, but the fidelity was good enough for me to learn what the sight lines looked like as I approached the airports I'd never been to before. Given the advances since then in both computer graphics and mapping/imaging data, the benefit would be even better.

The key in the middle ground would be to select the fidelity that best suits the task. For my familiarization flight mentioned above, visuals may be the most important. But for practicing instrument procedures, modeling is more important because you'll want to have as close to a real reaction as possible. Besides, the gray inside of a cloud looks the same in sparkling 4K as it does in dull SVGA. If you want to practice emergency procedures, the physical elements are important so that you practice in a way that translates to your aircraft and with less concern about the modeling or visuals.

And the Verdict is ...

There is no one right answer when it comes down to which method of flight simulation technology is optimal. It will always be an amalgam of what skill you are working on, whether you are training or testing, what options are available, and the opportunity cost of each option. Provided you're able to access one, a full motion high fidelity sim might work really well. But one hour in that sim might cost the same as ten-plus

hours in an AATD with an instructor. The AATD would probably be a better return on investment.

Now that we know just how many options we have, we can look at how to best use them. This will be different for every pilot. A good place to start is with an instructor. Having an instructor put you through the paces in an AATD is a great way to figure out your baseline, and decide which tasks you should prioritize.

Once you have that information, you can make a plan. You can set monthly goals. Maybe you need to work on your non-precision approaches (NPAs). Set a goal to do 50 NPAs this month on your computer at home when you have spare time. Next month pick a different task. Rotate through the things you need to improve. Then go back to your instructor six months or a year later and see how you're doing.

You can also do more specific work. Maybe a week before a planned trip you can "fly" to your destination virtually, practice any approaches you might encounter, and even vary the weather conditions. This activity gives you more experience, even if it's in a virtual world.

Both a continuous skill improvement plan and specific trip training are far more practical in the virtual world. You can fly to any airport in the world with a few mouse clicks in simulation. You can give yourself more training opportunities in less time, whether it's at home, at a flight school, or in an AATD. You could easily do four or five approaches in simulation in the same time that it might take to do one or two in the real world.

While real world experience is still the gold standard, simulation is a great tool to let you make the best of the time you do get to train in the real world. We all have limited time and money for training so it only makes sense that we should optimize it as much as possible to mitigate the risks of learning in Mother Nature's less forgiving environment. 

There is no one right answer when it comes down to which method of flight simulation technology is optimal. It will always be an amalgam of what skill you are working on, whether you are training or testing, what options are available, and the opportunity cost of each option.

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

THE FUTURE FLIGHT STANDARDS SERVICE REALIGNS IS NOW

JOHN DUNCAN

You might remember seeing references to the “Future of Flight Standards” in previous issues of this magazine, as well as in recent news articles. I am happy to report that the future is here: On August 20, Flight Standards transitioned its management structure from the traditional geography-based regional structure to a functional structure. The new functional structure aligns our leadership in four areas: Air Carrier Safety Assurance, General Aviation Safety Assurance, Safety Standards, and Foundational Business.

Let me get this point across right away: our structural realignment should be completely transparent to you. We have “erased” the geographic boundaries and aligned our reporting and management practices according to function, but you will not see any structural change to the local FAA offices who serve you today.

What you *should* see, though, is continuing improvement in how those offices operate. As I have said many times to our employees, our structural changes are important, and they are the most visible part of our Future of Flight Standards transition. But structural change won’t do much for us without the essential cultural changes at both the individual and organizational levels. For several years now, we have been stressing the importance of interdependence, critical thinking, and consistency in our workforce, and these behavioral attributes and competencies are now embedded in each Flight Standards Service employee’s work requirements. At the organizational level, the ongoing culture change includes training managers in the competencies of change management, and the “coach approach” to leadership, which is about helping employees by expanding awareness

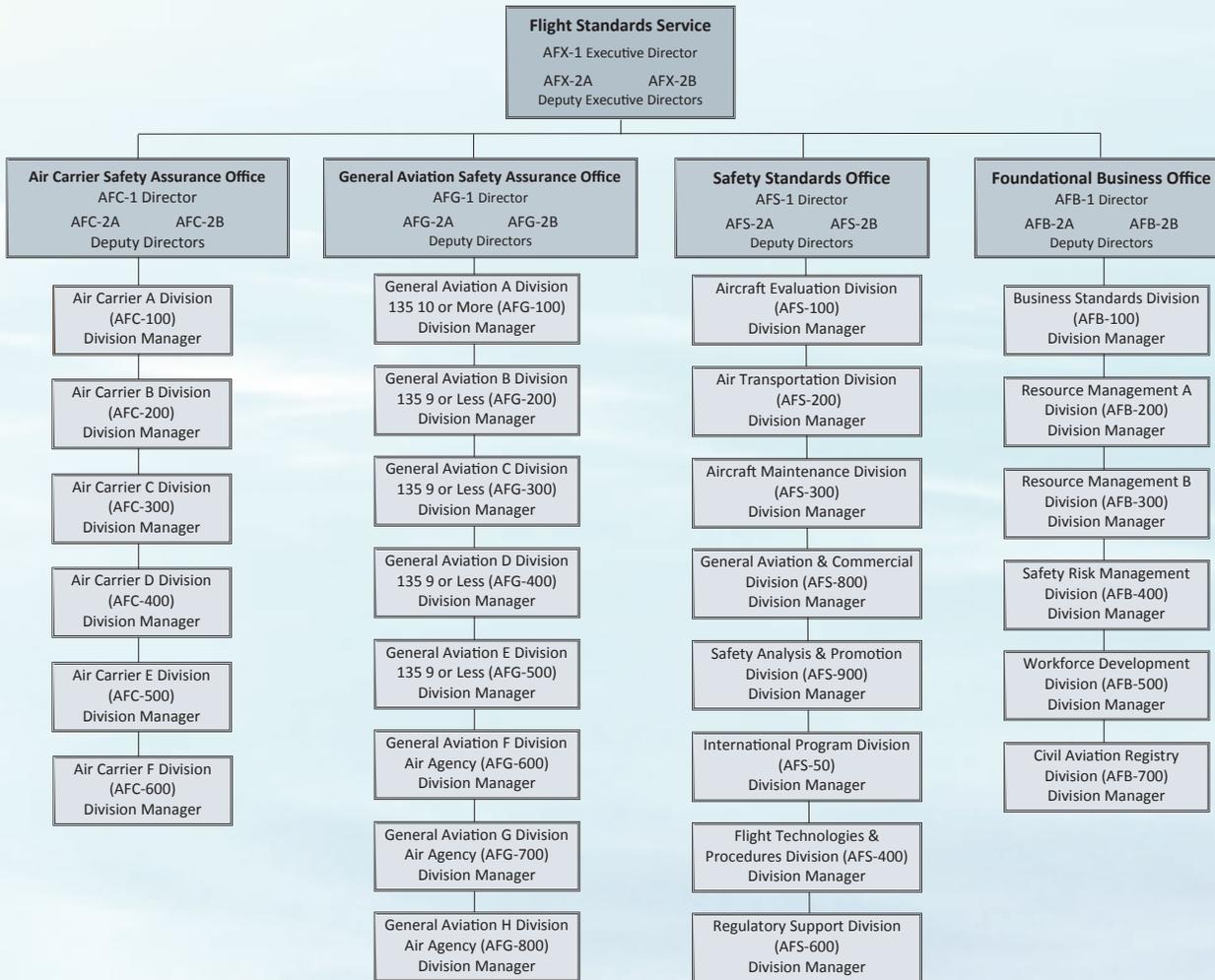
and sharing experience.

With our less-tangible but absolutely critical culture changes well underway, we were finally in a position to benefit from the structural realignment. The intent of the shift to functional organization is to increase efficiency, eliminate multiple interfaces, and integrate surveillance activities.

You can probably see how our cultural and structural changes are mutually reinforcing, and how both aspects of the transition contribute to a Flight Standards Service with greater accountability, better use of resources, and change readiness. So the change we *do* want you to notice is what we have already been hearing from some of our industry stakeholders. From my vantage point, the conversation with industry has changed for the better. Our stakeholders are noticing that we are responding in a different way, with a greater amount of service, and with better care and quality. I hope and expect that your experiences with Flight Standards will be similar.

I also hope and expect that you will also see us continue to improve. You’ve probably heard it said that “the future is now.” What that means to me — and for the FAA Flight Standards Service as a healthy organization — is that the future is the result of what we do right now. So I want to see us get better still at practicing our new cultural norms, and creating a Flight Standards Service that is truly agile, efficient, and consistent in our service to you. We owe you that, and we are ready to deliver. ✈️

John Duncan is the Executive Director of the FAA Flight Standards Service.



Learn More

The Realignment Toolkit: The Realignment Toolkit is designed to provide a one stop shopping point for information on realignment. Our intent is to provide as much information as possible to everyone.
go.usa.gov/xRsC3

New Flight Standards Service Websites: The Flight Standards Service websites have been updated to provide additional information. We offer both internal and external versions that provide links to the functional area offices.
go.usa.gov/xRsCa

Rapid Response Team: The Rapid Response Team (RRT) responds quickly to any issues that arise from realignment. These could include: information technology access issues, routing/coordination, roles and responsibilities, work stoppages, applicant issues, etc. To contact the RRT, you have the following options:

Email: FlightStandardsRRT@faa.gov

Telephone number: 888-283-8944.

Note: All modes of communication with the RRT are monitored 8:00 a.m. - 8:00 p.m. Eastern Time Zone.

Info 17010, Federal Aviation Administration's (FAA) Flight Standards Service Reorganization
go.usa.gov/xRsC2



Is There An App For That? *Augmented Reality in GA Maintenance Training*

As the enabling technology continues its fast pace of development, Augmented Reality (AR) is making its way into aviation maintenance training. AR is a technology that overlays computer-generated images, graphics, or sound on top of your view of the real world. Using wearables, holograms, or hand-held screens to display virtual images, it “augments,” or adds to, the object you’re looking at.

AR glasses, for instance, allow you to see labels or instructions pop up into view, while your eyes travel over each part of a real aircraft engine that’s right in front of you.

Some industry and military facilities are already using AR to train technicians in the maintenance, repair, and overhaul of heavy metal and military aircraft, so it’s only a matter of time before we see an increase of similar activity in GA.

Here’s why. In a world with growing demand for skilled aircraft mechanics, the appropriate use of AR could facilitate speedier training that is also cost-effective. AR, also known as simulation-based training, can reduce the cost of hands-on training, increase comprehension and retention, and enable multiple students to work in teams, or individually at their own pace.

What, Who, Where

AR is also very cool. Technicians can explore the aircraft as a real object combined with virtual captions or helpful user manuals that materialize as you walk around the aircraft or dive under the hood. Wearing AR glasses, or using hand-held screens, multiple trainees can work together or individually to learn about each component, inspect parts, or troubleshoot repair scenarios.

It gets better. A technician in training can open up a brake assembly, for example, and reference detailed, interactive manuals and information sheets for each part and process. On-demand video and 3-D graphics can be superimposed over any part or component to simulate what a technician would see in the real world. Information is easily accessible, eliminating the need for bulky print manuals or information sheets.

Since these user-friendly systems allow trainees to learn in a realistic environment, they are more engaged, and thus more likely to benefit from

increased comprehension and retention. As noted earlier, AR allows trainees to work individually, focusing on any key problem areas, or at their own pace, but it also enables multiple students to work as a team — just as they will do in real-world operations.

So what’s happening now? The FAA’s Partnership to Enhance General Aviation Safety, Accessibility, and Sustainability (PEGASAS) works with university partners to research enhancements to GA safety, accessibility, and sustainability. Among those partners is Western Michigan University’s College of Aviation. WMU Associate Professor Lori J. Brown, a research investigator for PEGASAS, specifically works on the use of augmented reality in technical driven training, wearables in the cockpit, and classroom-virtual training. Her work also contributes to Phase III of the PEGASAS research, which is sponsored and funded by the FAA NextGen Weather Technology in the Cockpit (WTIC) Program.

Stay tuned for a future PEGASAS-themed FAA Safety Briefing that will provide updates on this technology.

When

Although simulation-based maintenance training is at present more prevalent with the airlines and larger training providers, some aviation maintenance training schools are already applying AR to educate their students.

These schools are regulated by the FAA under 14 CFR part 147, the regulations that govern the curriculum and operations of FAA-certificated AMT schools. Part 147 does not prohibit or require the use of AR. It defines the curriculum, but the schools have the liberty to decide how training platforms are presented to their students.

The FAA is currently working to amend part 147. Proposed changes are intended to facilitate training that better meets the changing needs of the aviation industry — so don’t be surprised to see increasing use of AR in GA maintenance training.

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



Simulating Your Drone Flight

In this issue, we are focusing on flight simulation and training aids that can help pilots maintain proficiency and improve skills without the need to be in the air — the benefits of which are obvious. What may not be so obvious is that operators of unmanned aircraft systems (UAS), or drones, can also benefit from flight simulation. While you may be tempted to take a quadcopter right out of the box and launch, there are many things to consider that may prevent you from losing your drone in a tree, violating an FAA regulation, or worse yet, creating a hazard to others flying around in the same airspace. Flight simulation can help drone pilots with preflight planning as well as with practical aspects of flying these highly capable machines.

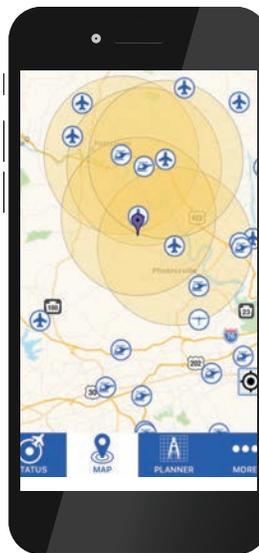
Proper preflight planning is the cornerstone to safe flying. In addition to the obvious need to check the weather and ensure that your equipment is working properly, all pilots should do contingency planning in case things go wrong. A good practice is what manned pilots call “chair flying,” which means just what it sounds like. Sit in a chair and imagine scenarios — like a mechanical failure or lost link — and then run through the steps of what actions you would take. Hold the controller and practice what inputs you’ll make. Get familiar with the software and explore ways to pre-program commands or waypoints in advance. Another good idea is to practice flying on a drone simulator. There are dozens available online for free that will let you simulate weather conditions, landscapes, and scenarios, like how your drone will respond in various situations or how to manipulate the camera. These are good skills to hone while your drone is still on the ground!

Another key component to safe flying is knowing where you are, and using a simulator beforehand can help you plan appropriately. The airspace can be busy and complex and the rules vary for different types of operations. For example, if you are a hobbyist operating under 14 CFR part 101, you’ll need to notify all airports within five miles of your flight. The FAA’s B4UFLY app, which is geared for hobbyists, is a great way to see which airports you’ll need to notify. You may be surprised how many airports there are out there — including helipads. The B4UFLY app will also show you other location-specific information, like temporary flight restrictions and national parks where UAS are not allowed to fly.

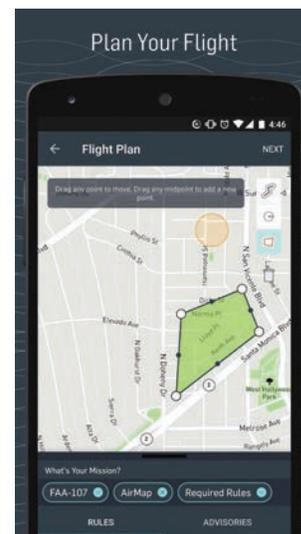
If you’re flying under 14 CFR part 107, the “five-mile from an airport” rule doesn’t apply to you; instead, you can fly in Class G airspace or get prior authorization from ATC to fly in controlled airspace. Using a more robust third-party app like AirMap or Kittyhawk or a software platform like DroneDeploy or Skyward will aid in simulating your drone flight before your takeoff. You’ll also want to plan your flight well in advance so that you have time to get an airspace authorization, if needed.

When it comes to operating any aircraft, there’s no such thing as too much preparation. Planning and simulating your drone flight before it leaves the ground will help you make informed decisions about when and where to fly and will keep the NAS safe and accessible to everyone.

Flight simulation can help drone pilots with preflight planning as well as with practical aspects of flying these highly capable machines.



FAA's B4UFLY App



3rd Party AirMap App

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

Flight Training on the Ground

As pilots, we love carving out time from our busy lives to jump into the cockpit, fire up the engine and take off, especially us helicopter pilots. However, there are days when getting into a helicopter may not be an option due to bad weather, aircraft availability, maintenance, or some other show-stopper that prevents us from scratching that flying itch. So what are you to do?

When you can't get in an aircraft, you may want to consider getting into a flight simulator. It's a good way to continue learning and reinforce your piloting skills. When comparing the cost of most helicopter rental fees, flight simulators or aviation training devices are a lot less expensive to operate. Most of these training devices are aircraft make and model specific, which provides pilots the opportunity to become more familiar with specific cockpit layouts and advanced avionics. You can perform takeoffs and landings, turns, autorotations, and emergency drills all without undue risk. Many flight instructors prefer scheduling time in these training devices because they can be paused mid-flight to discuss key learning points. Even if you're not working towards a rating, consider getting into a simulator with an authorized flight instructor and run through some flight scenarios.

Another huge benefit for using flight simulation applies to helicopter pilots without an instrument rating, as it can provide a unique opportunity to avoid the traps associated with continued flight into deteriorating weather conditions. A firsthand look into how easy it is to lose visual reference with the horizon, the ground, as well as maintain positive control in a helicopter is a true eye-opener. Many flight simulation devices can be programmed to start out VFR and then slowly deteriorate into IMC conditions. This allows flight instructors to take a realistic approach to

Photo courtesy of ELITE Simulation Solutions



Robinson R22 ATD

demonstrating the effects of unintentional flight into IMC, and the proficiency required to safely control a helicopter by reference to flight instruments. Because not all helicopters have flight instruments that can sufficiently support positive attitude control, these training sessions reinforce the need to conduct a thorough preflight and weather

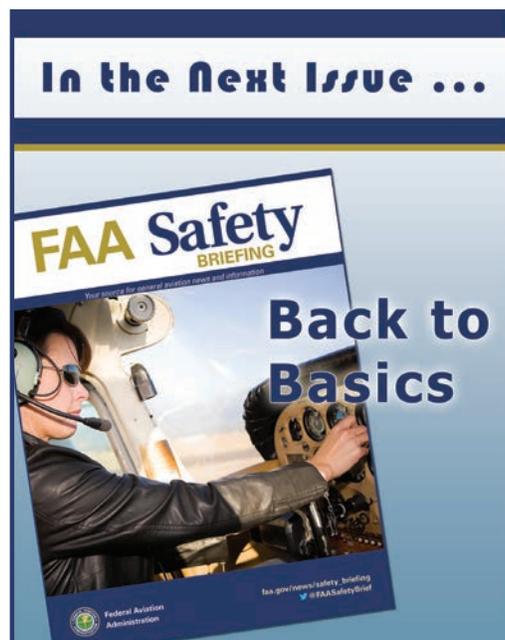
briefing, thus facilitating a safe go/no go decision. The best part is that it's all performed safely on the ground. After flying a simulator, you may even find yourself compelled to start training towards a helicopter instrument rating. For those pilots who already hold an instrument-helicopter rating, this is an excellent way to chip off the rust and become proficient and current. Additional information on instrument flight can be found in the *Instrument Flying Handbook*, FAA-H-8083-15B, specifically, Chapter 8, "Helicopter Attitude Instrument Flying."

Not all flight schools may have a flight simulation trainer, but because ATDs are becoming more popular (and affordable) in the GA community, it would be advantageous to seek out one that does. So take advantage of some flight time in an ATD. They're easy to operate, affordable, fun to fly, and your aviation skills will improve making you a better and safer pilot.

Stay safe and keep learning.

Jim Ciccone is an aviation safety inspector with the General Aviation and Commercial Division. He is also an Airline Transport Pilot, and a Certificated Flight Instructor in multi-engine land airplanes, as well as helicopters, with 25 years of flying in the Long Island and New York City airspace.

In the Next Issue ...





Who Verifies Your Simulator Training?

Dear Sir or Madam, in the Fight Forum section of the Nov/Dec 2016 issue of Safety Briefing, the writer (Hal) asked several questions regarding the required logbook endorsements of an authorized instructor when using a simulator for flight experience. In the second paragraph, Hal asks: Why do the regulations require the signature of an authorized instructor to verify instrument flight experience in a flight simulator when the signature of a properly rated safety pilot will suffice for the same operations in a real airplane? I didn't see anything in your response that addressed his question. I very much look forward to reading that future issue because I would love to learn the logic behind these regulations. I enjoy reading every issue of Safety Briefing - keep up the great work!

— Rick

Hi Rick, thank you for your email, and we are pleased to hear that you enjoy the magazine! The FAA is currently proposing to remove the requirement that a flight instructor be present to verify instrument experience (what we describe as instrument currency) when using an aviation training device (ATD). Here's a link to the Notice of Proposed Rulemaking (NPRM) that shows the complete list of rule proposals and details — go.usa.gov/xRJ3B.

The NPRM also includes a proposal to align the use of ATDs with the allowances prescribed for aircraft, full flight simulators, and flight training devices specific to instrument currency requirements. The final rule is projected to publish in December 2017. I recommend that you occasionally check go.usa.gov/xRJ3K, or reginfo.gov, to get an update on the status of this rule project.

Is My ADS-B Out Really Working?

My ADS-B out has been installed for several months now AND thank you for the \$500 rebate — it really helped! I just finished reading the Mar/Apr FAA Safety Briefing (online .PDF) and I searched but did not find the answers to my questions:

(1) Is there a periodic requirement to check my ADS-B out on my experimental GA aircraft? If so, how often and how is it accomplished?

(2) Should I check it using the existing PAPER system like I did initially? Or can I just radio contact the tower for a quick-check?

— Richard

Hi Richard, thank you for your questions. There is no specific FAA requirement for periodic inspection of your ADS-B equipment beyond adherence to your manufacturer's Instructions for Continued Airworthiness, e.g., for 1090ES equipment, some manufacturer's may require testing of ADS-B functionality during 24-month transponder inspection and testing per 91.413. See page 24 of the July August 2016 issue of FAA Safety Briefing (www.faa.gov/news/safety_briefing/2016/media/JulAug2016.pdf) for the article, Mandate Myth Busting for ADS-B 2020 Equipage Requirements, for additional information.

The easiest and best way to verify proper operation of your ADS-B Out equipment is to request a Public ADS-B Performance Report (PAPR) periodically to verify continued compliance of 91.227 performance requirements. This can be accomplished following any flight within FAA ADS-B coverage and does not require a specific flight profile or operation within rule airspace defined in 91.225.



Facebook Comment of the Month

Had a Garmin GTX345 installed 6 months ago. Absolutely love having it on board. I fly in a heavy traffic area, and I really like seeing all the traffic out there.

— Gene

Hi Gene, thanks for sharing the see and avoid benefits you've experienced from your ADS-B install — it certainly is a great addition to a GA pilot's situational awareness arsenal.

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-921, 55 M Street, SE, Washington,

DC 20003-3522, or e-mail SafetyBriefing@faa.gov.



Get Real

Maximizing Simulated Training for IRL Flying

Throughout this “Sim City” issue of *FAA Safety Briefing*, we’ve explored the many ways you can use simulation tools and techniques in certification, aviation, navigation, communication, and mitigation of risk. Discussion of transferring simulated experience to “In Real Life” (IRL) flying is inherent in the treatment of each topic, but here are a few overarching tips for ensuring that you get the greatest benefit.

Bring Your A Game

Professional airline pilots treat flights in the simulator just as if they had a planeload of passengers in the back. Those of us in GA should do no less. Unless you are using a smartphone or tablet flight simulation game for sheer entertainment, always approach your simulated flight activities with the same attitude you apply to flying a real airplane with your family on board.

Set a Goal

Simulation costs a lot less than the real airplane, but if you are using some level of Aviation Training Device (ATD) and working with an instructor, you’ll still need to hand over a credit card when you’re done. Get the most for your money, and from the experience, by knowing what you are trying to accomplish. Greater precision and disciplined adherence to procedures should be a goal on every flight, but take a moment to write down specific goals for each session. To do that, here are two questions you might ask yourself:

- (a) What aspect of your flying do you most need to improve?
- (b) What do you most want to achieve through your aviation activities?

The answers can guide the development of an ongoing “aeronautical health plan” for pilot proficiency and skill development.

Make a Plan

Next, make a personal piloting proficiency plan that you can use in both “real life” flying and the time you spend in simulated flight. As discussed already,

simulation can accelerate your training for a new certificate, rating, or endorsement. If you are looking to improve your proficiency — a goal we all should have — pick up a copy of the applicable Airman Certification Standards (ACS) and make a list of the tasks and maneuvers you most want to improve. Work with your instructor to make a scenario-based plan that might have you simulate the flight to a specific airport you want to visit. If you are an instructor, use some of the task-specific risk management elements to help build or enhance the pilot’s critical thinking skills.

Execute the Plan

We have all heard the “practice makes perfect” cliché. Practice, both IRL and simulated, makes a proficient (if not quite perfect) pilot, but only if you pay attention, learn from your mistakes, and resolve to do better every time you fly. Putting A-game effort into intensive simulator work on the specific “areas for improvement” in your plan will produce demonstrable IRL benefits.

Reflect and Reset

Getting better requires you to understand where you fell short, why it happened, and how you can fix it. Simulation helps by giving you the on-the-spot, in-the-moment ability to pause and ponder those points. For example: (1) Replay the flight in your mind, taking note of what you did well and what you need to improve; (2) Reconstruct the maneuvers where you made mistakes, considering what you could have done differently; (3) Reflect on the most important lesson(s) you just learned; and (4) Reset and redirect those lessons to your next flight.

A final observation: as we head into the winter season, airplanes in the colder parts of the country head for hangar hibernation. Thanks to the wonders of simulation technology, you don’t have to let your piloting skills hibernate as well. Sim City awaits!

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.

Always approach simulated flight activities with the same attitude you apply to flying a real airplane with your family on board.



Marcel Bernard

Aviation Training Device (ATD) National Program Manager, Airmen Training and Certification Branch



Aviation Safety Inspector Marcel Bernard is a Maryland native who grew up in the flight path of Andrews Air Force Base. His proximity to this hotbed of aviation activity fostered an early appreciation and love for flying.

Recognizing his passion, Marcel's mom gave him a \$100 gift certificate for flying lessons while he was in high school.

"The very next day I went right to Freeway Airport for my first flight lesson!" explains Marcel. "I was immediately hooked. And I kept taking as many lessons as my limited budget would allow."

After high school, Marcel went to Embry Riddle Aeronautical University in Daytona Beach, Florida, and graduated with a bachelor's degree in aeronautical science. He moved back to Maryland and worked as a flight instructor at several schools, eventually winding up at Freeway Airport.

"I spent 23 years flight instructing there, and nine of those years as the chief instructor," he notes. "I also worked part time for a tech firm during some of those years, flying employees around the northeast corridor in a Bonanza A36."

As a chief instructor, Marcel became very familiar with the Baltimore Flight Standards District Office (FSDO) while facilitating the airport's 14 CFR part 141 pilot school certificate. These contacts eventually led him to apply for a job with the FAA and, in 2011, he became an inspector with the FAA's General Aviation and Commercial Division in Washington, D.C.

Marcel's current responsibilities include evaluating and approving Aviation Training Devices (ATDs), serving as the team lead for ATD-related FAA rule-making projects, and supporting part 141 pilot school policy under the division's Airmen Certification and Training Branch. The branch is responsible for the certification and training of pilots, ground instructors, and flight instructors, and pilot schools under 14 CFR parts 61 and 141. The branch helps develop and implement regulations, training standards, policies, and procedures.

"Some of the more prominent work we do includes revising the Practical Test Standards (PTS) for pilot applicants and implementing the new Airman Certification Standards (ACS), approving and overseeing Flight Instructor Refresher Courses (FIRCs), approving ATDs, managing and updating policy and guidance for aviation safety inspectors in the field, as well as the approving institutions that certify graduates for an airline transport pilot certificate with reduced aeronautical experience," explains Marcel. "There is also a tremendous amount of activity to facilitate safe UAS operations and remote pilot certification."

Marcel was instrumental in developing the proposed rulemaking for ATD regulatory relief, currently under review. The proposed changes would provide regulatory relief in several areas, to include allowing Sport Pilot training credit for higher certificates, allowing the use of technically advanced aircraft to meet Commercial Pilot experience requirements, and providing additional ATD credit allowances.

Marcel recommends that prospective student pilots look for a flight school with an experienced chief instructor, professional flight instructors whose availability suits their schedule, and whose curriculum uses simulators as a required part of the training program.

"The biggest challenge I see is to change the culture of flight schools and flight instructors by making the use of flight simulation a standard part of the curriculum for flight training," he said. "There is a lot of emphasis on getting flight time and getting that airline job, and not enough on providing comprehensive flight training. Why not get it right in the simulator first? The time and money that can be saved using simulation, along with the value of practicing normal and emergency procedures in advance, can contribute significantly to pilot proficiency and safety."

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.



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