

NORTH CAROLINA AIR NATIONAL GUARD MID-AIR COLLISION AVOIDANCE [MACA]



MID-AIR COLLISIONS

The primary cause of all mid-air collisions lies in the pilot's Failure to apply sound see and avoid principles. Many mid-air accidents might have been averted had one of the mishap pilots utilized sound scanning techniques. Performing non-essential tasks in flight seriously compromises a pilot's ability to see and avoid obstacles. To illustrate this, one need only examine the conditions under which most mid-air mishaps occur. **Nearly all mid-air collisions** happen under day VFR conditions. The majority of these incidents take place within five miles of an airport on warm weekend afternoons. 77 percent of all mid-air collisions occur on final. Enroute mid-air collisions usually happen below 8,000 feet, typically within 25 miles of an airport. Some of these accidents occur because of human physiological idiosyncrasies.

LIMITATIONS OF THE HUMAN EYE

Unfortunately, a pilot's failure to employ see and avoid principles while in flight is not the only impediment to safety. The design of the human eye and its interaction with the brain places **unique physiological constraints** on pilots. Closer examination of the following phenomena highlights some of these problems.

ACCOMMODATION

Accommodation is the amount of time [one to two seconds] your eyes need to **shift their focus** from instruments within the cockpit to an aircraft one mile away.

BINOCULAR VISIONS

If an object is visible to one eye but hidden from the other by an obstruction, such as a windscreen post, the mind sometimes **fails to recognize** and process that information. The object may appear blurred, or it might not register at all.

BLOSSOM EFFECT

From a distance, an aircraft on a collision course with yours initially appears motionless. At first, the size of the conflicting aircraft will **not appear to change** until it suddenly seems to blossom in your windscreen.

EMPTY - FIELD MYOPIA

When there is little or nothing upon which our eyes may focus, they don't focus on much at all. This most often poses a problem on **clear, cloudless days** where there isn't much upon which to gaze. Using proper scanning techniques can ameliorate this problem.

TUNNEL VISION

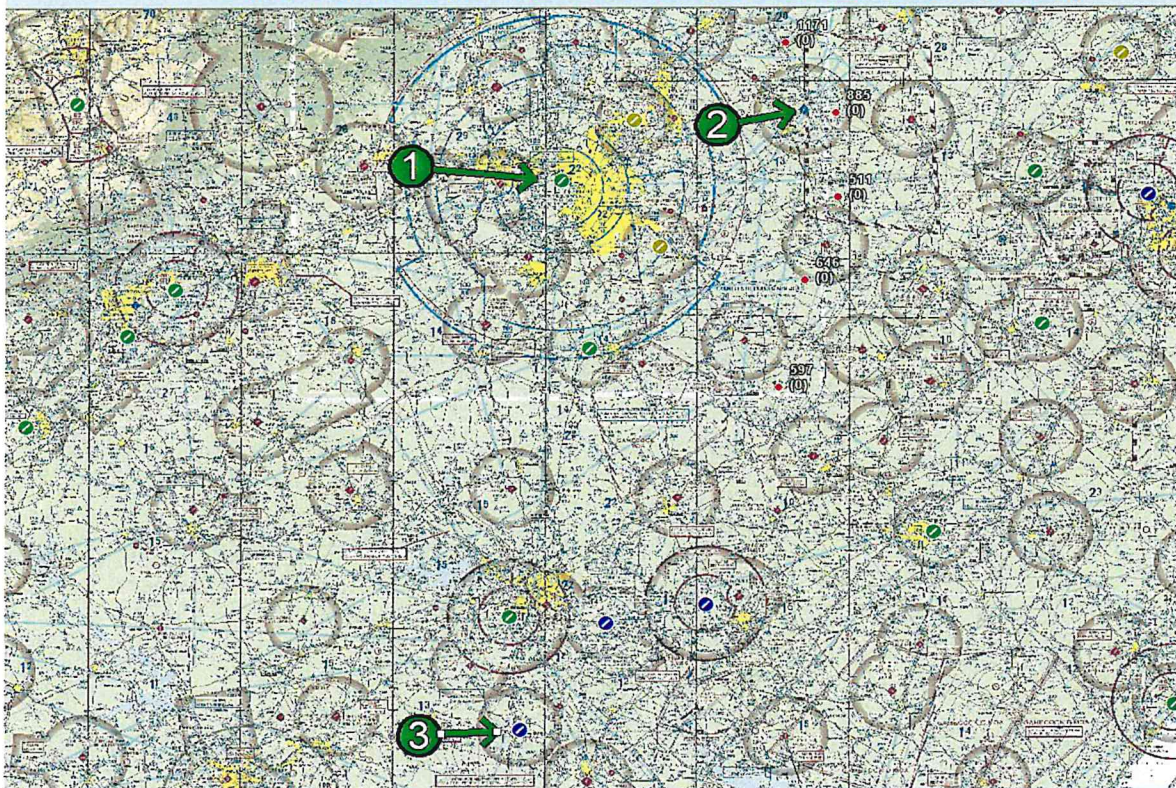
Our eyes accept light rays from an arc approximately 200 degrees wide. However, the brain only permits us to focus on details within a **10 to 15 degree cone**. If an object falls outside this cone, normally it will not be recognized. Again, good scanning techniques can help overcome this physical limitation.

Area Chart

This chart represents a portion of the local flying area for the 145th Airlift Wing. With 8 C-17 Globemaster aircraft, the North Carolina Air National Guard flies missions all over the world. However, many of our training and proficiency flights take place within the southeastern United States. Some of the local airports that we use are depicted on this chart. Others include Asheville, Greenville/Spartanburg, Columbia, Fayetteville, Pope AAF, Simmons AAF, and more. **Please note that our local flying activities are not limited to transition work at airports.** We also conduct high-speed, low-level flights throughout much of central North Carolina and northern portions of South Carolina. Proper chart review and route study in concert with thorough preflight planning may alert you to areas where increased military activity might occur. Our aircraft, clad in a distinctive gray paint scheme, are approximately 174 feet in length with wingspans approaching 170 feet.

LEGEND

1. Charlotte /Douglas International Airport [Home of the 145th Airlift Wing]
2. Stanly County Albemarle Airport [145th AW satellite training facility]
3. North Aux Airfield (KXNO) [145th AW & JB Charleston satellite training facility]



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Commercial, private, and military air traffic volume is rapidly growing throughout the United States as more people explore the joy of flight. This increase brings a heightened potential for mid-air collisions. The men and women of the **North Carolina Air National Guard** are committed to the principle of making our country's skies safer for all. This principle is the impetus for this poster. Produced by the Safety Office of the 145th Airlift Wing, this Poster is designed to raise awareness of mid-air collision dangers and provide ideas to mitigate the dangers that accompany VFR flight. This poster provides an introduction to causal factors of mid-air collisions, and offers some basic steps you can take to reduce your risk. Should you wish to learn More, we would enjoy speaking with you, Please contact the **145th AW Safety Office** at 704-391-4141 or **Base Operations** at 704-391-4178. Safe Flying!

PROPER SCANNING TECHNIQUE

Detection of potential traffic conflicts can best be accomplished through a series of quick eye fixations at different points in space. Start by mentally dividing the windscreen into segments. Begin your scan at the far left of your viewing area and **scan each segment well**, moving slowly to the right. Ensure that you spend enough time in each block focus outside the aircraft. Periodically shift your focus from outside to the instrument panel, and back again. At the end of your scan, check your instruments and start over.

REACTION TIMES

This example illustrates the rapidity with which traffic can become a threat. With a combined closure rate of 500 knots [assume your speed is 250 knots, and the conflicting traffic is a 250 knots], you are **seven seconds from impact** at a distance of one mile. Given an average of six seconds to acquire and analyze the threat, four seconds to decide how to respond and react, and two seconds to gain enough clearance, you are five seconds too late to avoid impact.

LARGE MILITARY AIRCRAFT

Stand back 10 feet from this illustration to approximate the size of this C-17 at a distance of one mile.



WAKE TURBULENCE

Lurking behind and beneath every large commercial and military aircraft is an area of disruptive airflow. Encountering this turbulence can be at best upsetting, and at worst deadly. **Exercise extreme caution** when flying in the vicinity of large aircraft, and ensure that sufficient physical separation exists to prevent wake turbulence upsets. Remember that the greatest wake turbulence is generated by a heavy, clean, and slow airplane [near the traffic pattern].

REQUISITE DISCLAIMER

This document was created for informational purposes only with the express intent of providing techniques for minimizing the risk of mid-air collisions. **Is shall not** be utilized for flight planning. All information, routes, and descriptions contained herein are current as of the publication date of this document and are subject to change. Consult the Airman's Information Manual [AIM] and the appropriate Federal Aviation Regulations [FAR] for up-to-date information and guidance.