

Angle-of-attack Systems Gaining Ground on Smaller Aircraft

by Matt Thurber

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Redbird's RedHawk will include the Bendix/King KLR 10 as standard equipment.

For many pilots, the first exposure to the benefits of an angle-of-attack (AOA) indicating system comes during their first simulator session toward a business jet or airliner type rating. Because fewer pilots are entering the world of professional flying via the military—which actively uses AOA systems—and general aviation training airplanes are rarely AOA equipped, new civilian pilots get little exposure to AOA indicators and their safety benefits.

That could change if AOA systems were routinely installed in training airplanes, but currently these systems are lacking in new airplanes that are flown worldwide for pilot training. Encouragingly, some new light sport aircraft (LSA) are equipped with AOA systems, but the lack of ubiquitous installations in trainers means that each generation of new instructor pilots has little or no experience teaching the use of such systems, and thus this knowledge is not transferred to new pilots.

The scarcity of AOA system installations stems partly from the absence of any requirement that they be installed in light aircraft, although there is widespread agreement that there are clear safety benefits when AOA concepts are taught properly and when pilots use the equipment. The regulatory framework for AOA installations is also confusing.

The FAA has opened the door for relatively simple AOA system installations and allows some to be done without a supplemental type certificate (STC). The details of how these installations can be accomplished are outlined in letters sent from the FAA's Small Airplane Directorate to AOA system manufacturers. Some of the parameters include no

penetration of aircraft structure, no interaction with the existing pitot-static system and that the system be used for advisory purposes only.

Bendix/King's new KLR 10 lift reserve indicator, while targeted at the experimental airplane market, ought to be installable under these guidelines because its AOA probe mounts onto a wing inspection plate, similar to other simple AOA systems. Redbird Skyport plans to install the KLR 10 on its RedHawk refurbished diesel-powered Cessna Skyhawk, an airplane that is being developed for flight schools. Embry-Riddle Aeronautical University has already installed **Alpha Systems AOA** indicators in the Cessna 172 fleet it uses for training at the university's Daytona Beach, Fla., and Prescott, Ariz., campuses.

Costly Installation Process

Less complex AOA systems, such as the **Alpha Systems** units, generally fall under the simplified installation parameters outlined in the FAA's Small Airplane Directorate letter. However, according to Bendix/King, the FAA has said that the KLR 10 can't be installed in certified aircraft without an STC, which means a costly installation process. Bendix/King is working with ASTM Committee F39 on aircraft systems, which has developed a new standard for angle-of-attack systems. The new F3011-13 "standard specification for performance of AOA system" establishes "functional operation and minimum performance requirements for an angle-of-attack system." Aircraft owners can only hope that complying with this standard will be less costly than the full STC process.

Safe Flight Instrument has developed an AOA system for light aircraft, which employs a mechanical sensor that detects the exact stagnation point where the wing stalls in any configuration. The company is demonstrating the AOA system in its Beechcraft Baron. The FAA also wants installation of the Safe Flight AOA system in existing airplanes to be done under an STC. The F3011-13 standard, according to ASTM Committee F39, could eventually address more complex AOA systems, which presumably would include the Safe Flight product.

LSA manufacturer Icon Aircraft, which is developing the A5 two-seat amphibious sportplane, has elected to include an AOA indicating system. "Angle of attack is likely the single most important parameter that helps a pilot fly safely at all times, and yet this information is not commonly found in small planes," said company CEO Kirk Hawkins. The A5's AOA indicator features a unique presentation, a wing-shaped needle that "flies" up or down as AOA changes. If the wing/needle is in the green, the wing has plenty of lift. The yellow zone means less left is available, and if the wing/needle points to the red zone, the airplane is stalling. Optimum landing AOA occurs where the needle is exactly between the green and yellow zones.

"It's so obvious, intuitive and right smack in front of the pilot," said Bruce Landsberg, president of the AOPA Foundation and a long-time advocate of AOA indicators. "You can see it in your peripheral vision as you're flying on final and taking off. It's brilliant, just brilliant."

That said, Landsberg is disappointed that the FAA isn't allowing all AOA installations in general aviation aircraft to be done without an STC, so that manufacturers and aircraft owners and operators would be encouraged to install such important safety equipment. "I gave Icon a pat on the back for doing something different," he said. "Is it required under Part 23 or the LSA standards? No, but it's the right thing to do. We don't need the FAA to tell us what to do. Here's an area where we know pilots have difficulty. Angle of attack is important and pilots need to learn to fly [AOA] and need a direct measurement [of AOA] and not to rely on airspeed."

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