The rolling circle
Conquer this impressive maneuver

by Dan Wolanski

In the 1930s, Gerhard Fieseler, a German aerobatics pilot in search of a new maneuver, invented what is now known as the rolling circle.

To this day, the rolling circle—or “roller”—is the single most difficult aerobatic maneuver to perform. In its most basic form, a roller is a turn of an aircraft 90 degrees or more while the plane is rolling. It sounds simple, but a proper rolling circle requires intense concentration to complete, using all of a pilot’s transmitter inputs at precise intervals. A rolling circle requires the use of elevator, aileron, throttle and especially rudder; in fact, the rudder is key to the maneuver, but many beginners disregard this because of the difficulty in coordinating rudder inputs with the plane’s attitude. If you try to perform a roller using only ailerons and elevator, you’ll have no control over the number of revolutions needed.
to get the plane to complete a circle. Your headings for each quadrant must be planned.

**HOW TO BEGIN**

To start, you need to decide which variation of the roller you want to learn. These factors should be considered:

- The more revolutions you make, the easier it is to get the plane to complete a circle.
- Pulling into a maneuver feels much “safer” than pushing, so an inside rolling circle (in which the plane rolls to the inside of the circle instead of to the outside) is easier to learn.

At first, favor your “strong” roll direction (clockwise or counterclockwise)—the direction in which you can hold a very precise, slow roll rate while giving other inputs.

Bearing in mind that pilot skills vary, I will explain a very simple four-roll circle, flying from left to right.

**TRYING A ROLLER FOR THE FIRST TIME**

Since the roller requires a considerable amount of timing and concentration, it’s best to practice it initially one quadrant (¼ circle) at a time. As you become more proficient, you can string the quadrants together. Practicing in quadrants will help you to identify what the plane should look like at each step and will also require much less concentration. Take your plane up at least one mistake high. Enter the aerobatic box, flying from left to right at ½ to ¾ throttle, and proceed to the center of the box. As you pass the center, slowly feed in left aileron and a touch of left rudder. You will hold this aileron setting throughout the maneuver.

As the plane approaches 15 to 20 degrees of rotation, slowly feed in up-elevator and a little left rudder. Both the up-elevator and left rudder turn the plane toward the center of the circle. Keep in mind that too much elevator will cause the plane to rise. Transition to right rudder, then continue to feed in slightly more elevator and rudder as you slowly roll to knife-edge flight. Keep the plane rolling at a very slow, constant rate; then, as you pass knife-edge, slowly reduce up-elevator while holding right rudder steady. The rudder will help you to continue “sliding” your plane in a circular fashion. Bear in mind that if you do not release up-elevator soon enough, you will start to pull the plane toward the ground, and all the rudder in the world won’t help you keep its nose up.

During the 90 degrees of rotation between knife-edge and inverted flight, keep right rudder constant, but transition from up-elevator to very slight down-elevator. Now you are halfway through the first quadrant of the circle! At this point, you’re 45 degrees into a complete rolling circle and are about to encounter the more difficult half of the rotation.

As the plane begins to roll past being inverted, slowly decrease right rudder and begin to input slightly more down-elevator. This will cause the plane to continue on its circular course. Now you must transition from right rudder to left. If you hold right rudder too long, the plane’s nose will tip toward the ground. Transition your plane as it passes the 270-degree rotation point (opposite knife-edge) by inputting down-elevator and left rudder. At this time, hold only enough rudder to prevent the plane from falling, and adjust down-elevator to bring the plane perpendicular to the flightline (it will be heading straight away from you).

You must release all down-elevator by the time you’re about 20 degrees of rotation shy of rolling upright, or you will once again push the plane downward. If you come up short, input more left rudder to slide the plane around. During the last 20 degrees of rotation to upright, it helps to input a little up-elevator as you roll. This will help to keep the nose up.

Now you have just completed ¼ of a rolling circle! Continue to practice this quadrant, then move on by flying your plane straight away from you and starting the next quadrant from wings level. Don’t try to tack the second quadrant onto the first yet; the plane will look very different to you on the back side of the circle. When learning a roller, it’s best to enter each quadrant from straight and level flight until you feel comfortable with each section; after that, you can string the quadrants together as your confidence grows.

**VARIATIONS**

The most common rolling circle variations are a change in the direction of the roll—from inside to outside—and a differing number of rotations—between one and four. An outside roller is more difficult to learn than an inside roller; once again, the key to this variation is the rudder. With an outside roller, you lead with a lot more rudder to get the plane to turn toward the center of the circle. Also,
reducing the number of rotations makes the maneuver considerably more difficult, since you have to slow your roll rate and increase the other inputs to end up at the correct reference points.

**HINTS AND TIPS**

You may want to set up a low-rate aileron or increase your differential to make your ailerons less sensitive around neutral. This can be accomplished easily with a programmable radio. Resist the temptation to limit your aileron throw so you can bury the sticks and achieve a slow roll rate. Doing this is like asking for disaster; if you need to bail out of the maneuver, you have only 10 percent of your normal aileron throw. You may also consider going to a higher-rate rudder, as you will need this input the most during the maneuver.

One other bit of advice: you can get away with inputting a lot of rudder during the upright and inverted portions of a roller without its looking too jerky. All of the other inputs, however, require a tremendous amount of finesse, and adverse input will blow the maneuver. Keep in mind that if you do use a lot of rudder, you will need to add throttle because of the drag produced by control-surface deflection.

I hope this has inspired you to attempt a roller. If you would like more information on how to perform aerobatic maneuvers or sequences, visit the International Miniature Aerobatic Club website at www.mini-iac.com. Have fun with the roller, and don’t get discouraged if it takes you a few months to learn this maneuver. Nothing is more impressive to your fellow club members than a properly done rolling circle. Heck, when I hit a good one, it impresses me, too!