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Emergency Strategies

A Pilot-Friendly® Manual

A simplified approach to handling emergencies in an airplane.

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SCENARIO 3
Practice Area Spin

You're a freshly post-solo student pilot practicing maneuvers by yourself in a Cessna 152. Doing old-school slow flight, flown right at the edge of stall with the horn blaring, you're a bit below your target altitude as you feel a slight stall buffet. You add power and pitch up. Suddenly, the plane rolls and yaws hard left, through inverted, as ***the ground turns into a spinning blur****.*

A Set Power

The practice area spin is a great example of how counterintuitive the correct first action can be. You just added power, maybe full power, to fix a sinking problem. Now you have a massive sinking problem. Human instinct is to just push in that throttle harder. Yet you must pull it all the way to idle instead.

In this spin, power makes everything worse. The left-turning tendency contributes yaw to the spin—that's why left spins are easier to achieve than right. As the nose yaws left, gyroscopic precession becomes a pitch-up effect that fights your effort to reduce angle of attack. And when you do recover, you'll be pointed at the ground and building speed fast. Idle power is a win on all counts.

B Neutralize and Push

A spin involves unevenly stalled wings, and the natural reaction just makes that worse. That's why even though this is in many ways the opposite of the spiral dive, the strategy is similar. Neutralize the controls and add a slight push (if only so you don't pull) to ensure you're not continuing to hold pro-spin controls.

In this 152 that may also be enough to recover. In fact, there's a notion that simply letting go of the controls is a viable spin recovery strategy. Maybe sometimes.

It's true that many GA airplanes are somewhat spin-resistant and require pro-spin controls to maintain a spin. Cessna 172s, for example, can be notoriously hard to spin intentionally. They tend to immediately transition to a spiral and build speed. Note that 172s should be loaded in the utility category envelope for intentional spin practice. If you accidentally spin while heavily loaded or with an aft C.G., results may be different. "Hands off" may be a good first step, but be prepared to follow up with proper spin recovery inputs.

"Neutralize" in this case can also refer to flaps. They're extended, so retract them. Extended flaps increase the downwash on the elevator and the tail-down (nose-up) force and can also limit rudder authority. You'd also likely overspeed them in the recovery.

C Roll or Yaw

Unlike a spiral, a spin demands full opposite rudder to stop the rotation. However, make sure you're actually *in* a spin first. It's possible that the previous step stopped the spin and broke the stall, and you've now transitioned into a steep spiral. The key indicator is airspeed. If it's low (usually below stall), you're in a spin and need full opposite rudder. If it's high and/or increasing, it's a spiral and you need a coordinated roll to level the wings.

D Adjust Pitch

In the pullout from the resulting dive, you must pull gently (or perhaps even push) to avoid overstress. At the same time, you must be assertive enough to prevent overspeed (or hitting the ground). Relate the g-load to what you'd feel in a 45° steep turn. That's enough to raise the nose quickly while not coming close to overloading the wings. Again, you might need to push.

TIP When C.G. is beyond the aft limit, stalls and spins may not be recoverable. Always fly within the appropriate weight and balance envelope.

Considerations When Practicing Stalls and Spins

We practice stalls with a goal of *not* spinning, or spins with the goal *of* spinning. If you've done that, you know what your airplane will do with full anti-spin and full pro-spin controls, but not the in-betweens that actually occur in the wild.

If you're a CFI, it's worth exploring the territory where your students' mistakes live. Try a power-on stall that's just slightly uncoordinated, or with feet planted on the floor. Set up the base-to-final spin (with plenty of altitude to recover). Explore accelerated and cross-controlled stalls.

Before you do any of this, make sure your legal bases are covered. If your POH has a prohibition against spins, you can't do them. Similarly, there may be a specific weight and balance envelope that you must fall within for spins to be approved, like in 172s. Other airplanes have ADs that prohibit spins: Cessna 150/152s must comply with a one-time rudder stop AD to spin. It prevents a fully deflected pedal from getting stuck beyond its physical stop.

Spins qualify as aerobatic maneuvers (banks beyond 60° and pitch beyond 30). However, there's a specific exception to the parachute rule in 14 CFR 91.307 for spins and other maneuvers required for a certificate or rating. You must have a CFI on board, but FAA Legal Interpretations say that you don't need to be actively training for a certificate or rating that requires spins. A student pilot and instructor can spin together without parachutes even though the private pilot test doesn't include them.

It ought to go without saying: A good instructor is essential here. Spins are safe and predictable in the right hands. This is no place for being "self-taught."

Avoiding the Practice Area Stall-Spin

Stalls—especially the power-on variety—are commonly feared by student pilots. But inadvertent spins are just as likely during slow flight practice, as described in this chapter's scenario. (Well, maybe not during the modern ACS-style well-above-stall-speed version, but it's a good idea to practice right at the margins, too.)

In this scenario, the pilot in slow flight is sinking and slow. Power is added to fix the speed, while aft yoke is added to fix altitude. The added power increases left-turning force, as does the added pitch up. The added pitch induces a stall and—especially if the pilot has insufficient right rudder—the pilot then sees the plane go swiftly down and left in a spin. The instinctive hard up (elevator) and right (aileron) inputs are decidedly pro-spin controls. Aileron inputs while stalled only exacerbate directional control issues by raising AOA on the already stalled inside wing.

This is prevented by proper slow flight technique. At high AOA, focus on pitch for airspeed control and power for altitude control. Too-slow speed must be countered with forward elevator. Altitude can only be controlled by adjusting the amount of excess thrust with the throttle. Maintain directional control with small, smooth, coordinated inputs. If you stall, neutralize the ailerons and maintain wings level with the rudder while forward pressure is applied to reduce AOA.

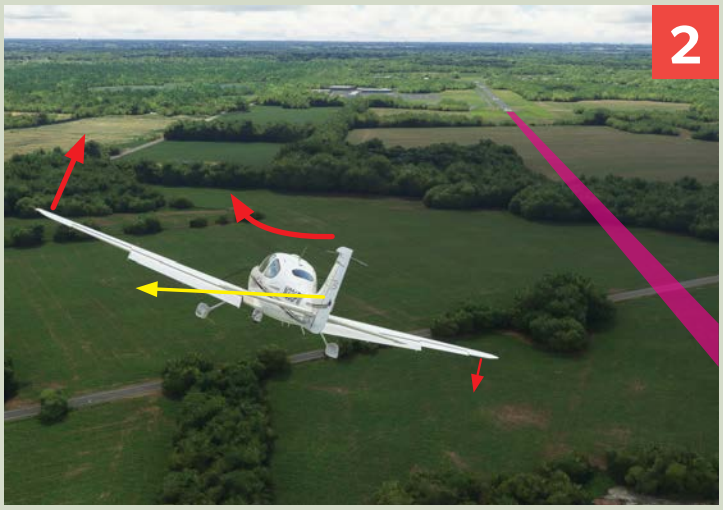
A pilot who has never spun an airplane will likely be struck by the intensity of the experience and may revert to counterproductive "pull and roll" instincts. Seek out training from an experienced CFI in an approved airplane, so the first time you see a spin isn't "for real."

The Base-to-Final Spin

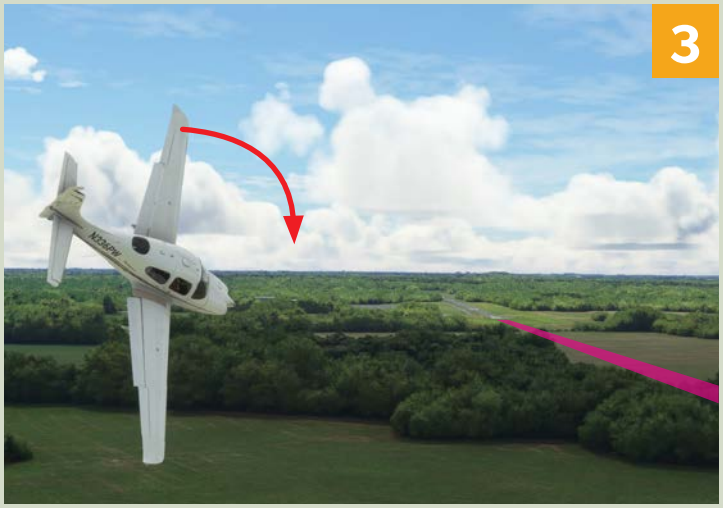
Here's this strategy applied to the notorious base-to-final spin. Step 1 is reducing throttle to idle. Next, you … hit the ground.

The base-to-final spin rarely leaves enough time or altitude to recover, even for an aerobatic expert. The name of the game is ***Avoidance***. So what accident chain are you trying to break?

1 The typical base-to-final spin begins with an overshoot of the final approach course. Often, a tailwind on base contributes to the overshoot. Usually a distraction, such as scanning for traffic or talking to ATC, is a factor. A lower-than-normal traffic pattern altitude can also result in a tighter-than-normal pattern and a resulting overshoot. Right traffic can produce the same illusion if you're not used to it. Be alert for all these factors when planning an arrival.



2 Attempting to salvage the overshoot is where it goes wrong. The pilot tightens the turn but doesn't want to bank steeper in the pattern. Instead, the pilot (maybe subconsciously) applies (inside) rudder to skid the turn. That accelerates the outside (raised) wing, which tends to rise and steepen the bank. The pilot counters with opposite aileron, plus more rudder. Now, it's a cross-controlled, skidding turn. The extra drag slows the plane and increases the descent rate. The pilot responds with aft elevator: a low, slow, skidding, cross-controlled turn.



3 The inside (low) wing stalls first—and the airplane rolls through inverted as it spins into the ground.

At any point before the spin, the pilot can save the day by simply neutralizing the controls and adding a slight push. Without the skidding turn, there's no spin. And without the aft elevator, there's no stall. Then add power, initiate a go-around, and try again.

If you overshoot, you have two options: Accept it and ***continue*** a normal turn to re-intercept final, even though you'll overshoot your runway in the process, or add power to ***go around*** for another try.