Alternative Training

Using the falling-leaf stall to teach spin avoidance

BY CHARLES FITZGERALD, MCFI

Many gallons of ink and acres of trees have been sacrificed over the to-spin-train-or-not-to-spin-train issue. I think there's a compromise solution that achieves many of the important objectives of spin training without actually putting the student into a fully developed spin. The compromise is to demonstrate—and have the student participate in executing—a series of falling-leaf stalls.

The pro-spin-training folks stress the idea that learning by doing is the best—and maybe the only way. Indeed, it's hard to overstate the visual and physiological overload that a pilot feels the first time he enters a spin in an airplane. Simulators might help the visual part, but nothing short of the real thing is going to emulate the feeling of being whirled around in your previously controllable mount.

The principal arguments against spin training are equally sound. First, the student who approaches a stall in coordinated flight, properly recognizes the imminent stall, and promptly initiates a recovery will never get into a spin. Even a severe upset is unlikely to result in a real spin. Many low-level stall-spin accidents may not involve fully developed (more than one-turn) spins, hence we are training a skill that should and probably will never be used. Second, full-spin recovery usually requires a fair chunk of altitude, which is not normally available in the typical stall-spin accident. Third, not all training aircraft are certified for spins.

To these rational arguments we should probably add a couple more that are more emotional but nonetheless true: Spins scare the daylights out of some students, thus further reducing the potential pool of future pilots. A related factor is that not all instructors have the experience to be comfortable and competent with spins or spin training.

Spin Training Today

All spins consist of three phases. First, the airplane must stall one wing and partially stall the other. In practice, this means uncoordinated flight. In the second phase, the fully stalled wing "drops" as the partially stalled wing imparts a rotational torque about the longitudinal axis. This is the real entry to the spin, and it is usually accompanied by the nose dropping. In the third phase, the aircraft is in a fully developed spin with the classic spinning motion about the longitudinal and vertical axis.

Conventional training today emphasizes recognition of the first step: detecting the imminent stall followed immediately by a prompt recovery. Recovery from the third phase, a fully developed spin, is generally covered only

in lecture and discussion. The second stage—the wing drop/spin entry—is often covered only to the degree that the student stops the wing drop as quickly as possible, if it occurs at all.

Indeed, an attentive student—one who keeps the aircraft in coordinated flight all the time—may go through the entire syllabus and never experience the second phase. This is particularly true if the instructor teaches them to recover at the first sign of a stall and does not let them get into a really deep stall. Even if the wing drops a little, and the student applies rudder correctly, he has very little time in this condition—and certainly not enough to really understand what the airplane is doing, and what it can do.

Most instructors are familiar with falling-leaf stalls, and many—but not all—have done them. Briefly, the airplane is held in a mushing stall while alternately dropping one wing then the other through the use of rudder control. The wing drop while stalled accurately simulates the initial entry into a spin.

How does this relate to spin training? All spins start with a wing "drop" in the direction of the spin, and the normal corrective actions include the prompt application of opposite, or "top," rudder.

If this is the pilot's initial, immediate, and instinctive reaction to a wing drop, it will be very difficult for any aircraft to enter a spin. The purpose of falling-leaf stall training is to give students the knowledge of the proper corrective action to take and to reinforce this with actual experience.

Stall Training

Any student who experiences and can correctly control a falling-leaf stall will be a believer in just how effective the rudder can be and how important it is in controlling the stalled airplane. Most importantly, the student will be conditioned to hit the "top" rudder whenever a wing drops. If she does this, she will never get past the spin entry into a fully developed spin.

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I've used a particular instructional procedure successfully to teach this maneuver. Conventional wisdom on instruction methodology dictates that having a student "follow along" with an instructor's actions is not the way to go. While I am in general agreement on this point, I believe that demonstration and participation in falling-leaf stalls are an exception to this rule for the following reasons: The instructor is always the "pilot flying"; the student touches only the rudders. The student does not get the airplane into the stall and does not execute the recovery. The student, as she gradually takes over the rudder actions, will get to feel the control actions and the resultant aircraft dynamics. This association between the top rudder and the reversal of turning direction is an important lesson to be learned.

The falling-leaf stall is entered by putting the aircraft into a straight-ahead stall and keeping it there with full back elevator. After the aircraft stalls, hold it in the stall with full back elevator. Leave the ailerons neutral.

If one wing does not drop, help it along with a little rudder to the side you want to drop first. As soon as it drops, apply full opposite or "top" rudder. This will stop the wing drop and, if held, cause the opposite wing to drop. When it does, apply full opposite rudder to that drop. While remaining in the stall, the airplane will now be dipping first one wing and then the other as it descends, just like a falling leaf.

Depending on aircraft weight and trim, it is usually helpful to add a small amount of power to keep the longitudinal axis somewhere near horizontal.

Also—again depending on that particular aircraft's characteristics—the rate of oscillation may vary considerably. In most training airplanes, expect a descent rate of 1500 fpm, so be sure to start with plenty of al-

titude and carefully clear the area below before you begin.

The instructor should have the controls throughout the maneuver. The student should have hands off the controls. In fact, tell the student to cross her hands over her chest. The student's feet should be lightly on the rudder pedals, following the instructor's actions.

After several cycles, tell the student to gradually start controlling the rudder pedals. The instructor can verbally command the student (left foot, right foot) until she gets the hang of it. The instructor can assist or even overpower the student, if required, but this is rarely necessary. After the student has executed several cycles more or less independently, the demonstration is concluded and the instructor recovers to level flight.

Note that at no time does the student have control of the airplane, nor does he even touch the stick, yoke, or throttle. It is important that the student have eyes outside the cockpit at all times.

Lessons Learned

This conditions the students to depress the "top" rudder if he gets a wing drop in a stalled or near-stalled condition. Secondly, he will actually control the airplane in this condition solely by the use of rudder and without the use of the ailerons. Third, he will have increased confidence in his ability to control the airplane in very slow flight conditions and to recover from unexpected upsets. Finally, he will gain additional experience in making full control deflections.

My experience is that this lesson should be taught by the midway point in the pre-solo training so that the student's first reaction to a wing drop in a stall is to get on the correct rudder. Primacy is important. I also stress to the students that this is a demonstration, and that they are not expected, encouraged, or even allowed to perform these on their own.

The falling-leaf stall exercise is not spin training. It does, however, take the student one step further into the stall-spin sequence, and it teaches proper recovery techniques. If the pilot never stalls, the airplane will never spin. If the one wing stalls, the airplane will start to spin. If the pilot takes the proper rudder action as the spin is starting, a spin is nipped in the bud. The rudder action is the second line of defense against the stall spin.

The falling-leaf stall exercise can be done in almost any training aircraft, and it offers most of the important benefits of spin training while being a lot less stressful on the student—and the instructor—than the real thing. ■