PRISM

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FIXED WING NEWSLETTER

June 2022 | Volume XXII | Issue VI

SAFETYWIRE

On Thunder, On Lightning, On Radar, On Summer

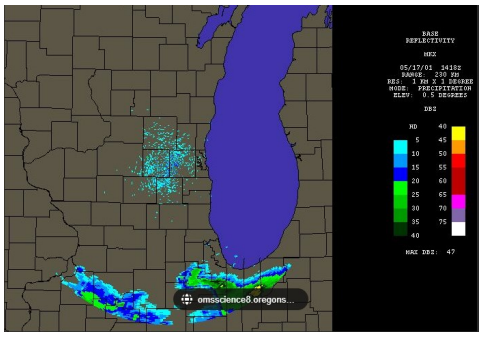
(By: Rhodri Norton-Quick, PRISM)

Tis the season of longer take off rolls, constant diversions, and flow delays into Florida. Welcome to another round of summer flying. We are all professionals, so rather than a rehash of our High school earth science class let's strategize about thunderstorm avoidance. First things first though:

How do we see them?

Radar, that's how. Either ground based, or on board we are using some form of radar. For the new guys in the back of the class there are two types operationally that we should concern ourselves with. Nexrad and the aforementioned On-board system.

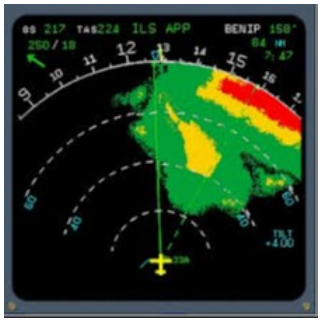
Nexrad:



The Next Generation Weather Radar (Nexrad because its cooler sounding) system is a network of 160 high resolution S-band doppler weather radars jointly operated by the National Weather Service, the FAA, and the U.S. Air Force. The Nexrad system detects precipitation and wind, and its data can be processed to map precipitation patterns and movement. There is one big gotcha here with this system. The imaging can be anywhere from 30 sec to 15 min delayed. Additionally there is a requirement that you have some sort of internet connectivity to utilize the system.

On-Board:

We aren't going to go into all the different manufacturers and products here. Just know that if your aircraft is equipped with one it is an instantaneous picture, and speaking from experience…..leaves a lot to be desired (diplomatically speaking of course). This isn't really the radar's fault, the strength and resolution are controlled by the size and sophistication of the equipment, and anything crammed into the nose or wing of an aircraft is going to have limitations. This is where people tend to get hung up. How do you control it? Well, Gain and Tilt. Tilt is pretty self explanatory, but here's something to stress to a new user of radar. You need to adjust it based on where the weather is to you. I.e. if you're on the ground you will probably have a significant up angle, Duh right? But what about the climb? Easily forgotten in the mad dash of checklists, flows and callouts is your radar angle. Climbing out with the radar tilted up is all but useless and vice versa on the decent. If you're an-



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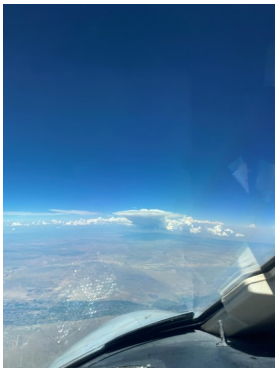

gled downward; the cell or at least the meaty part of it is going to be above you. Gain on the other hand tends to confuse people. Gain is essentially adjusting the amplification of the radar beam, but to a pilot that is gibberish. It focuses the beam and changes the color calibration of the radar. Think of it as squelch for a radar. While an ambitious operator might try to "get a better picture" by adjusting the gain, the reality is that Auto mode does it pretty well by itself, and unless you're in an extreme situation; try tilt first.

Great, So now we've covered some basics, lets get down to avoidance techniques.

Over top:

Obviously the benefit here is that the sky is clear up there. The limitation is just as glaringly obvious: can you get up that high? ISA temps and aircraft performance are the big ones here. There are a couple other less talked about limitations that I'd like to highlight as well though.

Hail: Lets not forget that a thunderstorm can shoot hail as far as 50 miles away from the cell, and much like an old popcorn maker it launches it out of the top. You wouldn't be the first person to think they got away with it just to find out the bottom of the aircraft looks like a golf ball.

Turbulence: Ok so this is just going to be a standing limitation. In and around summer weather it is always going to be bumpy. Family road trip anyone? Just remember that turbulence is often caused by warm rising air and colder falling air. Sound familiar? That's how a thunderstorm is made. It is generally smoother above the tops but again, be aware of your altitude limitations just because you can get above the cell, doesn't mean you will get above the side effects (and don't forget to hit that seatbelt sign everyone pays attention to).

Fuel: While fuel burn is significantly less at altitude make sure you have the fuel to get up there as well. Sometimes that 100 mile detour will actually be better on your landing fuel. Your fuel purchaser will think you're making him look good though, so it's a viable option. Don't forget the physiological strain from being at altitude as well. Your elderly passengers, and those in poor health are much more susceptible to hypoxia and as a Colorado resident I say this with great confidence, you would be surprised what 8,000ft elevation will do to someone unaccustomed.

Dodge and weave:

The most common of strategies, tried, tested, and more often than not successful. Although I will admit to finding at least one sucker hole in my career. This brings us to the obstacles.

Holes: So you saw the gap and went for it. Now you're surrounded and trying to beg ATC for a 180 before it turns into an ASAP report. Use your eyes. The amount of pilots that rely solely on

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that piece of technology strapped into the nose, whilst simultaneously forgetting that we can just look outside and go towards the blue part (situation depending) astounds me.

Night time: Remember what I said about on board radar? Or rather what I didn't say? It is highly limited. If you find a hole on the radar at night, you could potentially run smack dab into the mouth of a waiting cell that is just out of reach of the radar. Likewise, using your eyes will lead you into a 1999 dance club of strobes and noise. You'll be wishing you had just diverted. Which leads us neatly into the final strategy we will cover today.

Just stay home:

Ok, Ok, we are all professionals here. None of us are going to stay home because of a thunderstorm 20 miles away from the airport. Now that's out of the way and the guy in charge of revenue has relaxed; staying on the ground is really the only surefire way to avoid the life or death hazards of thunderstorms. Having a conversation with your dispatcher/passenger/chief pilot about the benefits of rescheduling to a late evening, early morning flight in the worst case, or just delaying the flight to allow enough time for the cell to pass is definitely the best option from a five point restraint wearing perspective. Remember that when you're looking at a storm at your destination, there is still a significant amount of travel time you need to factor into your decision on how long to delay. (common sense I know but in the heat of a discussion that can be forgotten) Sometimes something as little as 10 minutes can make all the difference in where that cell parked itself when you happen to arrive. Just run a really long checklist or something before you fire up. Obviously that's a joke, please follow company procedure and inform everyone that needs to be informed.

Honestly, all of us have our tried and true methods for avoidance. It never hurts to consider alternatives though. The real point of this article is to give you all a heads up. The seasons have changed, what worked for the last six months won't work for the next six and whilst those of us that strap in and light fires are well aware of this, sometimes the people asking us to do that haven't quite thought as far ahead as we have; and why would they? That's our job. Well, our job is to have the conversation. Hopefully this gives some of our operations personnel some strategies to help get it done, and hopefully it gave you the reminder that the fun is just getting started. Happy Summer and wishing you blue skies.

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How to Maximize the Benefits of your ADS-B

What Every GA Pilot needs to know

(By Paul Von Hoene, FAA Flight Operations Branch)
Originally published April 20, 2022 in “Cleared for Takeoff”

Just because the first word in Automatic Dependent Surveillance-Broadcast (ADS-B) is “automatic” doesn’t mean you can forget about it once you’ve been equipped. You need to know and understand a lot about this technology to ensure you have optimized its performance in your aircraft. To help, we’ve highlighted here several important facts that every pilot should know about their ADS-B system, including transmitting requirements, failure indications, performance requirements, and operating considerations. Additionally, for pilots who also take advantage of ADS-B In services, we’ll highlight what you need to know about your ADS-B system to maximize those benefits.

Know the Transmit Requirements and Check Your Startup Procedures

Did you know that to comply with rules that cover ADS-B requirements, your ADS-B equipment must be in the “transmit” mode at all times (14 CFR section 91.225(f)), both during flight and while taxiing? It seems like a simple requirement, but it’s actually not that simple, depending on the ADS-B system.

For example, one popular system gets its power through the navigation lights, which means the lights have to be on day and night to transmit a signal. Another system has a specific power-up sequence for proper ADS-B operations — if you don’t follow this sequence correctly, it will not transmit. The extended squitter, which broadcasts the ADS-B message, can be unintentionally disabled with other systems.

We recommend that you add a step — check that your ADS-B system is on — to your preflight checklist for every flight, day or night, regardless of the airspace you fly in.

You might be wondering, “But isn’t it simply just a matter of turning the ADS-B system to ‘On’ for it

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to transmit?" Well, not exactly. Proper transmission of ADS-B includes broadcasting all of the correct message elements identified in 14 CFR section 91.227, the equipment performance requirements. The requirements include approximately 19 pieces of information, including barometric pressure altitude. Some systems can transmit most ADS-B message elements without transmitting pressure altitude. These systems have an "On" position and an "ALT" position. The "On" position does not broadcast pressure altitude, which would result in not complying with the rule.

In addition, failing to transmit pressure altitude renders the aircraft altitude invisible to nearby ADS-B In aircraft, diminishing a key safety benefit of the system.

If ADS-B In-equipped aircraft are not transmitting at all, they are not receiving broadcasts of two valuable ADS-B traffic information services, Traffic Information Service – Broadcast (TIS-B), which provides non-ADS-B traffic in the vicinity, and ADS-Rebroadcast (ADS-R), which provides opposite link ADS-B Out traffic. More on these services later.

Know How to Recognize Failure Indications

In addition to knowing how to power up your ADS-B and select the correct transmit mode, you should know how to recognize when your ADS-B Out has failed. Per Advisory Circular (AC) 20–165B, Airworthiness Approval of Automatic Dependent Surveillance-Broadcast OUT Systems must have the capability to alert the pilot of a failure using some indication.

Your ADS-B installation documents should include how to recognize if the ADS-B transmitter has failed (device failure) or the GPS receiver input to the ADS-B transmitter has failed (function failure). (Also, take a look at your Pilot's Operating Handbook.) Failures may occur in one of two major components — the ADS-B transmitter or the position source (GPS or Wide Area Augmentation System (WAAS) receiver).

It may not be an obvious indication, so you may really need to dig into the documentation for your particular system. For example, some installations use the existing transponder fail light, while others have a dedicated indicator. The ADS-B indicator shown in Figure 1 has a dual purpose — it indicates a device failure or a position source failure, depending on whether it is flashing or steady.

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There are also some ADS-B systems where the failure indication is only visible from outside the aircraft. This external indication setup is due to the method used to install a Universal Access Transceiver (UAT) on aircraft with only a Mode C transponder, typically navigation light and taillight installations. For these systems, it is important to include the external failure indications and operation of the exterior lights in the preflight inspection.

Know the Performance Requirements

Now that you know how to recognize a failure indication, you probably think you're good to go, right? Well, unfortunately, the failure indication does not tell the whole story. The ADS-B rule has performance requirements that take inputs from multiple sources on and off the aircraft to meet those requirements (see Figure 2). Because of its many inputs, your system still may not indicate a failure, even though it's not performing correctly.

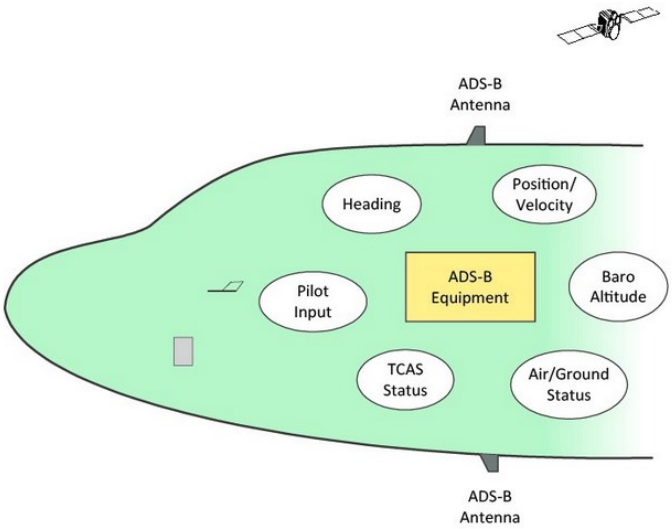

Figure 2 — Multiple inputs for the ADS-B system.

The best and easiest way to determine if your ADS-B Out system meets all the requirements is to request a Public ADS-B Performance Report (PAPR) at bit.ly/PAPRequest. It's free, and you can request it as often as you like, after any flight. We strongly encourage you to request a PAPR at least annually, but particularly after you have had any maintenance performed on your aircraft.

You can also ask the FAA Flight Standards ADS-B Focus Team to pull a PAPR report for you or help you understand it by emailing adsbfocusteam@faa.gov or 9-AWA-AFS-300-ADSBAVIONICSCHECK@faa.gov. For more information on how to check ADS-B performance, watch the virtual PAPR seminar on YouTube.

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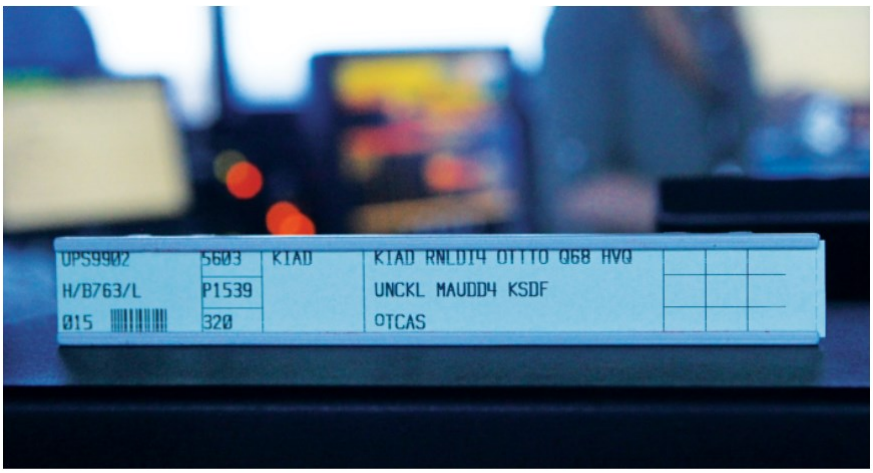
Know How Your Call Sign Affects Your Operation

The operation of ADS-B is intentionally simple — set it to transmit and ensure your call sign is correct. But your aircraft call sign is a critical piece of the ADS-B broadcast message.

Air Traffic Control (ATC) uses it to communicate with pilots, but they also use it to help match the flight plan to the track the controller sees on their display. When you file a flight plan, the call sign broadcast by your ADS-B must precisely match the aircraft identification you entered on the flight plan as your call sign. Otherwise, the controller will receive a call sign mismatch (CSMM) alert.



When you file a flight plan, the call sign broadcast by your ADS-B must precisely match the aircraft identification you entered on the flight plan as your call sign.

The call sign is just the aircraft registration number for most general aviation aircraft, which doesn't change. However, it's a little more complicated for operations where the call sign is not the registration number or if the call sign changes from one operation to the next. For example, airlines use an approved three-letter code and assigned flight number as their call sign. When the call sign changes, they change it in the ADS-B transmitter.

Those aircraft that file with a third-party flight planning company or participate in public benefit flying with an approved local or other call sign have to take extra precautions to ensure that the call sign matches the aircraft identification in the filed flight plan.

We recommend using a standard procedure before taxiing to check that you have entered the correct call sign. Also, be aware that in some installations, whenever power is removed from the ADS-B unit, such as during maintenance activity, the call sign field may change to the manufacturer's preset setting.

For more information on Call Sign Mismatch, watch the virtual CSMM seminar on https://youtu.be/1Mwerc27a8Q

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Know your ADS-B In Benefits (and Limitations)

Once you've gotten to know your ADS-B Out system, you will also want to get to know your ADS-B In system to maximize its benefits as well. TIS-B and ADS-R are important services for transmitting nearby traffic information to properly equipped ADS-B aircraft. However, it is not necessarily a complete traffic picture even with this information.

As noted earlier, your ADS-B Out system must be properly configured and transmit all the required information. Your aircraft and opposite link ADS-B-equipped aircraft must be in range of the ADS-B ground stations, while any nearby non-ADS-B traffic must be equipped with an operating transponder and be within FAA radar coverage. You must always use ADS-B In to supplement your outside visual scan, not replace it.

In addition to TIS-B and ADS-R, Flight Information Service-Broadcast (FIS-B) is a free service available to aircraft that can receive data over 978 MHz (UAT). FIS-B automatically transmits a wide range of aeronautical products with a national and regional focus.

While it does not replace a proper preflight weather briefing, FIS-B offers a wealth of aeronautical information, including weather products like Terminal Aerodrome Forecasts (TAFs) and NEXRAD, as well as airspace information such as Temporary Flight Restrictions (TFRs). The availability of certain FIS-B products depends on several factors, including the altitude tier in which the aircraft operates, the look-ahead distance factor, and, in some cases, the size factor of an airport.

It's important to know how FIS-B delivers information to you because it affects the type and timeliness of the products you receive.

You might be wondering what altitude tiers are. FIS-B radio stations are assigned to one of four altitude tiers: high, medium, low, or surface, to make more efficient use of available bandwidth. This allows the system to provide tailored sets of products that most effectively serve the different customer groups at each altitude tier.

The look-ahead distance factor is an indication, in nautical miles, of how close you need to be to a particular airport to receive a FIS-B product for that airport. For TAFs and other weather products,

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the size of the airport also determines when you can receive those products for a particular airport.

You'll also need to understand how often the FIS-B product is updated and transmitted. The update interval is the rate at which the product data is available from the source. The transmission interval is the amount of time a new or updated product transmission must be completed, along with the rate or repetition interval at which the product is rebroadcast.

Now consider the performance of your aircraft in relation to the update and transmission intervals. For example, a pilot of a light twin aircraft, flying at a medium altitude with a tailwind, could easily have a ground speed of over 200 knots. Thus, traveling at over three nautical miles per minute, a pilot may not have enough time to receive and decipher a pop-up TFR, based on the 100 nautical mile look-ahead and a 10-minute transmission interval.

Now You Know Your ADS-B!

The better you know your ADS-B system, the more you can enjoy its benefits, including real-time precision, shared situational awareness, and a new level of safety and efficiency.

Paul Von Hoene is an aviation safety inspector and ADS-B policy and guidance lead in the FAA's Flight Operations Branch.

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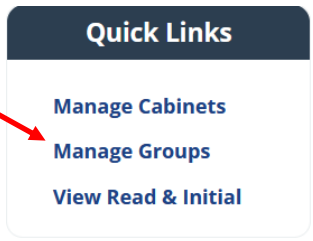
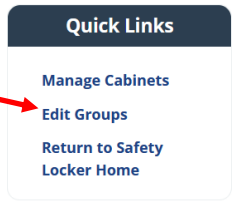
SAFETY MANAGER'S CORNER

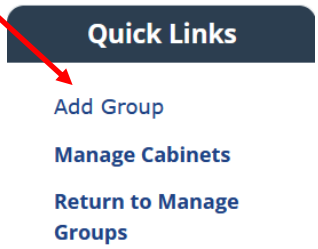
Creating Groups:

Did you know that in Armor's Safety Locker you can assign "Groups" to restrict who can view the contents of a specific folder? Say you had a file that you only needed the pilots to see. This is how you would do it.

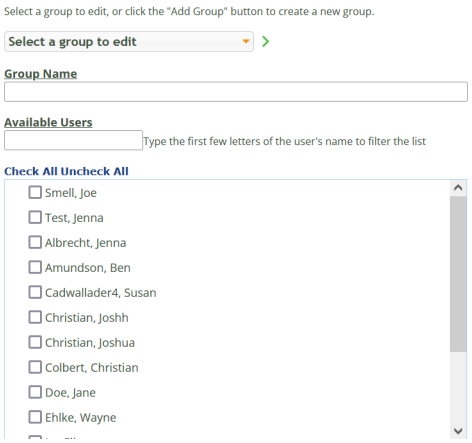
1. **Enter the Safety locker and select "Manage Groups"**
2. **Now select Edit Groups**
3. **Select Add Group**



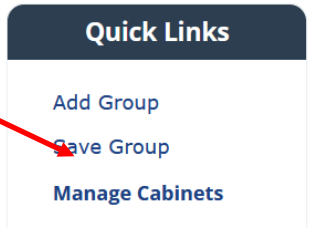




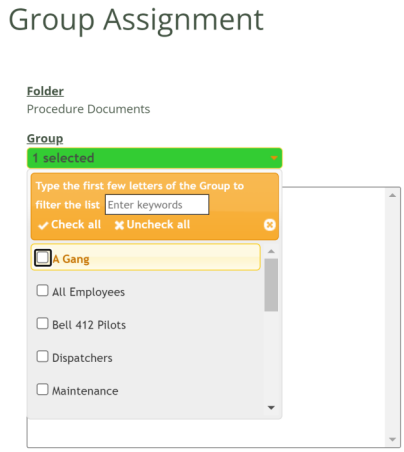
4. Name the group, and then select either the individuals or check all. These will then be "in the group"



5.SAVE SAVE SAVE!!!



6. **Now go back to "Manage Groups" in Step 1.**
7. **Select the folder on the left and then select the Group you want assigned to it on the right**
8. **Look at the folder on the left side and mouse over the new icon that looks like a person—it will tell you "Group Assigned: Pilots"**



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Quote of the Month

"I am learning everyday to allow the space between where I am and where I want to be to inspire me and not terrify me"

— Tracee Ellis Ross

SMS as a formal process was only put down on paper in 2007. We are all learning, we are all adapting. Don't let the space between perceived perfection and current status be debilitating. What is important is that you are willing to close the gap, and that you are willing to inspire others to join you in that pursuit. At the end of the day, we as safety managers help set the tone. Be inspired, be inspirational, and most importantly, don't be discouraged.

On Short Final...

It really is though!

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UPCOMING COURSES

Aug 22 to Aug 26, 2022—PROS Course
Aviation Lead Auditor Training (ALAT)
Denver, CO

Sept 27 to Sept 29, 2022—PRISM Course
Safety Management System (SMS)
Denver, CO

Oct 3 to Oct 7, 2022—PROS Course
IOSA Auditor Training
Denver, CO

Nov 28 to Dec 2, 2022—PROS Course
Aviation Lead Auditor Training (ALAT)
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Dec 12 to Dec 16, 2022—PROS Course
IOSA Auditor Training
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