SEE and Avoid
Effective Collision Avoidance

The recent loss of four individuals in the midair collision between the Trans Pac Piper and the Westwind Cessna demonstrates the need for heightened awareness of midair collision potentials in our Deer Valley Pilot community. It will be months before any conclusions can be made by the NTSB. However, we should turn this tragedy into an opportunity for advancing our skills in avoiding midair collisions.

Studies have revealed several facts about the occurrence of near miss and midair collisions. Most happen in day, VFR conditions. A majority occur within 5 miles of an airport. The majority of events are not with high speed closure rates. In fact, a majority of collisions are with slow closure rates with the faster plane overtaking and hitting the slower plane. Rarely, is the collision a head on type of collision. 82% of midair collisions are with convergence angles, only 5% are head on. Low altitude collisions are the most prevalent, with 77% below 3000' AGL. No pilot is invulnerable. There has been no correlation between age, experience, or pilot rating. Who is at risk for a midair collision-YOU ARE!

The mantra for avoiding midair collisions has been "See and Avoid". Thus, the only sense organ the pilot can use for avoidance is the eye. But, vision is an imperfect sensory organ. Vision can be altered by fatigue, age, optical illusions, glare, heat, windshield distortion, and "normal" physiologic properties of vision. By knowing the limitations of vision created by normal physiologic properties, one can utilize improved scan techniques to find that impending target aiming for your aircraft.

Accommodation: Our eyes need to adjust the focal length from near to far automatically. This change of focal length is done by muscles that distort the lens of the eye. This process is known

as accommodation. Normally, it takes about 2 seconds to accomplish this. Thus, every time you look at your instruments and then look outside, you are "blind" for 2 sec. As one ages, this time is longer. Another issue is that of "empty field myopia". Under hazy light conditions, the eye cannot focus on a distant object well. Thus, your "camera" is in an out of focus condition and until an object is large enough, you will not see it.

Binocular Vision: The visual cortex of the back part of the brain requires input from both eyes. If an object is hidden from view of one of the eyes, then the image is not processed accurately in the brain and not recognized. Windshield posts are a common structural issue that can cause this.

Tunnel Vision: Although our field of vision is approximately 200 degrees, the arc of vision that can actually focus and have detailed focused clarity is about 10-15 degrees. Movement may be detected in the peripheral vision; however, the brain cannot what exactly is happening there.

Blossom Effect: If you are on a collision course with an object, it will remain motionless in your visual field. Motion across the visual field is needed in order for the brain to recognize this as an object. Not until the object get very close that it blooms into your awareness, it is not recognized as a threat.

Human Factors: The mind set of pilots can contribute to not effectively seeing and avoiding. Expecting radar to keep us out of collision risk is not a reasonable approach. The control tower cannot assure separation. Keeping one's head in the cockpit will almost guarantee not seeing a converging aircraft. Thus, developing an efficient external scan is the only defense for avoiding midair collision. Is there a perfect scan? No. Each pilot must develop a workable and comfortable scan that takes into account the physiologic factors discussed here.

How do you develop your best scan? First, start with getting rid of the bad habits picked up along the way. Quit keeping your head inside the cockpit. It only takes seconds to have a disaster happen. Glancing out and giving the airspace a "once over" is of little value. So is staring out at one spot.

Here are some good suggestions. On descents and climbouts, make gentle 'S' turns. This is a way of clearing the airspace above and below as well as around your aircraft. Additionally, the motion you are creating with your aircraft may make it easier for others to see. Avoid tunnel vision on landing; look around, below and above. Scan in sectors both left and right as well as up and down. Two basic scan techniques have been shown to be the best. The block system is based on the theory that traffic detection can be made only through a series of eye fixations at different points in space. Each of these fixes becomes a focal point of your field of vision. By

fixating every 10-15 degrees in blocks, one should be able to detect any contrasting or moving object in that block. This gives you 9-12 blocks in your scan area, each one need 2 seconds to allow your eyes to accommodate and detect an object.

The two techniques of the block system is 'Side-to Side' scan and 'Front-to-Side' scan. The 'side to side' technique is starting at the far left of your visual field and step blocks across to the right side, stopping 2 seconds at each block. The other technique, 'front-to side' scan is starting in the center and moving each block scan to the left, return to the center and repeat on the right.

This is a starting point. The best scan is what works for you. The salient points are that you must clear 10-15 deg. Blocks allowing your eyes to accommodate in each block for 2 seconds. Targets may be anywhere, usually not directly in front of you.

Another thing to consider is making your aircraft more visible. Use you landing light, even in the daytime. I personally keep it on anytime below 10,000'. Consider getting one of the new LED landing lights. They last longer than the airframe and use very little current. It is one more tool to be seen.

Always be vigilant. Fly Safely.

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