Cuckoo's Guide to Stall/Spin Awareness Knowledge

Below are some good questions to use to test a pilot's knowledge of stall/spin awareness. They also provide key points that should be discussed and all pilots should know intimately in order to increase their level of safety. This is not an all-inclusive list, nor are all of the details provided for each questions discussion, but this covers some critical areas to cover, in my opinion.

I highly recommend that stall/spin awareness be covered for any final stage check for a new rating, every flight review, any time an instructor takes on a new student, etc. My experience has shown that most pilots have weak knowledge in this area.

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1. What is the leading cause of airplane fatalities? A: Loss of Control – Inflight (LOC-I), with many of those mishaps caused by a stall/spin event

2. When does an airfoil (wing) stall? A: When it exceeds the critical angle of attack (AoA)

3. What is the definition of AoA? A: Angle between chord line of wing and relative wind.

4. What happens to the lift produced when an airfoil stalls? A: Lift rapidly decreases with increasing AoA past the critical AoA (best to display with the Coefficient of lift graph that shows lift vs. AoA)

5. What are the characteristics of a stall? A: A stall is characterized by any or a combination of the following:
    1. Buffeting, which could be heavy
    2. Lack of pitch authority
    3. Lack of roll control
    4. Inability to arrest descent

6. What attitudes and airspeeds can you stall an airplane? A: ANY! The wing only "knows" AoA. Attitude does not matter and airspeed is not a primary factor, exceeding critical AoA is the primary, thus most important factor.

7. What is the slowest speed you can theoretically slow an airplane to and not stall?

    A: Zero! (Time to look at a V-G Diagram) Focus on the area inside the stall lines and how they lead to zero G. With less than 1-G flight you can temporarily reduce your stall speed dramatically and even to zero!

8. How do you "un-stall" an airplane? A: PUSH on the yoke/stick! This is always the answer for a positive AoA stall, no matter the attitude or airspeed. Adding power is not how you fix a stall (contrary to some beliefs). If the yoke or stick is full aft and the pilot adds power then

they have a power-on stall that will remain stalled until the elevator is moved to where the airplane can recover from the stall.

9. What "forces" are required for a spin to occur? A: Stall and Yaw (More specifically, an adequate amount of yaw, of which it may not take much!). Good to discuss how you can do either stall or yaw separate from each other with no problem and maintain control. Put the 2 forces together and you get to go for a ride! Discuss sources of yaw (P-factor, improper rudder use, turbulence, adverse yaw from ailerons, etc.)

10. What maneuvers/activities are the most common where pilots are having stall/spin mishaps? A:

    1. Skidding base to final turn. Discuss how and why this may happen and the aerodynamic effects of a skidding turn. Here is a link to a good description from APS.

    2. Stall on takeoff: P-factor creates yaw. If the ball is out of center then the airplane has yaw. If a pilot pitches up too rapidly or too much and stalls with yaw then they may spin.

    3. Engine failure after takeoff with a turn back to the airport. The problem is when the pilot does not lower the nose sufficiently to maintain best glide (or unstalled flight) and then starts a skidding turn in a futile attempt to turn the airplane faster towards the runway. Discuss the proper way to turn back to the airport with an engine failure. Discuss the ramifications of flying at any other speed than best glide. Ensure you do not skid to turn the airplane! See my Emergency Maneuvering page for more info.

11. What is the difference between a spin and a Spiral/Graveyard Spiral/Diving Spiral?

    A: Airspeed. A spinning airplane's airspeed indicator will show airspeeds somewhat close to the 1-G stall speed of the aircraft in a spin. If the airspeed is increasing then you are in a descending spiral. Some airplanes (e.g. C172) will come out of a spin into a spiral despite having pro-spin inputs held in. Discuss the different recovery procedures for a spiral vs. spin.

12. What is the primary cause of stall/spin mishaps?

    A: The pilot! Incorrect pilot inputs are the main cause of almost all stall/spin mishaps. An airplane normally won't stall or spin unless the pilot puts in too much elevator up for a stall and too much (or not enough) rudder for a spin.

    If the airplane is doing something uncommanded and the pilot is not sure of how to fix the problem, the pilot should neutralize controls and analyze (quickly) before making control inputs. By neutralizing controls, the problem is less likely to get worse and may improve compared to leaving the controls in the original position. Flailing about on the controls without specific purpose is not good and more likely to make the situation worse instead of better.