



## We Need Stick Shakers

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The FAA recently announced streamlined procedures to allow installation of angle of attack (AOA) systems in general aviation airplanes. That's good news because the STC process for approving an AOA system in a standard airplane can be so cumbersome and costly that few equipment manufacturers want to undertake it, and few airplane owners want to pick up the extra cost.



Homebuilders can, of course, install an AOA system without specific FAA approval just as they can put other avionics in their airplanes without TSOs or STCs. And many builders are doing just that.

Many safety experts believe AOA indication systems can prevent low speed loss of control accidents by showing a pilot the actual AOA and margin above the stalling AOA. It makes sense. If you avoid the stall you avoid losing control, and maintaining AOA below the stalling angle means you can't stall no matter what the attitude or airspeed.

But I believe measuring AOA is only part of the safety advantage. The other element is how to make the pilot aware of AOA, particularly when the angle is nearing stall. And I firmly believe only a stick shaker can deliver the warning in a meaningful way to actually improve safety through stall avoidance.

There are unlimited methods of displaying AOA to a pilot, particularly if a flat glass display is in the panel. Some of my favorite display techniques are marks or chevrons that show the stalling AOA on the PFD and indicated which way to push the nose to reduce AOA. There are also basic vertical displays that can be mounted close to the pilot's line of sight over the glareshield that simply point down when AOA is approaching a stall.

But whatever display is installed they all have one thing in common—you have to look at them and make an interpretation of what the display means. And that's why I don't believe visual display of AOA will do much good to prevent the typical stall-spin accident.

When pilots unintentionally stall airplanes they are usually distracted by something, often a loss of power, or they have, as the safety experts say, become task saturated. In those situations the pilot is not looking at the information in the panel or at least not interpreting it correctly. The distracted brain is paying attention to something other than AOA, and in a situation, such as a forced landing, where so much is happening so fast and so confusingly our brains just can't process everything.

That's why the stick shaker warning is so important. A shaker vibrating the controls in your hand cuts through the distractions and information overload better than any aural or visual warning can. A shaker is intuitive. It requires no interpretation. The learning curve is straight up.

If you don't believe me drive one of the several new luxury cars that have shakers in the seat to warn of collision

threats. Even when you have no idea that a warning shaker is installed, such as when driving a rental car, when the shaker goes off on the side of the seat you look instinctively in that direction.

I even read a story about a company making clothing with shakers. The shakers are connected to a navigation system so you can be guided soundlessly by the position of the shaker in your vest.

The stick shaker has decades of proven success in jets. Jet pilots simply aren't stalling and spinning and the shaker gets some credit. But the more convincing demonstration of the effectiveness of the shaker is when flying a wind shear escape.

The stick shaker warning is calibrated to fire at an AOA safely above the stall. That also happens to be the most efficient AOA for maximum climb gradient in most airplanes. So in the simulator pilots are taught when trying to escape a severe wind shear encounter to pull the nose up until the shaker fires. Then you relax back pressure just enough to keep the AOA going in and out of the shaker. That's the AOA at which the wing can produce the most lift and offers you the best chance to get away from the ground.

During a wind shear encounter the airspeed is all over the place and the optimum pitch angle is constantly changing. There is so much to look at and interpret on the instruments that the shaker becomes the intuitive way to find best angle of climb when your brain is in overload.

A stick shaker is an electric motor with an eccentric weight attached. A shaker for GA need not be complex or expensive. It can be attached to the control column or stick almost anyplace and still deliver the unmistakable vibration to your hands.

I hope and expect to see more AOA systems for GA introduced soon since the FAA changed its certification policies. I just hope stick shakers are part of the new systems. Shakers can make a difference.

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