

SPORT

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WAC 2013 Results

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So You Want to Do a Low-Altitude Roll

**Or . . . the first rule in aerobatics is
learning when and how to think, "No."**

BY DUDLEY HENRIQUES





Okay, so you've gone and taken a course in aerobatics to improve yourself and your flying abilities and/or you've purchased an aerobatic aircraft, now what?

Chances are you've received great instruction from a good *aerobatic* instructor. If so, along with learning how to perform good maneuvers and recover from the bad ones, you have also been inspired by that good acro instructor into a mindset based on safety. You know about risk management and have a healthy respect for limits, both for the airplane *and* for yourself.

If you are one of these new aerobatic pilots, you are well ahead of the game and will no doubt fly safely through your tenure in aviation with little trouble. On the other hand there just might be a slight chance that a few of you have completed some aerobatic training out here and are entering into this new world of performance not quite as armed and prepared as you should be. This isn't to say you are unsafe. What it means is that you just might be one of the few pilots out here who go through an aerobatic course or receive some training either with an instructor or on your own, who continue on after receiving that training carrying with you the same mindset you had before the aerobatic training. In other words, you flew well before, made good decisions, flew safely, and were rewarded with accident-free results. In other words, your flying was okay prior to your aerobatic instruction so it should be okay afterward . . . even better now that you have your new skill set. Well . . . perhaps! In many cases this will true out, but there is something sinister that might be lurking in the shadows, and that sinister something involves the decision-making process. If all your deci-

sions concerning how you were handling the aircraft were good before your aerobatic training, why shouldn't they post-training remain good?

Let's hope they do, and in all likelihood you, as a new aerobatic pilot, will progress through a natural self-improvement process where the attitude you need to be a safe aerobatic pilot will prevail. With this process working you will be developing the proper mindset to keep you where you should be in the sky when doing aerobatics.

What I'm about to relate here is for those new aerobatic pilots who perhaps haven't had the time yet to develop by themselves what they might have missed in their training *if* that training wasn't exactly what it should or might have been.

So what does all this have to do with a low-altitude roll?

It has to do with a very simple thing—a thing so simple almost every new aerobatic pilot might say, "This would *never* happen to *me*." But trust me, it can, and sooner or later there's a better-than-even chance it *will* happen. It's called *temptation*!

There will come a moment that's just right. People and friends will be on the ground watching. The sky will be clear of traffic, and there you'll sit all nice and happy in your new or rented Citabria or Decathlon or whatever. You have done dozens of rolls at altitude with no trouble at all. In fact, the instructor told you your rolls were exceptional. You are proud of your abilities.

The only thing missing in this equation for you is the fact that all this great flying you have been doing has been done where most of your friends and especially *other pilots on the field* haven't had the pleasure of witnessing all this piloting skill.



You've had the training, you've done the roll before, and a roll is a roll right?

So there you are—now what?

If you're the smart pilot I think you are—and I *hope* you are—nothing will happen. You won't even think about "showing them your stuff." But alas, for some reason, you turn out to be the subject of this article and decide that NOW is the perfect opportunity to do a beautiful roll over the field, low enough they can appreciate the beauty and skill involved—just like the one you've envisioned in your head as doing so many times before and haven't done. You've had the training, you've done the roll before, and a roll is a roll right? Well not quite.

What you might not know is that pilots who do rolls at low altitude start preparing for those rolls by doing them at altitude. Not only at altitude but to specific and extremely strict and narrow parameters. They practice and practice some more until they can thread a needle on a hard deck they have given themselves on their altimeters. These pilots can slow roll their airplanes and recover within a needle width of their altimeter needles covering a zero. They then practice until they can do this a specific number of times in a row without the slightest error. This regimen might vary from pilot to pilot but not by much. Precision and *consistency* are the key words here. This is the hallmark of the professional display pilot...the *only* pilots in the world who should be doing a low-altitude roll!

So there you sit at low altitude over the field looking down on all those faces below. Let's assume you give in to temptation and decide

to do that low-altitude roll. What happens next?

Let's concede that if you are lucky enough to be flying a high-performance aerobatic mount like a Pitts or an Extra, what I'm about to discuss might not be as serious as with an aircraft of lesser roll performance due to the faster roll rate available. Faster roll rate equals less chance for a control error during the roll and less altitude loss as the roll progresses.

For the purpose of this discussion we'll assume a light aerobatic trainer, a novice pilot, and the desire to perform a rather slow display-type air show roll as opposed to a fast aileron roll. It's this type of roll that is usually the type of roll envisioned by a novice in these situations and usually the roll of choice in this situation. It's exactly this type of roll wherein lies the danger for an unwary low-altitude newbie.

So let's follow this hypothetical novice into this low-altitude roll and explore what can happen.

Of all the roll choices a novice

can choose from for a first attempt low-altitude roll, what might very well be the natural choice might be a nose-high modified aileron roll; not quite a slow roll, as it would be natural for the novice to want to do the roll cleanly and without the precision involved with cross-controlling a slow roll. This is conjecture, of course, but from discussions on these issues over the years with other aerobatic instructors, there seems to be an overall consensus among our community as relates to this factor.

For a "modified" aileron roll we'll assume the novice, having done these rolls at higher altitude, has the procedure pretty well set in his mind. This means the pilot will have a sense of expectation as the roll progresses. The control pressures should be the same down low as they were at higher altitude, so what can go wrong?

What this pilot might have left out of the roll equation for low altitude is the *sight picture* through the maneuver, and that sight picture can easily become a *very* impor-

tant player as a first-time roll at low altitude is attempted. Keep in mind that the professional knows this and has carefully prepared for it, carrying a completely different mindset into the low-altitude roll entries. These pilots have prepared carefully by bringing their rolls down gradually, noting and compensating for the change in sight picture as their rolls come down lower. The novice is attempting the roll without the benefit of this mindset. The novice might have some “idea” of what to expect, but it’s just a veiled concept. The professional pilot initiates the low-altitude roll relaxed and confident based on *proper preparation*. The novice might be confident, but

this confidence without preparation is a potential killer in low-altitude aerobatics. Let’s follow this pilot through a bad decision and into a low-altitude roll.

All lined up over the field in our slow-roll-rate aerobatic trainer—let’s say at around 600 feet—our novice initiates a nose-up pitch control input to set for a roll entry to a nose attitude of 40 degrees. The roll is initiated using inside aileron and inside rudder to offset the rather considerable adverse yaw. So far so good. Now rolling, the novice attempts to “trim up” the roll a bit by switching to some outside rudder going through knife-edge. Now here is where

things begin to have a huge potential to go wrong.

Holding in rolling aileron without *considerable* forward stick in this slow roll rate trainer, the nose really wants to come down. Now doing these rolls at altitude, you can allow for some degree of nose-low excursion from the intended roll axis and get away with it. At 600 feet, this error margin disappears like a pork chop into a starving pit bull. In other words, what the novice has experienced before and gotten away with is now something that under no circumstances should be allowed to happen.

So the roll continues. The novice may or may not notice the down-



nose rate. For the sake of argument let's say the need for forward stick has been noticed, and the novice is trying to deal with it. Now enters the dragon—something the novice hasn't even considered—the sight picture inverted through the windshield experienced at this new lower altitude. As the aircraft goes through inverted, there is a much closer ground environment in view; much more ground and less sky. It's here the novice can get in *real* trouble. For the professional, the eyes and viewpoint through a low-altitude roll are focused where they should be, centered on the *desired* roll axis. For the novice pilot, entering an inverted position at low altitude for the first

time with the ground and sky sight pictures changed from what that pilot has become accustomed to seeing at a higher altitude, there lurks an insidious factor that can instantly become a killer.

In a nutshell, what can happen to the novice is that instead of the eyes maintaining the desired roll axis, the eyes can divert downward into the ground. What this does is mentally *change* the roll axis downward and establish a new and potentially deadly reference point *below the horizon!*

So here we have the novice, inverted at low altitude with a new reference point below the horizon on which the control pressures ap-



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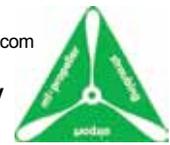
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What can happen next can seal the bad decisions that have prevailed so far in this roll.



MIKE STEINEKE

plied can now be focused. The first result of this new focus can easily be a relaxing of the forward pressure that exacerbates the nose-low condition. What can happen next can seal the bad decisions that have prevailed so far in this roll. The mind sees the new nose-low condition as the nose lowers, passing through inverted, and a natural instinct to rush the recovery can take over in a heartbeat. If this happens, back pressure is applied. If this happens along with neglecting a rudder switch to top rudder as the aircraft rolls through the inverted position, the result can be catastrophic; a nose-low scooping dish-out from the roll that ends in ground contact. Game over!

Keep in mind that what I have described here isn't a certainty to happen, but considering all the aspects involved there is enough wiggle room here to say that the warnings I've projected in this article just might be worth remembering if you are new to aerobatics.

The answer of course is that along with aerobatic training comes responsibility; responsibility to the aerobatic community and most importantly to yourself. Learn the limits and never exceed them, either the airplane's or your own personal limits. I realize most of you reading this article after learning acro would never attempt a low-altitude roll without proper training and indoctrination to the low-altitude environment. For those of you who just might be tempted, think twice. The respect goes to those pilots who others know always use good judgment. The aside to all this talk about low-altitude rolls is that even if you did one and got away with it, those who matter to you as peers in the community won't see you as they did before you did that roll. So the bottom line is that doing low-altitude rolls outside the professional arena is a loser either way you cut it.

Stay safe out there, you newbies, and enjoy a long tenure in the aerobatic community.

IAC