Misjudging the wind

Why do intelligent pilots continue to believe a myth?

BY BARRY SCHIFF / AOPA Foundation Legacy Society chairman

AFTER MY COLUMN about downwind turns was published ("A Persistent Myth," June 2024 *AOPA Pilot*), I received an email from a reader accusing me of reviving the subject just to get more mail. She was right about one thing. The topic did generate a response, much of it from those who steadfastly maintain that a turn made downwind (away from a steady-state headwind) is more hazardous than a turn made upwind (into a steady-state headwind). None of the emails was threatening, but a few questioned my sanity and maintained that turning downwind is aerodynamically different than turning upwind.

There has to be a logical reason, I thought, to explain why so many intelligent pilots continue to believe this myth. The truth is that there are conditions and illusions that can mislead many into believing the myth of the downwind turn. Before accusing me of backpedaling, however, understand that I am not altering my position. The so-called hazards associated with downwind turns are pilot induced.

> There has to be a logical reason to explain why so many intelligent pilots continue to believe this myth.

When climbing into a headwind after takeoff, for example, an airplane has an increased angle of climb. If the headwind equals your true airspeed—as an extreme example—climb angle would be 90 degrees (straight up). If a downwind turn were made at such a time, the pilot would perceive the climb angle becoming shallower (especially if he is near the ground). Airspeed and climb rate remain unchanged, however, because an airplane flying within a steady-state air mass has no way of knowing if it is flying upwind or downwind.

An increase in groundspeed when turning downwind can be sensed peripherally (especially at low altitude). Unless the pilot refers to his airspeed indicator, he might perceive this speed increase and climb-angle decrease as having been caused by inadvertently allowing the nose to pitch down somewhat. This can lure a pilot into subconsciously raising the nose in an attempt to restore normal speed and climb angle. If the nose is raised sufficiently while turning, the airplane can stall, which is blamed by some as the result of turning downwind. The culprit, however, is the pilot, who made the airplane stall.

There is another phenomenon responsible for perpetuating this myth. During initial climb after takeoff into a headwind, it is not unusual for wind speed to increase with altitude. This is called a wind gradient. If the wind speed increase with altitude is substantial (a steep wind gradient), the result can be a significant increase in climb rate. In effect, the airplane is under the influence of a subtle wind shear.

Assume that the pilot turns downwind while climbing through such a gradient. The shearing effect responsible for increasing the climb rate now becomes an increasing-tailwind type of shear, and climb rate is reduced. Is this the result of turning downwind? Well, sort of. But the real culprit is wind shear and not the airplane's aerodynamic reaction to a downwind turn.

Finally, there is a hazard relating to ground track maneuvers, especially when crop dusting. Assume that an agplane is spraying a north/south field. Immediately after flying a northbound swath, he makes a 180-degree turn to begin a parallel run in the opposite direction. This normally is not a problem but consider what happens when the turn is made under the influence of a strong northerly wind. As the airplane turns north to south, the wind causes the airplane to drift toward the field. This reduces the time and space available to complete the turn. The pilot notes that he will return over the edge of the field before having had a chance to complete the 180-degree turn. His only choices are to be off-heading when he reaches the field or tighten the turn so as to be properly aligned upon reaching the field's boundary. If the aircraft stalls as result of too tight a turn, this would be the result of pilot error, not of making a downwind turn.

Flying a circle around a pylon at low altitude can result in a similar problem. During the downwind portion of the circle, the airplane has such a high groundspeed that it tends to fly away from the pylon. To prevent this, the pilot must steepen the bank angle to increase turn rate and maintain a constant distance from the pylon. Too tight a turn and too much back-pressure can induce a stall.

When misunderstood, these events lead some pilots to erroneously conclude that they were caused by the natural loss of airspeed resulting from turning downwind. That clearly can never be the case. Let's put the myth to rest once and for all. ■

▶ **www.BarrySchiff.com**

BARRY SCHIFF has logged more than 28,000 hours and flown 363 different types of aircraft.