

AERONAUTICS BULLETIN



THE STATE OF MINNESOTA PROVIDES THIS TECHNICAL BULLETIN
IN THE INTEREST OF AVIATION SAFETY AND TO PROMOTE
AERONAUTICAL PROGRESS IN THE STATE AND THE NATION

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The Important Role of your Community Airport

Dan McDowell, MnDOT Aeronautics

An airport can be many things to many people. It can be a place of magnificent solitude like during an early summer's morning, just as the sun rises and the stillness is punctuated only by the chirp of birds in the distance. Perhaps a very thin layer of fog will form over the field and in minutes dissipate as the air quickly warms. It is moments like this when there are few things in life more beautiful and tranquil than the silence of an airfield before the days' operations begin. Now is when your airport begins to show its real value to the community.

One of the first things people will notice about any airport is that it is a place that provides fast, intercity and interstate transportation. Some larger General Aviation airports can handle aircraft that provide intercontinental capabilities. Whatever the case, having that capability there for fast, on-demand transportation opens the front door to the community for new businesses to come in and start new factories, warehouses, and commercial stores. It also expands the opportunities for growing, or new trade, and commerce.

In the US, GA airports have become vitally important in the economic growth and prosperity of small to medium communities. Cities with airports that are well maintained and user-friendly bring in traffic that has a positive impact on the city both directly and indirectly. For example, the airport is a great way to attract tourists to your city. Aviators tend to enjoy sharing good news with fellow aviators and non-aviators alike when they find a new location that is interesting, fun and enjoyable. Once the friends of aviators hear about a great experience in your city, the friends make plans to come and explore. Of course they tell their

friends, and just by word-of-mouth the level of tourism begins to grow.

But that's just one small facet of the value your airport brings to your community. Your airport also opens the door for conventions and conferences to choose your city for their venue. When they come, the attendees use local hotels, restaurants, and entertainment facilities. Area parks, recreation sites, and shopping will also be visited as your city demonstrates all it has to offer to the new visitors.

In an article titled, Airports as Engines of Economic Development: Great Airports Are Critical for a Region, by Cyrus Freidheim and B. Thomas Hansson, as published in Strategy-Business Magazine, authors Friedheim and Hansson said, "Airports are magnets for business and trade. Extensive and frequent air services are critical to attracting conventions and trade shows, and play a major role in the location of corporate and regional headquarters, service companies, research and development facilities and manufacturing sites." This in turn opens up new job opportunities throughout the region. And that brings in new income and tax revenues for the cities, which can bring improvements in infrastructure and the overall quality of life for all the citizens.

When new businesses locate at or near the airport, or even in the local city, they will make regular purchases of food, fuel, supplies and more, all from local suppliers. The goods, gear, parts, and even services the company produces can then be quickly taken to the airport. There it will be put aboard an aircraft and rapidly flown to the customer or location where those things are needed. That ability to rapidly respond and meet customer needs (more



**Photo courtesy of Gary Chambers
Aviation Photography/St. Louis, Mo. 2018**

than 150 miles away), can only happen when your community has a quality GA airport. When a plant has a manufacturing line down and needs a specialized part or technical assistance, only GA can truly speed the new part or technician to the site quickly and efficiently.

Also, by having and maintaining a quality airport in your community, you open the door for faster mail and package delivery, Aeromedical services, Law Enforcement, rapid response Disaster Relief, increased tourism, just-in-time services, and perhaps a flight training company and more. The point is that your airport can be the magnet that attracts organizations, companies and agencies to come to your city by choice, and quickly when needed.

It is because of your local airport that new opportunities for your city and region to expand commerce and trade throughout the state, nation and the world can be possible. Thus with the increased economic activity and employment, local consumer attitudes and behaviors change, and the standard of living for all people in your city and the local region increases.

Oh by the way, "A study by Harris Interactive found that a large majority of business aircraft flights are made into airports with infrequent or no scheduled airline service." Perhaps now you understand the important role of your community airport.

Making Better Memories

Gary Chambers

Tips for aviation photography

You can enjoy aviation events all year long with your photographs. The goal is to take photos you will want to look at, post on social media, print and hang on the wall. The tips here are simple and universal for all of your photography subjects. We will concentrate on composition, lighting, and exposure, but first a few words about safety and general tips.

You can't enjoy an event unless you do it safely. It is tempting to get a unique image but do so by obeying all crowd lines and volunteer's instructions. Set a good example. Even if you have a long history around aircraft, follow the crowd rules. You can serve as a good example to folks that are new to aviation that are unfamiliar with the hazards. AIRPLANES ARE LOUD. WEAR HEARING PROTECTION. Enough yelling, lets talk about photography.

If you fly, you know your airplane. If you photograph, know your camera. Be comfortable with all of the features before the event and practice. Don't wait for an airplane to be passing in front of the crowd to wonder why it won't focus. Most cameras have a mode "A." Your manual will say it is for automatic, I say it is for average. Using modes such as shutter priority, often abbreviated Tv for Time Value will let you adjust to get a nice propeller blur or a sharp image of a jet flying past. Use the viewfinder instead of a rear-viewing screen so you can brace the camera against your face for a steadier image.

Unless you want your images to look like most everyone else's images, vary your camera height. Sitting can allow you to brace the camera even more by keeping it close to your body and add more sky background to your photo. Likewise, holding the camera high over your head can give a pleasing result. Lastly, memory is cheap. Take images at the highest setting possible. Nothing worse than getting a great image that is only good for viewing on a cell phone because the file size is too small.

Let's get creative! We'll keep it simple with three items, composition, lighting, and exposure. The first question to ask is what is the center of attention? It may be the whole airplane or just the pilot. What story do you want to tell with your image? Look to see how your eye flows through



This series of photos taken at various airshows courtesy of Gary Chambers



the image. If a plane is flying right to left, place the subject on the right side of the image so the motion causes the eye to flow towards the center of the image. If the right to left flying plane was on the left side, the direction of motion would carry the viewer's eye off the image on the left side. One other decision on compilation is how much of the image the subject occupies. You can zoom in on the subject, have the subject nicely framed, or have the subject a small part of the image where the aircraft is part of a larger scene like a seaplane landing on a glassy smooth lake near sunset.

The lighting rule of thumb is to have the light at the photographer's back. That is not always possible at air shows. You can have dramatic effects backlit subjects. Again, don't wait for the day of the event to practice with light. The best light is morning and evenings. It is often called the golden hour in morning and evening but the best light may only last minutes. Noontime sun can be harsh with a lot of contrast characterized by really dark shadows and highlights with little to no detail. I avoid it if I can get the image at any other time of day. Overcast days may not provide much in the way of contrast



but clouds can act like a giant soft-box you would find in a photography studio.

The last of our creative trilogy is exposure. Photos of planes flying with stopped propellers is caused by a shutter speed so fast that the propeller appears motionless and the plane looks unnaturally to be hanging in the air. This usually happens at shutter speeds faster 1/250 and faster that is 1/500, 1/800, etc. Those fast shutter speeds work well for jet aircraft. 1/125 and slower for a pleasing blur on a spinning propeller.

These tips are just a starting point for making lasting memories.

Challenge yourself to expand your creative envelope. The Internet is full of ideas you can use.

Camera stores and photo clubs are also good sources that offer human interaction to answer questions.

Stay safe and have fun.

In the Rhythm of Flight

Dan Mc Dowell, MnDOT Aeronautics

Flight operations for military, airline, cargo flight crews, and even corporate/business flight crews are often disruptive to the normal cycle of human physiology. With frequent changes in flight schedules, (flights departing and varying hours of the day and night), sleep for pilots, at least quality sleep, is often hard to come by. Quality sleep sometimes seems like a unique facet of life that busy flight crew members may experience only on occasion. And that raises the question, do irregular schedules impact pilots and other flight crew members? The answer is yes, and it can impact anyone whose regular sleep cycle is disrupted.

When people deviate from their regular work/sleep schedule, their biological rhythms are thrown out of sync. While many human biological functions naturally vary during a 24 hour day, some of them function and vary systematically within a 24 hour cycle. This is called the “circadian rhythm.” The variations are controlled by the “circadian clock” located in the brain. Researchers have discovered the circadian clock is located in the suprachiasmatic nucleus of the hypothalamus gland near the center of the brain.

In an article from the Operator’s Guide to Human Factors in Aviation, it states that, “Laboratory studies have shown that, in the absence of any time cues (i.e., no sunlight or social time cues), the biological clock for most humans operates on a cycle of about 25 hours. Under ordinary circumstances, however, the biological clock is reset by about one hour each day such that the biological clock is synchronized with the 24-hour solar day. The cues that serve to reset the biological clock are called “zeitgebers,” a German word that means “time givers.” Evidence supports morning sunlight as the most important zeitgeber. Other cues in the social environment that serve as zeitgebers have not been identified with any amount of certainty. However, cues that may serve as zeitgebers include work/sleep schedule, eating schedule, social activities and, in the absence of other cues, subtle environmental factors such as building vibration and traffic noise.”

The article goes on to say, “both laboratory studies and field studies have demonstrated variations related to circadian rhythms in behavioral functions such as alertness, reaction time, short-term memory, long-term memory, search tasks, vigilance, and sleep. The circadian variation throughout a normal solar day is not the same for all biological and behavioral functions. Performance efficiency tends to decline to a low point in the early morning hours, (2AM - 6 AM). The important implication of this research is that circadian rhythms influence performance efficiency even when the circadian variations are in synchrony with the solar day and the normal work/sleep schedule.”

Research also shows that when an individual experiences circadian rhythm disruption (CRD), a series of problems can result. One problem is that the person with CRD may be working during the phase of their circadian cycle when their performance efficiency is near or at its lowest point. Another problem is, if the work/sleep cycle has been disrupted, the individual may have a decreased amount of quality sleep. That in turn leads to fatigue. Some of the causes of fatigue include:



Photo courtesy of David Gonzales Photography

- The shortage of quality sleep
- Sleep disturbances
- Poor diet
- Dehydration
- Exertion from heavy exercise
- Mental and/or emotional stresses
- Interruption of the circadian rhythm

Pilots or passengers who may be experiencing CRD may show one or more of the following symptoms:

- Increased day-time sleepiness
- A general lack of energy in the morning
- Difficulty concentrating or accomplishing mental tasks
- Maintaining alertness
- Increasing negative moods
- Impaired sensory perceptions and decision making
- Diminished decision-making skills, including making rash decisions, or no decision at all.

So one might ask, does CRD really affect your flying and/or driving skills? The answer is, yes, absolutely! The FAA’s publication, *Circadian Rhythm Disruption and Flying*, states that, “CRD- induced fatigue that goes untreated or ignored will have both physiological and psychological ramifications that not only can jeopardize your personal health but can also become a safety-of-flight issue. This author would add the exact same wording for driving. Think about road rage, or missing your turn and then doing a U-turn instead of going around the block, or getting off at the next exit to turn around safely.

A few of the known and undesired effects of CRD are:

- Increased reaction time
- Decreased attention
- Impaired memory
- Personal conduct of isolation
- Impaired decision making
- Mood changes
- Sleepiness

All of the above listed effects lead to the possibility of increased risk in (your) aviation operations including; increased frequency and severity of pilot errors; and increased operational incidents. Remember, the FAA publication *Circadian Rhythm Disruption and Flying*, says, “circadian rhythm disruption can lead to acute or even chronic fatigue. Fatigue in the cockpit has shown to be just as debilitating as drugs and alcohol. Do not let CRD-induced fatigue become a hindrance to aviation safety.”

Today, many people and organizations use electronic devices to help track and manage individuals’ fatigue and fitness levels.

These fitness tracking devices are often small enough to be worn on the user's wrist. Other types of devices include mounted cameras that monitor the individual's facial area and expressions. When the individual shows signs of fatigue for instance, the unit sends a warning in the form of various tones, bells, or other attention getting methods to wake up that person. These devices and systems also help the individual to keep track of their sleep hours and various other personal health/fitness data.

If you want to mitigate the issue of CRD, you can use guidelines that many professional pilots use. Read them along with other detailed information in the Flight Safety Foundation/NBAA document: Duty/Rest Guidelines for Business Aviation. You can find it as a free download at: https://flightsafety.org/files/DutyRest2014_final1.pdf.

Bear in mind that the period of circadian low is between 0200 and 0600 for people who have already adapted to a common day-wake/night-sleep schedule. A single (professional) pilot may have a maximum of a 12 hour duty day. That includes a maximum of 8 hours of flying during that day. Then he/she must have a minimum of 12 hours of off duty rest before starting another duty day.

These are the guidelines some organizations use when they have operations within the circadian low window. That includes a duty day that begins at 0400 or earlier, or flight through both sides of the circadian low, or a landing during the circadian low window time period.

Safety of course, should always be priority one. It is your responsibility to be sure you as the pilot-in-command are fully prepared and completely ready to take your planned flight. Proper rest prior to your planned long duty day is vitally important,



Photo courtesy of Gary Chambers

as is the proper rest at the end of your long duty day, or even your regular duty day. Getting proper rest and always using your checklists are two key elements of your safe flying practices.

For additional information on CRD and its potential impacts on your flying (and driving too) check out the following publication:

MEDICAL FACTS FOR PILOTS

Publication No. AM-400-09/3 Written by:

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From the Director's Desk

Celebrating the 50th Anniversary of the Minnesota Aviation Maintenance Technician Conference

As you have read in recent Aeronautics Technical Bulletins, we in the Office of Aeronautics, are celebrating 75 years of partnerships with Minnesota's fabulous publicly owned and operated airports. In addition to that celebration, we are also thrilled to be celebrating 50th Anniversary of the Minnesota Aviation Maintenance Technicians Conference.



This spring we had another very exciting and successful Conference. Nearly 400 people attended the event on March 19-20, 2018 at the Earle Brown Heritage Center in Brooklyn Center, Minnesota.

This conference was for aviation maintenance technicians, IA's, industry employers, aviation vendors, and aviation maintenance college students, and a special program for high school students seeking careers in aviation!

The Conference featured more than 20 breakout sessions

that ranged from aircraft brakes, to composite repair, to the Connected Aircraft that discussed secure internet services for business aircraft. The FAA provided several speakers on a wide range of topics for the General Sessions.

Throughout the Conference, attendees had the opportunity to meet with industry personnel and maintenance experts from over 50 exhibitors, while checking out some of the latest technologies and tools for aviation maintenance.

There were more than 100 aviation maintenance college students from Lake Superior College, Northland Community and Technical College and Lake Area Technical Institute. There were also over 60 high school students that attended a special program designed for them from as far away as Duluth Denfeld High School. The student program answered their questions, peaked their interests, and let them network with industry personnel!

It was a great 2018 Aviation Maintenance Technician Conference and a great way to celebrate 50 years of training and information for Minnesota's (and the Regions') dedicated aviation maintenance technicians. This annual event occurs with the outstanding support and partnership of the Federal Aviation Administration (FAA), The Minnesota State Colleges and Universities system, and the Minnesota State Transportation Center of Excellence located at the Dakota County Technical College campus and of course MnDOT Aeronautics.