

AERONAUTICS BULLETIN



DEPARTMENT OF
TRANSPORTATION

*The state of Minnesota provides this technical bulletin
in the interest of aviation safety and to promote
aeronautical progress in the state and nation.*

Cassandra Isackson, Director Dan McDowell, Editor

Office of Aeronautics, St. Paul, MN 55107-1618
(651) 234-7182, Toll Free (800) 657-3922

www.mndot.gov

Trust and verify to keep good SA

Dan McDowell

We all have likely heard the old axiom, “trust, but verify!” It holds true today in many facets of our lives, especially in aviation. With all the “gee-whiz” technology that is available in today’s cockpits to make flying easier and safer, it is still critically important that you trust your displayed, and controller provided information. But it is equally important that you verify that information.

When going into a towered airport for instance, it is common place to simply trust the air traffic controllers to give you instructions and guidance for a safe approach and landing.

While continuing your approach, do you listen to the radio traffic to help you maintain peak awareness? Do you listen to the tower and develop a clear understanding of where you are, not only in relation to the runway, but also in relation to the surrounding air traffic? Do you understand their intentions? So what does this have to do with what ATC just told you?

Well quite simply, we are all humans. The equipment we use and fly is made by humans; it, and we, are fallible. Thus mistakes can and do happen because we are human and not perfect. The point is, controllers and pilots do make mistakes especially when traffic is very busy arriving and departing. So it is easy for busy pilots to simply accept ATC directions without actually thinking about what they heard. This happens because many actions are driven purely by routine. The brain is essentially on “auto-pilot” (no pun intended) as the many actions and efforts involved with making a standard approach to a landing are now

to some extent accomplished by “muscle memory.” In other words, commonplace, routine, or normal actions.

It is very important to recall that the pilot in command has the full responsibility for the safe operation of their aircraft at all times, start to finish. Thus maintaining a heightened level of situational awareness (SA) is very necessary and in fact is critically important to a safely completed flight.

Aviation author Stein Miatveit defines SA in his May 2018 article on Core Competencies for Professional Pilots*, “Situational Awareness is a term that encompasses several elements of the pilots knowledge regarding his/her position, the environment they are operating in and the position of other aircraft relative to their own.”

It also includes being aware of what your aircraft is doing at any given time and predicting possible situations that could arise from the next moment to anytime in the future until your flight has ended. In layman terms, pilots should always know where they are, where they are going and what’s going on around them. This is true at all times, but heightened SA is vitally important especially when approaching an airport operations area or preparing to enter the traffic pattern at an airport.

Now, imagine your personal status after a three and a half hour, non-eventful flight. You call the tower at your destination airport and ask for a straight in approach. You are 7 miles out. Tower replies, “Cessna 1-2-3 X-ray, you are number three, cleared to land Runway 13. Winds 1-4-0 at 07 with occasional gusts to 13. Traffic is on about a three quarter mile final.” You look toward the end of the runway and you see one aircraft less



Photo courtesy of Dan McDowell

than a quarter mile final. But you don’t see the number two aircraft? Bare in mind, at this point you are also assessing the operating status of your aircraft and systems, while monitoring your glide path including your vertical and horizontal (lateral) position. In addition, you are maintaining awareness of your fuel status, while looking for the tower-identified traffic, and trying to remember all the info ATC just provided.

You are listening to the tower for additional information or instructions, and now planning a course of action if you cannot see the aircraft somewhere in front of you on a similar glide path to Runway 13. Should you continue your approach to a landing? Should you go around? Should you try to break into the communications chain and advise the tower you cannot see number two? Does the tower think YOU are number two? Is there another aircraft above, below, or immediately behind you?

Now step back for a moment. Clearly you can see that this pilot has much activity going on outside the aircraft, all while monitoring his/her own aircraft systems and continuing to maintain proper aircraft separation. This is happening while holding proper descent rate and lateral position and considering the possibility

of a go-around, while looking for other aircraft in the pattern, or possibly entering the pattern.

This pilot's SA is gone at this point in time. The distractions being concurrently dealt with degraded his SA to the point of loss. It is important for pilots to remember that the flight environment is dynamic which can (and often does) change very quickly. Many may ask the question, what can be done to mitigate distractions and potential loss of SA?

One way to maintain heightened SA is to use ADS-B-OUT. ADS-B Out is a function of an aircraft's on-board avionics that will periodically broadcast the aircraft's state vector (3-dimensional position and 3-dimensional velocity) and

other required information. ADS-B Out greatly improves your visibility to other aircraft by broadcasting your aircraft's position to other aircraft equipped with ADS-B In and to air traffic control (ATC)*.

Keep in mind that ADS-B Out is mandated, and only within specified airspace. Beginning January 1, 2020, you must be equipped with ADS-B Out to fly in the airspace where today, a Mode C transponder is required.* Oh by the way, the FAA has restarted the ADS-B Rebate Program! The program will end promptly on 10/11/2019, so take advantage of this opportunity right away!

Experienced pilots also know that they should never expect their flight will

play out exactly as they planned it. This is simply because of the many variables that can and do come into play. These variables may include unexpected air traffic, dynamic weather systems, various other meteorological elements, and the ever present possibility of aircraft mechanical issues.

Given the previous scenario, you can clearly see the importance of maintaining heightened SA during your entire flight. It can take one simple distraction to cause you to lose your SA which could then lead to a serious situation requiring extraordinary skill to get through. So make sure you trust and verify to assure you keep good SA for your entire flight.

Making the right call

Dan McDowell

Imagine you are a new pilot and live in an area where you don't have an air traffic control tower (ATC) at your community airport. Perhaps you can fly from point A to a number of point B's and C's without speaking to ATC. You may be wary of the day you actually have to push the microphone button and broadcast your information across the air waves to ATC.

That day will come and you need to be able to make the right call.

Well, today is the day. So, you have your communications radio on and you are monitoring the tower frequency. If traffic is light and the tower is not busy, ATC prefers that you call and provide all your information in the initial contact. For instance, "Village Tower. Cessna 123 X-ray, 12 miles west with Charlie inbound for full stop." Doing this reduces the number of additional questions ATC will need to ask and will reduce overall radio traffic.

Now, if ATC is busy, like when it is difficult to get a break in radio traffic so you can call up, keep your transmission simple by saying "Village Tower Cessna 123 X-ray." This gives ATC time to record your call sign. After the tower responds you will be able to give them your location, ATIS, and your request for landing.

The point is to be respectful of the Tower Controllers and your fellow aviators.

Keep in mind that your aircraft radio is not a CB radio. Before you transmit, know



what you are going to say well before you say it. Remember also to include your call sign at the end of your read back to assist ATC (as well as other pilots) in knowing which aircraft the read back is from and so other pilots with perhaps similar call signs or tail numbers will know that information wasn't for them.

Your transmission should always be made in a clear voice, and the message transmitted should be concise and as brief as possible. Extended chatter on the radio makes it difficult for other pilots to call in. It also makes it difficult for ATC to transmit instructions to other pilots in the airport operations area or in the pattern.

Student pilots should always advise ground control and also the tower that you are a student pilot. This helps ATC to

assist you and perhaps keep an eye on you. It also helps controllers to know you are a student pilot so that they can avoid giving you complicated instructions that could cause you undue concern or confusion.

For additional guidance and information, please review the Aeronautical Information Manual, Chapter 4, Section 2, Radio Communications, Phraseology and Techniques, 4-2-1. It is a relatively short section to read, and well worth the few minutes it will take to review the basics.

As you start your aviation career or aviation hobby, you want to do so being as safe, smart, and careful as possible.

Learn, practice, and be prepared to make the right call.

From the Director's Desk

We are just weeks away from the opening of the EAA AirVenture at OshKosh, Wisconsin, July 22 through July 28, 2019.

AirVenture is well known as the world's largest aviation gathering and fly-in. For us at MnDOT Aeronautics, the event offers an opportunity to meet individual Minnesota pilots, welcome attendees to stop and visit Minnesota airports on the way to and from OSH, and meet with our peers from across the nation. It is a fun and productive time for all things aviation!

We have heard that the EAA expects nearly 800 exhibitors this year, including about 30 from our own state. We are excited to be one of them!

MnDOT Aeronautics will have a large, open, inviting booth space at numbers **3170 & 3171** in the Epic Exhibit Hangar C, it's the hangar with the nice restrooms, sort of by the control tower. We are in the first isle in the NE area of building. Please stop in to say "hi" and chat with us about your favorite airport – or favorite aviation activity.



Cassandra Isaacson
Director
MnDOT Aeronautics

I will be there, along with other Aeronautics staff, to answer your questions about the Fly-in-Minnesota program, the State Aviation System Plan (SASP), provide state charts and directories, and other information. Other folks will join us at our booth as well.

Individual airports will send representatives to talk about their community and give a personal insight into why you might want to fly-in to their community.

We are also hoping for DNR and other state agencies to send their experts to tell you more about state parks and trails you may want to explore.

Summer will also be filled with a variety of Airport Fly-in Breakfasts and BBQs. Although my schedule fills up quickly, I am still open on a few weekends. Mama always said, "Don't go where you are not invited." So, if you would like us to attend please invite us in advance.

There are many new faces in our office as the result of staff changes, we have said our good-byes to those who have retired or moved to other jobs, and have welcomed our new employees with smiles. We'd like you to meet the new folks too, and let them get to know your airport and community, so they can serve you better as they gain experience.

As always, we love to come and share the excitement and wonder of flying in our beautiful state, fly safely – and Happy Landings.

One of Summers challenges

Dan McDowell

Minnesota is strikingly beautiful no matter which season, but summer is quite simply amazing. With brilliant blue skies, diamond sparkles on the lakes, and a patchwork quilt of rolling prairie as far as the eyes can see, the beauty is seemingly endless. Even though it can get quite warm and humid, Minnesota's summers range from tolerable to terrific and it validates why we choose to live here!

While summer flying is generally awesome, it brings about some unique meteorological challenges that pilots must be aware of and know the proper actions to take to mitigate risk. Some of the more obvious and common challenges are thunderstorms, rapidly moving fronts, and pop-up weather systems that may cover a very small or a very large area along your route of flight. One challenge that may not be as common to many pilots in the summer season is density altitude.

According to the Pilots Handbook of Aeronautical Knowledge (PHAK), density altitude (da) is pressure altitude corrected for nonstandard temperature.

Because aircraft operate in a nonstandard atmosphere, the term density altitude is used for correlating aircraft performance in the nonstandard atmosphere.

Density altitude is the vertical distance above sea level in the standard atmosphere at which a given density is to be found. The density of air has significant effects on the aircraft's performance because as air becomes less dense, it reduces:

- Power, because the engine takes in less air
- Thrust, because a propeller is less efficient in thin air
- Lift, because the thin air exerts less force on the airfoils.

Quite simply, density altitude is the altitude your aircraft "feels" it is flying.

The PHAK goes on to say, density altitude is determined by first finding pressure altitude, and then correcting this altitude for nonstandard temperature variations. Since density varies directly with pressure and inversely with temperature, a given pressure altitude may exist for a wide range of temperatures by allowing the density to vary. However,

a known density occurs for any one temperature and pressure altitude. The density of the air has a pronounced effect on aircraft and engine performance. Regardless of the actual altitude of the aircraft, it will perform as though it were operating at an altitude equal to the existing density altitude.

The Aircraft Owners and Pilots Association (AOPA) says when you calculate density altitude, "Keep in mind the standard temperature is 15 degrees C but only at sea level. It decreases about 2 degrees C (or 3.5 degrees F) per 1,000 feet of altitude above sea level. The standard temperature at 7,000 feet msl, therefore, is only 1 degree C (or 34 degrees F). For example, the density altitude at an airport 7000 feet above sea level, with a temperature of 18 degrees Celsius and a pressure altitude of 7000 (assuming standard pressure) would be calculated as follows.

- $18 - 1 = 17$
- $17 \times 120 = 2040$
- $2040 + 7000 = 9040$ feet Density Altitude

“The “simple” act of taking off or landing accounts for 50 percent of all general aviation accidents.”

This means the aircraft will perform as if it were at 9,040 feet.”

- **Pressure altitude** is determined by setting the altimeter to 29.92 and reading the altitude indicated on the altimeter.

- **OAT** stands for outside air temperature (in degrees Celsius).

- **ISA** stands for International Standard Atmosphere (temperature in degrees Celsius).

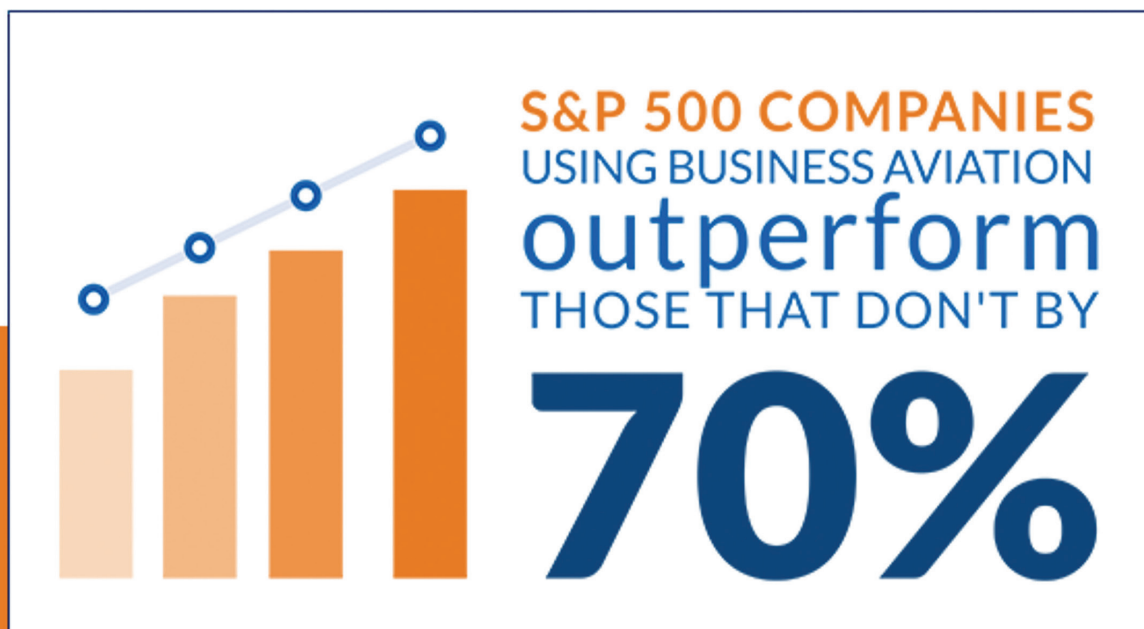
For additional information, review the Aeronautical Information Manual, Chapter 7, Safety of Flight, Section 5, 7-5-6 Mountain Flying. Also see the Pilots Handbook of Aeronautical Knowledge, Chapter 4, section 4-3. Another source of information is the AOPA Safety Advisor Operations & Proficiency No. 6.

The Air Safety Institute says: “The “simple” act of taking off or landing

accounts for **50** percent of all general aviation accidents.” So on those hot, humid days of summer when skies are clear and going flying is the only rational thing you can think of doing, remember to calculate density altitude before you takeoff. That way one of summers challenges won’t catch you unaware and unprepared.

No Pain No Gain

“The mostly small, public-use airports across the country that are used by business aircraft are key economic engines, boosting jobs, local investment and economic activity in communities across the nation.”



Business Aviation Increases Efficiency

Business aviation is a productivity tool used by thousands of companies and organizations of all sizes. These forward-thinking organizations utilize business aircraft to minimize travel time; enhance the efficiency, productivity, safety and security of key personnel; and remain nimble, competitive and successful in today’s highly competitive marketplace.

noplanenogain.org

Graphic provided by noplanenogain.org