



The Safety Benefits of Angle of Attack Systems

Loss of control is the number one root cause of fatalities in both General and Commercial Aviation. Currently, in GA alone, we are averaging one fatal loss of control accident every four days. We need to do something different to reverse this trend. Angle of Attack (AOA) is taught as a theory to private pilots starting out in ground school, however, once flying lessons start, the student relies on SPEED (and published 1G stall speeds) to avoid a stall.

The problem with airspeed alone is that an airplane can stall at any speed, any attitude, and any power setting. The 1G stall speed published in airplane flight manuals is only valid for unaccelerated flight (1G load factor), coordinated flight (ball centered), and at one weight (most typically max gross weight). Unfortunately these conditions are not always met on a given real world flight. Consequently, speed itself is not a reliable parameter to avoid a stall. Again, an airplane can stall at ANY speed.

AOA is a Better Way

Angle of Attack is a better parameter to use in avoiding a stall because for any given configuration, the airplane will always stall at the same angle of attack, also known as the critical angle of attack. This stall angle of attack does not change with weight, temperature or density altitude. AOA indicators can help pilots detect this otherwise invisible airfoil position and avoid a stall.

Here are some basic points about AOA indicator use:

- An AOA indicator is a useful reference when used in conjunction with airspeed and existing stall warning systems
- AOA system/indicator alerts when entering stall parameters
- Other benefits include more precise and efficient flying (V_y , V_a , V_x , and V_{ref} AOA are always the same)

References and Additional Reading:

- FAA-H-8083-3A, Airplane Flying Handbook, chapter 4, page 4-3, figure 4-2
- FAA-H-8083-15B, Instrument Flying Handbook, chapter 4, page 4-6, figure 4-8
- FAA-H-8083-25A, Pilot's Handbook of Aeronautical Knowledge, chapter 4, page 4-22
- NAVAIR 00-80T-80, Aerodynamics For Naval Aviators, Chapter 1, Figure 1.11
- Real World AOA Use by Dave Sizoo in [Transponder Magazine](#). This article is available on request.



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