Intentional Spins Encouraged

When I was a teenager, I came across a cool looking bi-plane that was obviously meant for aerobatics. I had to look inside and saw a placard that read “Intentional Spins Encouraged”. It gave me a chuckle, because many of the aircraft I was flying had big placards bordered by black and yellow hazard markings that read “Intentional Spins Prohibited”.

Spin training at our glider-port was absolute. You got the training before solo, after solo, before your checkride, etc. I did not know any different and thought spin training was an integral part of every syllabus.

I did spin training in the powered aircraft and my examiner made me do four spins on my Private Pilot checkride.

I was used to doing the spin and recovering on a pre-determined heading. It required me to be aware of where the aircraft was, at all times, and to understand the recovery so I could time it to achieve the desired outcome.

I went off to college and found out that my training environment was different than others. The FBO where I flew told me that spin training was dangerous and only required for CFI candidates. I was incredulous that people were not being trained in this basic and fun maneuver.

Then I got to US Navy flight training and found out spins where considered out-of-control flight. That made no sense to me. The basic trainer at Whiting Field, the T-34C, had fins and strakes all over it to make it spin predictably. The training manual said that the T-34C would continue for 2 and a half to 3 turns before recovery after anti-spin control inputs were initiated.

It is one thing to read this fact, and quite another to experience it. I dutifully entered the spin and fell back on my previous experience as I applied anti-spin controls. Nothing happened! I looked at the controls, full right rudder and stick neutral and slightly ahead of center. What was going on? One turn complete. This isn’t right. My instructor is unreasonably calm and obviously unaware of what is happening. Two turns complete, nothing! Funky sweat is forming quickly. Finally, after what seemed an eternity, the aircraft started to wobble and the rotation stopped. I completed the recovery and my instructor said great job, let’s do another. All of a sudden I was afraid of spins. They really were out of control!

Or were they really “out of control”?

I had to learn what was really going on.

I learned spins are very simple, and very complicated. The wings are stalled, but one wing is stalled more than the other and is producing much more drag causing the auto-rotation that is characteristic of a spin. The aircraft is rolling, pitching, and yawing all at the same time. The axis of rotation is out ahead of the airplane, which causes the aircraft to move around the outside of an imaginary cone.

A spin requires a stalled wing and yaw. Eliminate either, and the aircraft will not spin. Simple, yet complicated.

"Aerodynamics for Naval Aviators" (pages 307-312) provides an excellent discussion of what is happening to the aircraft in a spin. It cannot be emphasized enough, it is paramount to understand that stall and yaw must be present to spin.

What the Navy meant by "out-of-control" was that my longitudinal and lateral axis control inputs did not produce a pitch or roll in the desired direction. Rather, the aircraft behaved in a way that was entirely predictable but opposite to what the controls would normally do if the wing, or a portion of the wing, was not stalled.

Today, the FAA's primary emphasis is now on "Loss-of-Control" (LOC). The FAA defines LOC (*FAA Fly Safe dtd July 6, 2015*) as an unintended departure of an aircraft from controlled flight which can lead to a flight regime that is outside its normal flight envelope and may quickly develop into a stall or spin. To enter a stall induced LOC situation, you fundamentally must stall the wing. To exit a stall induced LOC, you fundamentally must un-stall the wing. Simple, yes but easier said than done.

Because LOC happens at high angles of attack (AoA), you have to ask where you may encounter this.

Thermaling and maneuvering close to the ground are two situations where we can encounter high AoA situations that can lead to inadvertent stall/spin LOC events.

In a thermal by ourselves, an inadvertent stall is no big deal as long as we have sufficient altitude to recover. You can get yourself into a stall in the thermal by flying too slowly; encountering a strong vertical gust; abrupt control inputs; or a combination of these. The SSF strongly recommends that you establish a personal "Hard Deck". The Hard Deck is the altitude above the ground where you no longer thermal and start to fly a pattern to a predetermined landing area. If you are below your personal hard deck, you may not have enough altitude to safely recover from an inadvertent spin. Know how much altitude it takes to recovery from an inadvertent spin, double it and that should be a starting point for your hard deck.

In a thermal with others, give yourself some extra speed and try to keep all the other sailplanes in sight and at arms length. Always allow yourself an escape route of something starts to go wrong.

In the landing pattern, your target airspeed should be 1.5 Vs_o + 1/2 the wind + gust factor. The Joy of Soaring, Glider Flying Handbook, and Soaring Flight Manual all recommend this speed. This will help you account for wind gradients, gusts, and other unknown factors. The "yellow triangle" on the airspeed indicator is the Minimum Recommended Approach Speed. This speed is 1.3 Vs_1, which is below the recommended 1.5 Vs_0. It is interesting to note that Best L/D is very close to 1.5 Vs_0 on most gliders. This lets you make it easy. Use Best L/D + ½ wind + gust factor. This puts you on the favorable side of the drag curve.

The best way to avoid a stall in the pattern is to fly the recommend speed and keep the yaw string straight back. It is very easy to convince yourself that a skidding turn makes the sailplane turn faster. Pulling back on the stick and slowing down also creates the illusion that you are "stretching the glide". A skidding turn while trying to "stretch the glide" in the pattern sets all the factors against you when it comes to inadvertent stall recognition and recovery.

Remember that if you begin to feel like you are getting low, close the spoilers a bit and do not pull back on the stick. If you get below Best L/D, you will actually descend at a steeper angle the slower you get.

You must discipline yourself to fly at the recommended speed and be coordinated in the turns. Even in a coordinated 45^{o} angle of bank turn at the recommended airspeed, you still have a safe margin above the stall speed.

If you do stall, you must un-stall the wing to get it flying again. Un-stalling the wing requires lots of power or a loss of altitude. Un-stalling the wing requires an immediate reduction of the wings AoA. Pulling back on the stick to stop the nose from dropping will only deepen the stall.

Since we can only trade altitude for speed, you must know how your sailplane recovers and how much altitude is required. Simple concept, but do you really know what that number is?

It is very important to understand that for all practical purposes, if you stall any portion of the wing, you have stalled the entire wing. Because once the aileron area on the lower wing stalls, the aircraft will begin to auto-rotate into the turn and begin to pitch down. If you have not practiced or reviewed your stall spin entry and recovery techniques, it is highly likely that you will introduce aggressive pro-spins control inputs. That is, the aircraft is pitching down and rolling into the low wing, so you put in back stick and opposite aileron. This deepens the stall and accentuates the auto-rotation.

As I found out in the Navy, knowledge is power. I conquered my fear by getting smart about the aircraft characteristics. I also admitted my fears to my instructors and they helped me through it.

Spin training is not a required maneuver, but who knows, you may be a CFI someday. So why not get the training out of the way early. I challenge you to find a CFI and demand spin training on your next flight review or season-checkout. Practice what an incipient spin looks and feels like. Become familiar, if not comfortable, with what is going on. Embrace the spin. Learn how to avoid the unintentional spin. Know what your immediate reaction must be to an inadvertent spin.

Remember, Intentional Spins Encouraged.