

The Lowdown on Low Turns: What Every Skydiver Should Know

By Scott Miller

"I'm really careful under canopy. I never make low turns."

You've probably heard someone say this before. You might even say it yourself. You might also think that most people involved in low-turn accidents are "hot shots" making radical approaches under heavily loaded canopies. These accidents might stop if people would just heed the warning most students are given in their first jump course: low turns under canopy are dangerous. Don't do them.

Many DZs repeat this warning every weekend. Some DZs have even banned "hook turns" completely. Yet jumpers continue to be injured under fully functional canopies. Again, you might think most of these people are reckless hot shots who ignore the warnings and break the rules. Surprisingly though, the opposite is often true.

Imagine yourself in this situation: You've just had a great skydive and are making your normal approach to the landing area. You're facing into the wind, a hundred feet above the ground, planning that perfect flare and a soft stand-up landing. Everything is nice.

Suddenly you notice something out of the corner of your eye. You look to your left and see another canopy at the same altitude as you, way too close, headed for the same spot on the ground. The other jumper doesn't see you. You're going to collide!

Instinctively, you pull your right toggle down to avoid the collision. You turn away, but now your canopy is diving straight at the ground. The earth is coming up way too fast. You realize that something very bad is about to happen just as your body slams into the ground. Moments later someone is looking down at you asking: "Can you hear me? Don't move, okay?" Someone else is yelling, "Call 911!"

There are dozens of stories like this one, stories about people who were injured making low turns while trying to avoid obstacles, other canopies, or just trying to turn back into the wind. Most of these people weren't showing off under tiny elliptical canopies. In fact, most were flying canopies considered appropriate for their weight and experience level. The injured jumper is often described as someone who "usually doesn't make low turns."

It's easy to warn people about the dangers of low turns or even prohibit people from making them, but it's obvious that this does not fully address the true nature of the problem. Most people who are injured making low turns don't really intend to make them; they just get into a bad situation and react the wrong way.

Although we should always stay clear of obstacles and other canopies and turn into the wind at a safe altitude, we must also learn how to react when the unexpected does happen under canopy. We can't "just say no" to low turns. They need to be accepted for what they are: a maneuver that every skydiver can and must learn to do safely and correctly.

Low Turn vs. Hook Turn

Before going any further we should understand the difference between a low turn and what is commonly referred to as a "hook turn." When making a hook turn, the jumper intentionally pulls down on a front riser or steering toggle at a relatively low altitude. The canopy turns, dives and picks up speed as the jumper swings out from under the canopy then back underneath it. If altitude and rate of descent are judged correctly the extra speed gives the canopy increased lift and allows the jumper to swoop across the ground for several seconds before touching down.

When a jumper tries to avoid an obstacle, canopy, or downwind landing by making a hard toggle turn, the canopy reacts in the same manner. Unfortunately, this jumper has usually not considered his altitude or rate of descent and may slam into the ground before he has even swung back underneath his canopy. In extreme cases the nose of the canopy can hit the ground before the jumper does.

Ouch. Let's try something different.

Suppose a jumper who needs to make a low turn could do so without making the canopy dive at the ground. Suppose the person could make a slow, flat turn, keeping the canopy above his or her head and maintaining a low rate of descent. Suppose the jumper could turn 90 degrees or more without losing much altitude. If the person could do this then he or she could avoid the obstacle and still land softly.

"Flat turns" are one of the most useful things you can do with a canopy and may be the only way to avoid a hazard at a very low altitude without crashing your canopy into the ground. Unfortunately, many skydivers are never taught to make them. In fact, instructors usually spend a great deal of time discouraging students from flying this way.

Slow Flight Phobia

Student jumpers often have a habit of holding their toggles down around their ears instead of letting the canopy fly at full speed, especially when coming in to land. As a result, instructors are constantly urging them to "let it fly." Some students are nervous about turning their canopies too quickly, so instructors encourage them to "pull the toggle all the way down" to get comfortable with doing so. Telling a student to fly in brakes and turn slowly often seems like the wrong thing to do.

After making a few jumps and getting used to the canopy, students quickly learn that pulling a toggle all the way down doesn't just make their instructors happy. It's also a whole lot of fun. Those 360-degree spirals are the thing to do! Students also find that their landings improve when they keep their hands up and "let it fly" before flaring.

Unfortunately, many of us never progress past this "hands-up, hands-down" approach to canopy control. We spend little if any time flying our canopies in brakes and basically ignore a significant portion of the canopy's control range. Then one day we end up in a tight situation at low altitude without the skills necessary to handle the situation safely. Our normal hands-up, hands-down reactions betray us in our time of greatest need.

Putting on the Brakes

By spending some time flying your canopy in brakes you will explore a range of maneuverability that many jumpers don't even know exists. You can learn to get a whole new level of performance from your canopy and develop skills that can save your life in a tight situation. The following exercises can help increase your level of confidence under canopy and guide you toward an important transition in your canopy piloting abilities.

Start by pulling your toggles to chest level, or half brakes. Your canopy's forward speed will decrease, as will your rate of descent. Try turning by pulling one toggle down a bit farther, letting one up a bit, or doing a little of both. Notice how the canopy turns but doesn't really dive at the ground. You will actually have a lower rate of descent while turning like this than if the canopy was flying straight and level at full glide.

It's possible to make 90-degree or even 180-degree turns from half brakes while losing very little altitude. By pulling the toggles down to your waist, or 3/4 brakes, you can make the canopy turn even more quickly without diving. In this case it's better to let a toggle up a little rather than pulling one down, since the canopy will be close to its stall point. If you've never stalled your canopy then you may want to practice this first before playing with turns from 3/4 brakes.

To stall your canopy, go to 3/4 brakes and continue pulling your toggles down slowly and evenly while keeping the canopy on heading. The canopy will slow down, then rock backwards as it stops generating lift. If you continue to hold the toggles down your canopy will depressurize and start to fly backwards. The ends may even fold back into an interesting U-shape. Don't be alarmed. The feeling may be a little uncomfortable at first, but it will help you learn to recognize the onset of a stall.

To recover from a stall just let the toggles up slowly and evenly. The canopy will reinflate and start flying normally again. If you let the toggles up too quickly or unevenly the canopy may surge forward or turn. You might also get end-cell closure. If this happens then deal with it the same way you would after opening.

If all this is a little too uncomfortable for you, try making some stalls with the rear risers first. Rear-riser stalls are usually more docile and will help you get used to the feeling. Just grab your rear risers as far up as you can reach and slowly pull yourself up towards the canopy. To recover, slowly lower yourself back down. Your goal should be to learn what it feels like when your canopy is about to

stall. Once you recognize this feeling you can prevent a stall from happening by letting your toggles or risers up slightly, as you would when recovering from a stall.

Experimenting with these techniques will help you become comfortable flying your canopy in brakes. As with any new maneuvers, stalls, slow flight, and flat turns should first be practiced at a fairly high altitude. Always keep an eye open for other canopies, and remember that your first priority is landing safely in a clear area.

Performing a full toggle stall on a highly tapered or "elliptical" type canopy is usually not recommended. If a highly tapered canopy is put into a full toggle stall there is a good chance it will develop line twists accompanied by a fast, diving turn. It could take several thousand feet of altitude to recover from the line twists, if it is possible to recover at all. Rear riser stalls can safely be performed on highly tapered canopies, but it's a good idea to experiment with toggle stalls on a more docile canopy before flying in deep brakes on an highly tapered one.

As you gain confidence and experience you may wish to try flat turns at a lower altitude, perhaps flying your whole landing pattern in half brakes. It's best not to attempt this until you have practiced at a higher altitude and have a thorough understanding of how your canopy will react. It's extremely important to avoid stalling your canopy near the ground. Also, make sure you don't create a hazard for others trying to land.

You will probably want to let your toggles back up before flaring, but be aware that your canopy may not have time to recover if you do so too low to the ground. Always let the toggles up slowly and evenly, and try to go back to full glide at least 10 seconds before you have to flare. Avoid sudden, jerky toggle movements and be ready to make a PLF (parachute landing fall) just in case you land harder than expected. It's possible to land a canopy in half brakes without going back to full glide, but unless you flare perfectly the landing may not be soft enough to stand up. Flaring too high or too far may cause the canopy to stall just before you touch down. Again, you should always be ready to make a PLF.

It's a good idea to practice landing in brakes, nonetheless. If you ever have to make a flat turn near the ground to avoid a hazard you may not have enough altitude to let the toggles back up and flare normally.

By practicing slow flight and flat turns at lower altitudes you will learn how far you can turn and how close to the ground you can do so. You will be better prepared for unpleasant surprises and less likely to "hook it in" when faced with a bad situation.

The Canopy Catch 22

The basic techniques described here are just that: basic. Flat turns are as important for a beginning jumper to learn as landing softly on his or her feet, perhaps more important. It's best to learn these techniques under a large, fairly docile parachute, which is what a student or novice would traditionally be jumping. A canopy loaded at one pound per square foot or less is ideal. These days, however, many beginners are buying smaller canopies that they load much more heavily than this.

Here's the catch. A smaller canopy needs more forward speed to carry your weight than a larger one and will have a higher rate of descent, even when flown in brakes. Landing in half brakes may not be very comfortable, as it will require a precise flare technique that may take hundreds of jumps to perfect. If you try this type of landing under a smaller canopy you may quickly become discouraged and give up on these techniques without ever mastering them. Unfortunately, it's even more important to know how to fly and land in brakes if you jump a smaller canopy. A smaller canopy may stall quickly without much warning, will lose altitude a lot faster in a turn, and can easily drive you into the dirt if you do the wrong thing at a low altitude.

This is one advantage to sticking with a fairly large canopy for your first few hundred jumps. It's safer to experiment under a larger canopy, and easier to develop the skills you will need to fly smaller canopies successfully.

No matter what type of canopy you fly, you need to understand its entire control range and how it reacts at different airspeeds and to different inputs. You should be just as comfortable hovering on the edge of a stall as you are hauling down on your front risers.

Too many times someone will walk away from a bad landing saying, "I was lucky I didn't get hurt." Luck is great if you're playing poker but it takes more than luck to land a parachute safely. Learning to fly in brakes and make flat turns correctly will put a couple of aces up your sleeve for those times when your luck runs out.

This article was first published in Skydiving, Volume 17, Number 6, January 1998.