

## **From The Loft**

Entry #3

17 February 2004

### **DOWNSIZING**

Everyone's favorite subject!

There is presently a lot of misinformation on this subject, and in this newsletter I will refer you to two sources of good information. First is, again, Performance Designs. This canopy manufacturer is leading the way in education in this area. Basically, loading does not necessarily equal performance, nor does it mean safety at low ratios. Please refer to <http://www.performancedesigns.com/education.asp>

There are several reports here of great value to all skydivers, but in this instance I am especially referring to "Wing loading and its effects".

The second source is from an e-mail from Portia "Limey Witch" Hill. She referred me to something she retrieved from [www.dropzone.com](http://www.dropzone.com) posted by Bill von Novak. This is an excellent source of information as to when we are ready to downsize.

The following is a cut and pasted posting from Bill forwarded to us from Portia "Limey Witch" Hill, also known as Limey Spice or Witchy Spice.

While I was an S+TA, I spent a considerable amount of time telling people that they shouldn't be loading their canopies so heavily. 90% of the time it didn't work. Skydivers can have a bit of an ego, and when I told them they probably shouldn't downsize yet they heard "I think you're a crappy canopy pilot who can't handle a smaller wing." So they downsized and broke their legs, backs and pelvises with some regularity.

A few years back I met up with Brett, one of the people I'd been lecturing to while I was an S+TA. He told me that he wished he'd listened to me back then. He had broken his femur during a botched landing, been out of the sport for a while, and then came back and really learned to fly his canopy. He took a canopy control course and actually upsized to get more performance out of his canopy. He ended up coming in first in one of the events at the PST that year.

That started me thinking. Maybe the approach I was taking was wrong. Since jumpers tend not to listen to other people who tell them they're not as good as they think they are, perhaps if you could give them better tools to evaluate themselves they could make better decisions about canopy choices. It's one thing to have some boring S+TA guy give you a lecture about not having any fun under canopy, quite another to try to perform a needed maneuver under canopy - and fail. In that case there's no one telling you you can't fly the canopy, it's just blatantly obvious.

So I came up with a list of canopy control skills everyone should have

before downsizing. Some are survival skills - being able to flat turn would have saved half a dozen people last year alone. Some are canopy familiarization skills - being able to do a gentle front riser approach teaches you how to judge altitude and speed at low altitudes, and how to control a parachute flying faster than its trim airspeed, a critical skill for swooping. It's important to do these BEFORE you downsize, because some maneuvers are a little scary (turning at 50 feet? Yikes!) and you want to be on a larger canopy you're completely comfortable with before trying such a thing.

The short version of the list is below. Before people downsize, they should be able to:

- flat turn 90 degrees at 50 feet
- flare turn at least 45 degrees
- land crosswind and in no wind
- land reliably within a 10 meter circle
- initiate a high performance landing with double front risers and front riser turn to landing
- land on slight uphill and downhill
- land with rear risers

Details:

1. Flat turn 90 degrees at 50 feet. This is the most important of all the skills. The objective of this maneuver is to change your direction 90 degrees losing as little altitude as possible, and come out of the maneuver at normal flying speed. Coming out at normal flying speed means you can instantly flare and get a normal landing. If you can do this at 50 feet, and come out of the maneuver with normal flying speed at 5 feet, you can flare and land normally.

Every year people die because they decide they simply have to turn at 100 feet and know only one way to do it - pull down a toggle. The parachute dives and they hit the ground at 40mph. To prevent this, not only do you have to know how to flat turn, but you have to practice it enough that it becomes second nature. Then when you do need it, you won't have to think about it.

To pull off this maneuver, start by toggle turning the parachute gently. IMMEDIATELY follow that with some opposite toggle. The idea is that you want to flare just a little to counteract the canopy's desire to dive. Continue adding opposite toggle until you've stopped the turn. At this point let both toggles all the way up. If you feel the parachute accelerate after you let go of the toggles (i.e. it feels like you just flared) use less opposite toggle next time. If you feel like the parachute is diving, like you just

did a toggle turn, use more opposite toggle next time. Basically you want to start the turn with one toggle, stop it with the other one, and use just enough toggle to keep the wing from diving but not so much that it does a flare.

It should go without saying that this maneuver should be practiced up high before you ever try it down low. If and when you do try it out low, start at lesser angles (i.e. try a 15 degree turn first) make sure the pattern is clear and make sure conditions are good (soft ground, good winds.) Work up gradually to a full 90 degree turn. I do think it's important to try at least a gentle flat turn very low; we are horrible judges of exact altitudes when we're at 1000 feet, and it's hard to tell if you've lost 50 feet or 200 in a turn. By trying it out down low, you'll get a better sense of what it can do for you, and you'll have the "sight picture" better set in case you have to use it for real one day.

A variation on this is to go to half brakes and then let one brake up. This gives you a flat turn, but by flaring first you "use up" some of the canopy's energy so you can't turn as effectively. On the plus side the turn happens more slowly. If you are about to hit a tree and want to make a last minute turn, this variation might be the way to go, as it combines a turn and a flare.

2. Flare turn at least 45 degrees. This does two things - it gives you another tool in your arsenal to dodge last minute obstacles, and teaches you to fly your canopy all the way through to the landing. The #1 mistake jumpers with new HP canopies make is to "reach out to break their fall" while they're flaring; this of course turns the canopy in the direction they are reaching. Most people decide that this is due to a side gust just as they're landing. I remember one jumper at Brown who, amazingly enough, experienced a side gust seconds before he landed (and always from the right) 40-50 times in a row! Learning to flare turn will help eliminate this problem.

To flare turn, start with a normal flare, then flare slightly more with one toggle. The canopy will turn. Bring the other toggle down to match it, and the canopy will straighten out. It's a dynamic process; rather than put the toggles at a certain position, you have to speed up one toggle for a second, then speed up the other to match it, before you level them and finish the flare. If you balloon upwards, then don't flare as quickly. If you drop to the ground, bring both toggles down more aggressively when they are 'split.' One thing that helps people is to think about where your canopy is rather than what it's doing. Use the toggles to put it off to one side for a moment, then use them to put it back over your head.

This can be hard to practice with a large canopy. I can pull off a 45 degree

turn on a Manta, but the flare is over so fast that it's hard to explain what I just did. It's much easier on a canopy loaded around 1:1, so you may want to wait on this one until you get to that loading.

Note that if you combine a flare turn with a flat turn, you can pull off nearly a 180 degree turn at just above 50 feet. Also note that knowing how to do flat and flare turns doesn't mean you can always turn at 50 feet and get away with it - sometimes it's better to accept a downwind landing than make a turn at a dangerously low altitude. But if you do have to turn low (say, you're on course for the electrified fence around the pit bull farm) a flat/flare turn will let you either turn and land normally or turn and minimize the damage caused by landing in a turn.

3. Land crosswind and in no wind. These are straightforward. No wind landings are pretty easy; the only issue is that your perception of speed and altitude will be off. Since you seem to be moving faster over the ground when there's no wind (which you actually are) it can seem like a good idea to add just a little brake to 'slow you down' before you land. Resist that urge! Keep that speed in your canopy; you can turn the speed into a good flare only if you start the flare with decent (i.e. full flight) speed.

Crosswind landings can be a little more tricky because of that strong tendency to want to "reach out to break your fall." Counter this by flaring with your hands in towards the center of your body. You may have to PLF on these landings, since you'll have some decent forward speed and have some sideways motion from the wind. If you want to get fancy, try a flare turn after you start your flare on the crosswind landing - you can easily pull off a standup landing if you get turned enough before you put your feet down.

If these work well you may want to try a downwind landing. The benefit to doing that is it will prepare you to accept a downwind landing in the future; you won't be tempted to turn too low to avoid it. Choose an ideal day for this one, with a slippery landing area (wet grass is perfect) low winds and a clear landing area. Prepare to PLF, and think about "laying it down" on your thigh as you land to start sliding. You can slide across grass at 30mph without getting hurt, but planting your feet and cartwheeling at those speeds can be very dangerous.

4. Land reliably within a 10 meter circle. This is essentially the PRO requirement. This is critical because your accuracy skills are what will keep you from having to turn low. It's very comforting to know that you can land in any 50ish foot clearing if you find yourself having to land out; it's especially important as you get to smaller canopies that need longer and longer runways to land well. Your only option may be a section of road, and you may have to hit the beginning of the road dead-on to have enough

room to slow down.

The subject of canopy accuracy is too long to do justice to here, but the top 3 hints I've heard are:

-If you're not sure if you're going to make it over a wire or tree, look at what it's doing with respect to the background. If more background is appearing from beneath the wire or tree, you're probably going to make it.

-As you look at the ground, most points will seem to move away from a central point. Some will rise, some will fall, some will go out to the side. If you look long enough you'll find one point that's not moving - that's where you're going to land if the winds don't change all the way in (which is rare.)

-Going into brakes usually makes you land short in high winds, but can extend your glide in no wind. Front risers almost always make you land shorter.

5. Initiate a high performance landing with double fronts, and a front riser turn to landing. I am pretty convinced that front riser high performance landings are a lot safer than toggle turn high performance landings, and double fronts are the safest of all. If you do it too low, or become worried about the landing - just drop the risers and you're back to normal flight.

For double front riser landings, set up a normal landing, aiming for a point a little farther away than you normally do. At 100 feet or so, pull down both front risers. Your canopy will drop and accelerate. At some point above the ground (30-10 feet depending on your canopy) drop the front risers. Your canopy will begin to recover. Before it completes the recovery to normal flight, you should be at flare altitude. Start the flare normally. You may need to use less toggle than normal, since the canopy is now going faster than you're used to, and the same amount of toggle gives you more lift. You will also plane out farther, since you have more speed you have to bleed off before you come to a stop.

For front riser turns to landing, first try front riser turns out above 1000 feet and get used to how your canopy recovers. Then start by coming in 10 degrees off the windline, and making a gentle front riser turn to line up with the wind at ~100 feet. The canopy will dive and accelerate, so be prepared to drop the front riser instantly and flare if you have to. Also be prepared to steer in the flare, since the canopy may not have stopped turning completely before the flare begins. Done correctly, you'll start the flare with more forward speed, giving you a longer planeout.

Make sure your flares are smooth for this! A smooth flare generates more lift for a longer period of time than "stabbing" the brakes. However, don't start the flare at 30 feet - starting the flare that high will slow the canopy down, negating the effects of the front riser approach. If you do find yourself stabbing the brakes to prevent hitting the ground, move the altitude at which you start front risering up.

Probably the most critical skill you will get from this exercise is the development of the "sight picture." Below 200 feet your altimeter is pretty useless, and you should be looking at traffic and the landing area anyway. Eventually you'll develop a sense of what "picture" you should see just before you start that riser turn. The picture will vary with wind, landing area etc. If you arrive at the point where you would normally start the front riser turn, and the picture's not right - abort it and land normally.

Once you have the picture down, and are doing front riser turns that transition to gradual flares, then start increasing the angle. Once you get to 90 degrees you're going to be gaining a lot of speed, so be sure to adjust your sight picture up to compensate. As always, bail by dropping the risers if you feel like there's anything wrong. Once you drop the risers, level the wing with your toggles and prepare to flare. At worst you'll have to land crosswind - but that's a skill you should have by this point anyway.

6. Land on slight uphill and downhill. Often, land away from the DZ isn't perfectly flat; sometimes you can't tell this until you're at 20 feet. To prepare for this, find a place in your LZ that's not perfectly flat, scope it out, and plan on landing there. There's not too much magic concerning landing on a slope. You flare more aggressively to land going uphill, less aggressively to land going downhill.

Obviously not all DZ's have slopes. If you don't have a good slope on your DZ somewhere, you may have to put this one off until you're at a DZ that does have one. Beaches are a good place to practice this, since they have pretty predictable slopes down to the water, and overrunning the landing just means you get wet.

7. Land with rear risers. Knowing how to land with rear risers can help you deal with a canopy problem like a broken or stuck brake line, and can help you make a better land/cutaway decision when you do have such a problem.

Again, this is best practiced up high. See how far you can pull the rear risers before the canopy stalls. It will stall much earlier with rear risers; memorize where that happens so you don't do it near the ground.

When you try it for real, choose an ideal day - steady moderate winds, soft ground, clear pattern. Be sure to try this for the first time on a largish

canopy (one of the reasons you should do these things before downsizing.) Leave your hands in the toggles and wrap your whole hand around the rear riser. That way if things go awry you can drop the risers and flare normally. Start the flare at a normal flare altitude, and prepare to PLF. You may get the sort of lift you're used to, but you probably won't slow down as much before you're near that stall point. Make sure your feet are on the ground (sliding preferably) before you get there.

On smaller canopies, you may want to start the flare with rear risers. Then, once the canopy is leveled out, drop the risers and finish the flare with the toggles (which are still around your hands.) That way you get your vertical speed to zero, which is the critical part of a safe slide-in landing, and can still stop the canopy without hitting the ground going too fast. (This is also a technique used by swoopers to extend their swoops BTW.)

As I mentioned in the beginning, these are skills you should learn before you downsize. If you can't do some of them yet? Get some coaching; it makes a lot more sense to learn them on your larger canopy, before you start jumping a smaller canopy that scares you. Once you can do them all, then try the smaller canopy. And if someday someone cuts you off under the smaller canopy, you'll have the reactions you learned under the larger canopy. Even if you haven't completely adapted those manuevers to the smaller canopy yet, those reactions will more likely than not save your life.