Flying and Landing High Performance Parachutes Safely

A Seminar by Performance Designs, Inc.

I. General Concepts

A. Different canopy models of the same size may perform differently, but they will fly about the same speed. Wing loading is the biggest determinant of speed. A Stiletto 190 is not faster than a Sabre 190, or even a PD 190! Other aspects of performance will be different, however. (Turn rate, glide angle, etc.) These differences may influence a persons impression of speed.

B. A person evaluates a canopy's speed according their individual frame of reference, which has been created through their own unique experiences.
Example: Jumper A and jumper B weigh the same, jump the same canopy, and have the same number of jumps. They may have completely opposite opinions of the speed and handling of their canopies. Why? Different frames of reference! The canopy may be the smallest one jumper A has flown. He may have chosen it to get more speed, quicker turns, and hotter landings, and might feel that it's a handful! Yet jumper B may have moved up one or two sizes to this canopy, to create more forgiving handling and easier landings than he had previously.

C. Choose your canopy size by reflecting on your impression of the canopy sizes and models you've recently flown, combined with your desire to go faster, slower. Choosing a canopy this way is much safer than using only a chart published by a manufacturer. Such a chart may be a guide, but cannot be used effectively without applying your own experience. If you don't want to go faster, don't go smaller than what you are using! When discussing the speed and forgiveness of a particular canopy, remember the different frames of reference of the individuals involved.

D. It is not necessary to heavily load a high performance canopy to make it fly and land correctly. This is a common misconception even with many "experts." If you're not getting good landings on a properly designed canopy flown at lower wing loading, you're not flaring it correctly!

II. Guidelines for Flying Conservative Approaches

A. Control your canopy smoothly keeping toggle movements to a minimum.
1. The canopy will fly more efficiently, making consistent landings easier to accomplish.
2. It will be easier for others to predict what you are planning to do.
3. It helps to make the canopy more stable in turbulence.

B. Practice approaches at various speeds. Through experimentation, learn how slowly you can approach and still get a reasonable landing.
A slower approach helps you get into tight areas, in part because it reduces the distance the canopy will float before touchdown. How slowly you can make a safe approach and landing depends on your wing loading, the design of the parachute, and how good your technique is. Technique comes only from practice and considerable work on approach and flaring technique:
1. Start with a full glide approach, and flare as you normally would. Then, experiment with flaring technique with the goal of getting a longer plane out in the flare. This additional float means you are now using the available flare power more efficiently, and you are prepared for the next step.
2. Try a final approach with a few inches of brakes applied, and still flare as before. You will probably get less float on this landing, because you had less energy to work with. Assuming the landing was still safe, continue making approaches at this speed, and work on developing a more efficient flaring technique. Again, the goal is to get the canopy to plane out longer.
3. If you are eventually successful in increasing the length of the plane out, it is because you are now using the available flare power even more efficiently. This means you are now an

even slower approach, repeating the process with slightly more brakes. You can repeat the cycle again if you are continuing to get good results.

C. If you are an aggressive canopy pilot and like swoop landings, it is very important to practice straight in approaches at various speeds.
If you believe a hook turn is required for a good landing, you probably need to work on technique. You may have to make a slow approach one day, and you need to stay good at it. It is better to practice in good conditions so you are prepared for the worst.

III. Learning About the Canopy Through More Aggressive Flying

A. Understand the various turning techniques for controlling the rate of altitude loss compared to the rate of turn.
1. Some turning techniques build up a great deal of airspeed with an extremely high altitude loss, even with a moderate rate of turn. (Example: Steep front riser spiral)
2. Other techniques still build up fairly high airspeed, but will produce somewhat less altitude loss, even at fairly reasonable turn rates. (Example: Carving toggle turn)
3. Still other techniques allow turns with little altitude loss, even at fairly reasonable turn rates. (Example: Shallow bank angle in fairly deep brakes)
4. It is even possible to briefly turn with no altitude loss, or even to gain some altitude, by exchanging lots of speed for lift during the turn. (Example: Initiate a flare while flying fast, and gently bank the canopy as you continue to slow the canopy.)

B. Experiment with these turning methods while above 1000 feet, and well clear of other traffic. Do this on every jump, when traffic permits.
During these experiments, you'll learn about your capabilities and limitations, as well as those of the canopy. By 1000 feet, however, you should be concentrating on flying a smooth flight path that will mesh well with the surrounding traffic.

C. Work your experimentation lower and lower over many jumps. However, make sure you still flare out of the maneuver high enough to allow yourself to return to a normal stabilized straight in approach and a normal flare.
During this time, you should be able to develop a feel for the altitude loss by looking at the ground, rather than by reference to the altimeter. During this phase of discovery, it is always tempting to continue experimenting with a hook turn to a swoop landing. Don't, even if you have been successful at this before. This is a good time to develop your "approach discipline," by remaining cautious and conservative.

IV. Basic Knowledge Required Before Attempting High Speed Approaches
A. Learn when to say no to an aggressive approach.
1. When there is heavy traffic, either in the air or on the ground.
2. When landing in unfamiliar areas.
3. When the weather conditions are marginal.
4. When you are angry or tired, or are disappointed with your free fall performance.
5. Make sure you err on the cautious side! You can make that swoop landing on a later jump when conditions improve only if you survive this jump!
B. Even if you are conservative, learn how to make a straight in approach using a small amount of front risers.
Make sure your canopy is very stable in this flight mode first. Just one to 3 inches of riser will produce quite a change in the approach speed and landing. By becoming familiar with the slightly higher speeds of this approach, you will be better prepared should the unexpected happen and you find yourself screaming along after making an evasive maneuver to avoid traffic near the ground.
C. Verify that the technique you wish to use works well with the canopy you are using. Some canopies have unusual flight characteristics that can take hundreds of jumps to fully explore. Do this exploration up high away from other traffic. Some canopies can become unstable using certain techniques.

D. Stay with more aggressive straight in approaches for many jumps, before attempting any turning approaches. Many people do not work long enough on improving their approach planning and flaring
technique on straight in approaches before trying aggressive turning approaches. Many tend to react too late to changing circumstances, and then over-control afterwards. This reduces the distance of the resulting swoop, and indicates that the jumper is over his limit of safety.
G. Learn the concept of the "corner" and stay out of it.
The corner represents the change from a vertical diving approach to a horizontal swoop. Make that corner as round as possible. (A large radius pullout started higher is safer than a sharp pullout started lower.)
1. If the canopy's natural tendency to pull out gets you to level flight without pulling any toggles at all, then you were not very far into the corner. This is the safer method.
2. If you need to pull the toggles down to get out of the vertical part of the approach before you can start your flare, then you were too deep into the corner. (Pulling the toggles down in this situation is certainly better than hitting the ground, of course!) The big problem here is that many jumpers do not recognize this as a sign of poor piloting, and do not realize how dangerous this really is.
3. As you can see, the measure of safety on your swoop is how little toggle movement it takes to get to a normal approach angle. Finding yourself deep in the corner should be considered a severe warning that you need to do everything higher, and start the pullout earlier. A more mellow turn would help too, since the approach would not be as steep to begin with.
4. Also, if you find yourself pulling the toggles down hard and late, it may indicate that your perceptual skills are too slow and your judgement too inaccurate to be making that type of approach with that particular canopy. If your perception and judgment were keeping up with what was happening, you would have applied just a little toggle, but much higher, rather than a lot of toggle at the last instant. Improving perceptual skills goes hand in hand with learning how to better plan the approach. Probably a less steep approach (by turning with less bank)would help!

V. The Turning Approach
A. When setting up for a turning approach, start with lots of altitude and only a slight turn with a gentle bank .
1. Be sure to set up all your turning approaches with enough altitude to make the ”high altitude loss” turn safe. Then start the turn using the high altitude loss turning technique, and use only a medium bank angle.
2. Evaluate the altitude loss as you turn. If you perceive that you are using up part of your safety margin, change the turn into one that produces less altitude loss. Now you have your margin for safety back again. Starting really high, keeping the bank shallow, and knowing many turning techniques allows you to have plenty of outs.
3. If you have any doubt about having sufficient altitude to do the “high altitude loss” turn, don’t waste your safety margin by starting with a front riser turn. Choose a different turning method to help preserve your margin of safety. If you notice during this turn that you are still using part of your safety margin, change the turn technique again to one that allows for even less altitude loss, or simply stop the turn. Remember all of the possibilities you have available.
B. Avoid the low turn! If it looks like you need to start with a low altitude loss turn method just to survive, don’t turn! This is surely an accident waiting to happen. If you think you’re good enough to attempt a turn with little or no safety margin, then you’re thinking unrealistically about your capabilities. Why? Because if your perception were really that good, why did you get yourself in that situation to begin with? Don't judge your approach technique as good just because you walked away from the landing!
C. Avoid becoming trapped into the habit of using only one turning technique that requires an exact starting altitude for success. Favoring one turning technique, especially a low altitude method such as a sharp snapping
toggle turn followed by burying both toggles, is very risky. Because the canopy tends to pull out of the dive almost the same way each time, you require an exact starting altitude and perfect judgement each time. Nobody can be that perfect all the time!
D. Top priority when you blow it: Wings level on impact!

If you discover you've blown it, try to salvage the situation by getting the wings exactly level, while still flaring out of the dive. Don't give up, and keep the toggles in the best position right through the impact with the ground.

III. Working on Improving Landings

A. Altitude control is the key to no wind landings.

It is not so important to be at an exact specific altitude when starting the flare, but how high you are when you finish the flare is very important. You should finish the flare so that you have no rate of descent (or at least your minimum rate of descent) when your feet are at ground level.

B. The speed at which you move the toggles is just as important as the distance they are moved.

When flaring after a conservative approach, the toggles should be moved fairly quickly to get the canopy to level off. Moving them too slow may cause a mushy sink into the ground. On a high speed approach, the toggle movement is usually slower, (to avoid a rapid climb,) unless you are digging yourself out of the corner!

C. For the best landings, transfer the weight from harness to ground gently and gradually. If you are at zero rate of descent with feet at ground level, you can gently press your feet on the ground while you continue to sit in the harness. With the first step, you can remove a little weight from the harness, by stepping only lightly on the ground, and more heavily on the next steps, then the next, and so on until all your weight is transferred from the harness to the ground. You can't do this if your canopy is flying too high to allow you to reach the ground! You must also maintain adequate flying speed during this time. No parachute or wing of any type is capable of supporting you without forward airspeed!

D. Be careful to avoid using your hands and arms for balancing or protecting yourself during the flare and landing. As you will see in the video, the canopy will respond to every toggle movement (or shifting in the harness), even when you are well into the transition to the ground. Look for these errors:

1. Lifting one toggle at touchdown This is the balance trap. If you feel like you are falling to one side, you may try to stick an arm out for balance, which turns the canopy. You may think it was a side gust.

2. Extending a hand out to protect yourself

This is the protection trap. By extending your hand out to the ground to protect yourself, you unknowingly steer the canopy that direction.

3. Lifting both toggles and stabbing the ground with your feet

This is done usually in anticipation of a hard landing. Stabbing at the ground with your feet only increases the pain. This is usually accompanied by lifting both toggles backwards and upwards, which compounds the situation by causing the canopy to dive harder at the ground.

4. Fighting the wind

Sometimes people let one toggle up and push the other one down prematurely, in anticipation of difficulties in getting the canopy on the ground in high winds. This can produce some really ugly accidents. Make sure you're really on the ground first, then get the canopy on the ground.

5. Tunnel vision

Though we try our best to avoid it, all of us tend to concentrate more on our flight path, and less on the surroundings, as we get closer to landing time. Sometimes swoopers or accuracy jumpers start having this problem much higher up. This is very dangerous! Try to keep looking around and seeing people!

6. Flaring too slowly, too high, or too far, etc.

Experiment more while up high. Watch the landings of other people, and watch videos of your own landings.

IV. Conclusion

Acknowledge your current limitations.

Create safe situations for yourself and others.

VOW TO BECOME A STUDENT OF CANOPY CONTROL AGAIN.

Have fun!