Teaching the Basic Aerobatic Course

Bonnie Kratz

Part Five: The final lesson

GREG KOONTZ, MCFI-A

This is the final part of a series about teaching a basic aerobatic course. Intended for the beginning student, the course covers the four fundamental maneuvers of aerobatics (loops, rolls, hammerheads, and spins). Here I will be addressing the instructor who wants to learn more about teaching this kind of course, but hopefully the contents will be helpful to those seeking to begin an aerobatic course as well.

Flight instructing is an art, and therefore it is personal. I will share my personal techniques and philosophy about the subject, but in the end each instructor will teach with a style that's best suited to him or her. Therefore, no information shared here is meant to be a judgment of the quality of the instruction given by anyone else.

As we take a look at the contents of lesson four, keep in mind that this is an initial aerobatic course for pilots who have no prior experience. Completion of this course should leave the student with the skills necessary to begin a regimen of solo practice with the instructor's supervision. When the student has had time to successfully develop his skills and confidence on his own, he should return to the instructor to hone the skills needed for the first competition.

Lesson four starts with a review of rolls, loops, and hammerheads. Your student has learned a lot about orientation by now, which has probably improved his tolerance for all this flipping around. If he is having a good day, this is a great time for some fun and challenges. Begin with a short run-through of each maneuver separately as a good review and warm-up. Then begin to link the maneuvers together. If all goes well, the student should be doing a string of maneuvers such as a hammerhead followed by a loop followed by a roll. Throw in a roll-off-the-top-of-a-loop that he learned in lesson two. Mix it up, have fun, and make him think a bit.

"YOUR STUDENT HAS LEARNED A LOT ABOUT ORIENTATION BY NOW, WHICH HAS PROBABLY IMPROVED HIS TOLERANCE FOR ALL THIS FLIPPING AROUND."

Let's follow this with some serious work on the roll. We originally started with a plain-Jane zero-lift aileron roll with no help from rudder or elevator changes. Next we added a little rudder at the start and top rudder at the end. Then we fed in forward stick and opposite rudder after the roll started until we rolled to the top left rudder point at the last knife-edge. That's a complete roll with a few rough edges. Take this last flight to refine each step until each blends seamlessly with the others. One way to help the student see this is to put him into inverted flight and let him work on keeping the attitude that level inverted flight requires. Then have the student roll to inverted on his own, hesitate there, and then roll on through. I teach that every slow roll has a first half and a last half, with the level inverted attitude as the checkpoint in the middle. Never fly through inverted level without the right nose attitude.

Before you wear your student out with too much review, move on to stalls. The main point of this lesson is to learn stalls and spins as they relate to sport aerobatic flying. I start with a simple stall to evaluate recognition and recovery. You are looking for a smooth and gentle hand, unrushed and confident. Explain that the old technique of shoving the nose hard forward and diving for speed will not work on top of a loop. We want a smart relaxing of the controls that allows the wing to unload and fly. Look carefully for anticipation and fear of the maneuver. Some people have a problem with stalls. I think it comes from a feeling of "losing control" of the airplane. I have seen a few flight instructors who are actually scared to stall an airplane and have passed this fear on to their students. Toning down a fear of stalls takes time and careful training. If you sense some anxiety in your student, you should deal with it now by spending time teaching him to be in charge of the airplane throughout a stall.

DeKevin Thornton

Next have the student fly the "falling leaf." Put him in a 45-degree climb with about 50 percent power and hold it until the plane stalls. He should hold the plane in the stall and use coordinated aileron and rudder to keep it straight. This builds great control and a good understanding of why the controls should be coordinated and the prop forces kept at bay. This is hard to do at first, so don't wear it out trying to get it perfect. A student who is used to flying more benign planes such as Skyhawks might need more practice later.

You might have noticed by now that I am not preparing this student to do competition spins at this point. The stall and spin portion of this course is designed for recovery techniques. You want to send your student away with sound skills that allow him to stay safe. He will build confidence practicing many spins before he is ready to refine them into a competition maneuver.

The next step is the cross-controlled stall. With enough altitude to give a Sherpa a nosebleed, give your student the airplane with the nose a few degrees above the horizon (about climb attitude) and a power setting of about 50 percent. Ask the student to begin adding left rudder smoothly while holding the nose up and the wings level. This will require continually increasing opposite aileron as rudder is applied and continually adding more backpressure as drag increases. Keep encouraging him to add rudder and keep the nose up/wings level. Eventually the airplane will make a startling entry into a left spin that is fed with the energy of the engine and the gyroscopic propeller force caused by the sudden down pitch. Almost every student will relax the elevator first—which could accelerate the spin. Because the spin is not well developed, most students will see a recovery in about 1-1/2 turns. This maneuver provides a memorable demonstration of the effects of power and how it can drive a spin. If you are using a Decathlon for this, you will certainly find it takes quite a bit of follow-through to persuade the lightly loaded wing to do this. Nonetheless, it will still serve its purpose as a lesson, and it is easy enough for your student to imagine how much quicker this would be in a higher-performance airplane. While your student might practice spins in a power-off mode, he will more likely have a lot of power on when he inadvertently spins. He needs to feel this firsthand. A little safety note here: Since this maneuver can be surprising, be ready to help if things start going wrong. I have seen a few surprised students leave the power and spin inputs in place and cause a wild ride. Try to help out soon enough to avoid this demonstration from becoming too dramatic. You want the student to have a firsthand experience of the cross-controlled stall without scaring him away forever!

Finally, let's do regular spins. While climbing back above that Sherpa altitude, set up a few ground rules. We're intentionally spinning or intentionally recovering—nothing in between. If your student decides to relax the stick during a spin, he will accelerate the spin and cause a lot more altitude loss. If he relaxes during the entry stage of the maneuver, he will turn it into a nasty little spiral. So be sure he understands that a spin requires full rudder and full elevator deflection until the decision to recover is made.


DeKevin Thornton


DeKevin Thornton

After a good spin and recovery has been made in both directions, your student needs to experience an accelerated spin. Be sure your student is feeling well before attempting this, because someone on the verge of being sick will surely be finished off here. If all is well, have him enter a right spin as before. After the spin stabilizes, have him smoothly and firmly (but not quickly) move the stick toward the firewall. The results will come immediately. Don't wind him up too tight; it doesn't take much of this to make a point. Convert to a normal spin with full backpressure and then execute a normal recovery. I think a student who never really experiences this will not be safe from making the wrong move when a clean recovery is needed.

"YOU NEVER KNOW WHAT A SPIN MIGHT DO, SO GIVE YOURSELF A LOT OF ROOM."

I teach P.A.R.E. recovery; Power: Idle; Ailerons: Neutral; Rudder: Full opposite yaw direction; Elevator: Forward through neutral. Hold these inputs until the yaw rotation stops then; Rudder: Neutral; Elevator: Aft to recover straight ahead to a climbing attitude. I like this method because it establishes a clear and direct method of understanding the recovery. Always take the time to explain why that "E" is last. The accelerated spins should drive that point home with no questions. I also teach a recovery I call the "lawn dart" recovery. It is a lot like a Pitts recovery as it does not depend on knowing if you are turning right or left or spinning right-side-up or inverted. In the lawn dart method, simply chop off the power, place your feet together for neutral rudders, and, as the rotation slows, move the stick to dead center neutral. This is a good "when in doubt" method, but it is not as fast as P.A.R.E.I believe if you get all the way through accelerated spins in one flight, you are lucky. It's just a lot of twirling for the beginner. If you do have a hardy student, your next option would be to cover inverted spins, but I find very few students at this level who are ready for it. After they get some real time flying inverted, they are usually more fit and oriented to the inverted attitude and will absorb the lesson much better.

I feel inverted spins are a bonus at this level and are a lot more important to cover when teaching the advanced student. If your student does choose to do some now, please remember the one pitfall: Inexperience is going to make the student slow to cause an inverted stall. This means you might hang upside down a long time coaxing him into the spin entry. By the time you do a few turns and initiate a positive recovery, you might have a good setup for a blackout. Be ready for the ol' grunt maneuver and try not to let him haul back on the stick too hard.

My old mentor and friend Jim Holland once told me, "You never know what a spin might do, so give yourself a lot of room." Take this advice very seriously. I have had the whole gamut of the unusual happen to me during spins. I have had students accelerate them and then pull back so quickly they've made a simple ol' Decathlon flat-spin a few turns. I have seen a person panic and clamp down on the controls, requiring "force" to get their attention. I even had one student somehow manage to get the top of the Decathlon's front stick up under the seat belt, where we couldn't get it back forward to recover! It took a lot of turns to get this figured out and some time to talk the student into unlocking his belt. Always have much more altitude than you could ever imagine needing and then climb some more!

No aerobatic lesson should ever begin without a good safety briefing tailored for the flight. For the spin lesson, the usual use of the chute and exit procedures must be accompanied by good positive control transitions, clear understanding of what is expected in every maneuver, careful inspection of the interior for unwanted cargo, and an accurate weight and balance computation.

At the completion of this lesson, you should be seeing a level of competency that assures you that your student is ready to practice the four fundamental maneuvers without you on board. You should supervise the practice flights and retain some authority so you can help in deciding when conditions are safe for practice at his skill level.

Please feel free to contact me with any questions. I have found flight instructing to be a skill that's continually developing, and I always welcome feedback from people who are willing to share their knowledge. I can be reached at *Greg@GKairshows.com*.

Greg Koontz is a NAFI Master Certificated Flight Instructor-Aerobatic and has been teaching basic aerobatic courses since 1974. He is a full-time aerobatic professional sponsored by American Champion Aircraft flying shows in his Super Decathlon, is an aerobatic competency evaluator (ACE), and is a member of the International Council of Air Shows' ACE Committee. Greg is a member of the National Association of Flight Instructors (NAFI) and actively supports its efforts to raise the standards for aerobatic instructors.