AIRSPEED ALONE WON'T TELL YOU WHERE THE STALL IS

Aeronautical engineers and flight-test pilots refer to the wing's angle-of-attack as the letter "alpha," typically written as the lower-case Greek α. There's no Greek, however, to the basic takeaways from our primary flight training:

- **Angle-of-attack—alpha—controls airspeed;**
- **Power controls altitude;**
- **A stall occurs at that alpha where airflow over the wing separates; by definition, where lift stops.**

In practice, however, most of us use an airspeed indicator as a proxy for depicting and setting alpha. From landing-configuration V_{S1} stall at the lower end of the white arc all the way up to V_{NE} and the red line, we look for speeds that correspond to a desired pitch angle. Best climb rate; best angle of climb; minimum-controllable airspeed; maximum maneuvering speed—those airspeeds we learn correspond to the alpha we want. In this way the ASI is a proxy for alpha.

We're also taught those speeds on the dial match the tested number only when the aircraft flies in unaccelerated, level, standard-day conditions, or rarely. In other words, the airspeed indicator doesn't compensate for anything much beyond pressure. Meanwhile, the airplane's true stall speed, we learned, varies with attitude, G-loading and density altitude. None of these conditions are reflected directly on the airspeed indicator.

Increase the G loading—say, in a turn pulling 1.5 or 2 G—and stall speed increases; pull just a little more when near the wing's critical alpha and true stall speed rises quickly above aircraft stall speed, even if well above indicated Vs, and without greatly moving the ASI needle.

Make this pitch change too close too the ground to salvage? Bad things result, and they're called LOC accidents. Stalls in the pattern and on landing approach make up a majority of that 40 percent of LOC-accident fatalities. Hence the ongoing focus on increasing AoA use to help pilots avoid LOC events and, in turn, reduce LOC accidents overall.

Above, the two uppermost Alphas Systems AoA indicators pictured are designed for mounting atop an airplane's glareshield. The round display at bottom is for in-panel mounting. Each uses the same basic sensor and associated components. Other AoA manufacturers offer similar displays and an array of mounting options, as does Alpha Systems.