



Spectre Flight Characteristics

1. Introduction

The Spectre is a slightly tapered, zero-porosity, seven-cell main canopy from Performance Designs. The Spectre is a great general-purpose skydiving canopy that appeals to a wide range of skydivers. A larger Spectre may be a great choice for a novice jumper, or even an experienced jumper who simply wants a conservative, forgiving canopy. On the other hand, experienced canopy pilots who enjoy the speed and responsiveness of smaller canopies can have a lot of fun with smaller-sized Spectres.

In this document, we will describe the general performance and handling characteristics of the Spectre, and compare the Spectre to several other popular canopies.

A Note on Comparing Canopies: When comparing two different canopy designs, such as the Spectre and the Sabre2, an accurate comparison can only be made if the canopies are the same size and are flown under similar conditions. The canopies must also be flown by the same jumper, or by two jumpers of very similar size and weight. Comparing a Spectre 150 to a 170 square foot canopy, for example, would not yield an accurate comparison. If you jump one canopy when the winds are calm, and another canopy when the winds are slightly stronger, this can also affect your impression of the canopies.

The way canopies are “set up” can also affect a comparison. Two identical canopies will perform differently if one has the toggles attached at the location specified by the factory, but the other has had the steering lines shortened a few inches. There may be differences between a canopy with new lines and one that has several hundred jumps on the line set. There will also be a significant difference if one canopy has a collapsible pilot chute and the other does not, even if both are fairly large canopies.

2. Openings

To describe the way a canopy opens, we need to agree on some common terms. The first part of the opening you feel, when the canopy first reaches the end of the lines, is the **snatch force**. This is the force that sits you upright in the harness. The second phase of the opening, when the canopy is overhead but the slider is still all the way up, is called the **snivel**. A significant amount of deceleration normally occurs during the snivel, which makes the final **inflation** more comfortable. The **inflation** is the third stage of the opening, when the slider travels down the lines and the cells finally pressurize.

The snatch force of a Spectre will be similar to other canopies of the same size. All sizes of the Spectre have a relatively long snivel and slow inflation speed. Larger Spectres tend to inflate a bit more slowly than smaller ones. Jumpers who enjoy soft, comfortable openings tend to be very happy with the Spectre.

The Spectre is fairly forgiving of packing technique, body position, and the airspeed at which it is deployed. We had consistently good openings while testing the Spectre using a variety of packing methods, including our normal factory PRO pack, a neat side pack, and some other pack jobs that we only use to find out how forgiving a particular design will be. We've also found that the Spectre is more resistant to off-heading openings than many other canopies, and tends to turn less and recover more quickly if it does open off-heading.

You will get the best results by using the packing method we recommend, and by deploying at a reasonable airspeed while in a good body position. As with any canopy, it is important to position the slider correctly and make proper line stows when packing a Spectre, and use a pilot chute that is the correct size. See our information sheet titled “Solving Deployment Problems” for more information.

3. Flight Characteristics

Straight Flight at full Glide: The Spectre flies at about the same airspeed as other canopies such as the original Sabre, the Sabre2, and the Stiletto. Many jumpers do not expect a seven-cell canopy to glide as far as a comparable nine-cell, but at full glide the Spectre actually has a slightly flatter glide angle than some nine-cell canopies, including both the original Sabre and the Sabre2. Remember that accurate comparisons can only be made between canopies that are the same size and flown with the same wing loading. Other factors we described above in “A Note on Comparing Canopies” may also affect your impression of the way a canopy glides.

Straight Flight in Brakes: Many older ram-air canopy designs tend to descend at a steeper angle or “sink” when flown in brakes. Canopies made for disciplines such as traditional accuracy are also designed to do this. Modern “high performance” canopies are usually designed with different characteristics in mind, and may perform differently when flown in brakes. Many canopies being used today, including the Spectre, actually glide farther or “float” when flown in brakes, although the Spectre is not quite as “floaty” in brakes as canopies such as the Sabre2 and Stiletto.

Although the Spectre does not have the true sink capability of a traditional accuracy canopy, it comes closer to having the ability to sink than most other modern canopies. Under certain conditions, it may seem like the canopy actually does sink. If you are flying into a strong head wind, your ground speed will be slower. By flying in deep brakes, it may be possible to reduce your ground speed to zero in a strong wind so that the canopy appears to “sink” relative to a point on the ground. Light winds do not reduce your ground speed as much, so the “float” in brakes will be more apparent and the canopy will not really seem to “sink” the way it appears to do in stronger winds.

The Spectre’s rate of descent will be noticeably slower when flying in brakes than it is at full glide, particularly when flying in deep brakes. This can be useful if you are returning from a long spot with the wind at your back. It will also be useful if you like to fly in brakes for a while after opening, to let other canopies land first. Keep in mind that flying in brakes on final approach may not be a good idea in turbulence. Most modern canopies handle turbulence better when they are flown at full glide. Also, remember that flying your final approach at full glide will help you get the most effective flare in all wind conditions.

Toggle Turns from Full Glide: If you have been flying a rectangular canopy like the original Sabre or original PD 9-Cell, you will probably enjoy the responsiveness of the Spectre. The Spectre will turn more quickly and smoothly than a rectangular canopy, with less toggle pressure. Toggle turns on the Spectre feel similar to those on the Sabre2, although you may notice some differences. A Sabre2 requires less toggle input to start and maintain a turn, while the Spectre actually turns in a tighter radius.

If you have been jumping a very responsive “elliptical-type” canopy like the Stiletto, you may feel that the Spectre is not quite as responsive and has a slower turn rate. This is mainly due to the fact that the Spectre will require more toggle input to start and maintain a turn. Although more input is needed to make a turn, the Spectre is like the Sabre2 in that it will dive longer and lose more altitude in a turn than the Stiletto.

Toggle Turns in Brakes (Flat Turns): Flat turns are an important technique to learn on any canopy. By pulling the toggles half way down, then slowly raising or lowering one toggle to start a turn, you will lose much less altitude than by making a turn from full glide. Like many seven-cell canopies, the Spectre is very responsive in braked flight, and it can be very easy to make precise turns and heading adjustments when flying in brakes.

Front Riser Characteristics: The Spectre has relatively light front riser pressure. Even larger sizes of the Spectre respond fairly well to front riser input. Smaller sizes will respond more quickly, and also lose altitude more quickly. Like any canopy, the Spectre will not respond as well to front riser input if the control lines are too short.

Stall Characteristics: Depending on how much you weigh, you may not be able to stall a Spectre even if you hold the toggles all the way down. Quite a few skydivers, even very knowledgeable and experienced ones, believe that you must be able to stall a canopy with the toggles all the way down in order to land it correctly. This belief does not apply to many canopies, including the Spectre. When a canopy actually stalls, its lift decreases dramatically and its rate of descent rapidly increases. A stalled canopy is not really “flying.” If you want a soft landing, you want your canopy to keep creating lift and maintaining a low rate of descent until your feet are on the ground. If a canopy stalls while landing, it may set you rather abruptly on the ground. If you adjust your steering toggles so that your canopy is easier to stall, it may actually become more difficult to land softly.

The Spectre will reach a fairly low airspeed before stalling. As with many canopies, the Spectre may take several seconds to fully re-pressurize after recovering from a full stall. Holding the toggles down at between $\frac{1}{2}$ and $\frac{3}{4}$ brakes will help the canopy re-pressurize more quickly.

Landings: The Spectre tends to have a lower flare point or “sweet spot” than some of our other zero-porosity canopies, meaning you will need to pull the toggles a bit farther on the Spectre to stop your descent. If the flare is a bit slow, the Spectre tends to exhibit the more traditional seven-cell type landings, where the forward speed bleeds off quite well, but the descent rate is not completely stopped. If the flare is more efficient, with the toggles coming down to the sweet spot a bit more rapidly, the canopy will “plane out” and fly level with the ground quite nicely.

Other canopies such as the Sabre2 are designed to plane out more easily, and reach level flight even if the flare is a bit slow. Jumpers who want this type of performance may prefer a canopy like the Sabre2. Other jumpers might prefer the combination of “high performance” characteristics and traditional seven-cell performance that is provided by the Spectre.

Aggressive Approaches (High-Speed Approaches): As we mentioned earlier, the Spectre loses more altitude in a turn than some other canopies. By comparison, the PD Stiletto pulls out of a dive relatively quickly. As with most canopies, smaller sizes dive more in turns than larger ones.

It is important to consider differences like these when making an aggressive, turning approach on a canopy that is new to you. Even if you have made hundreds or thousands of these approaches, it is best to be cautious when trying a new type of canopy or a smaller size than you are accustomed to.

A note about control line length: The Spectre was designed with quite a bit of slack in the control lines for several reasons, some of which are explained in this document, and we recommend keeping the control lines at their original length. Some jumpers have shortened their control lines by changing the point where the toggles are attached because they felt the slack in the control lines was excessive. If you believe your control lines are too long, we suggest you read an article on our web site titled “Getting the Best Performance From Your Canopy,” which can be found at <http://www.performancedesigns.com/education.asp>.

If you have read the article on “Getting the Best Performance From Your Canopy” and still want to shorten your control lines, you should only shorten them by an inch or two (2 – 5 cm), then jump the canopy a few times to see how it performs. There should always be some slack in the control lines when the brakes are released to allow the canopy to perform the way it should. Keep in mind that you may need to lengthen the steering lines again after a certain number of jumps to keep them at the correct length. Also, remember that modifications like this should be performed by or under the supervision of a qualified rigger.

4. Canopy Sizing

The chart below shows our suggested weight limits for the Spectre. We provide this information with each of our canopies to help you choose the correct canopy size for your weight and experience level. It is important to understand what the information really means so you can use these charts correctly.

Exit weight is your body weight plus the weight of your clothing, rig, main and reserve canopies, and anything else you will be wearing when you exit the aircraft. The average jumper's exit weight is about 20 to 25 lbs. more than his or her body weight.

There are various exit weights listed on the chart below, divided into several experience categories. It's important to note that these are **maximum** weight limits. For example, the maximum exit weight listed under "Novice" for a Spectre 190 is 171 lbs. This means we feel the Spectre 190 is appropriate for a novice jumper who has an exit weight of 171 lbs. **or less**. It does **not** mean you must weigh at least 171 lbs. to make this canopy perform correctly. In fact, a much lighter jumper might be perfectly happy flying a Spectre this size. The canopy will have a slower forward speed and lower rate of descent when flown by a lighter jumper, and is likely to be more forgiving and easier to land. These may be the exact characteristics wanted by a novice jumper, or one who is a conservative canopy pilot!

Of course, a light jumper on a large canopy may be affected more by high winds. This is why the **minimum** exit weight "varies with weather and landing conditions" (VLC). If the winds are light, a 150 lb. jumper might enjoy flying a 230 square-foot canopy, but that jumper might choose to stay on the ground when the winds are very strong and gusty.

The chart below can help you determine the canopy sizes that might be appropriate for you, but we don't recommend making your decision based solely on this information. Just as you need to try on a pair of shoes to see if they actually fit, jumping a canopy of a particular size is the best way to really know if it is right for you. When purchasing a canopy, it's best to choose a model and size that you know from experience will provide the performance you want.

If you plan to jump a canopy that is smaller than any you have used before, your exit weight should be within the "Student" or "Novice" category for that canopy, and you should be trained to use the canopy by a qualified instructor. Or, you should have made at least 50 jumps on a canopy that is no more than 15% larger (approximately one size), and be able to consistently make soft, accurate landings with that larger canopy.

| Canopy | Minimum Exit Weight | Maximum Exit Weight (lbs.) | | | | | |
|--------------------|---------------------|----------------------------|------------|--------------|------------|------------|------------|
| | | Student | Novice | Intermediate | Advanced | Expert | Maximum |
| Spectre-97 | VLC | N/S | N/S | N/S | 97 | 126 | 155 |
| Spectre-107 | VLC | N/S | N/S | N/S | 107 | 139 | 171 |
| Spectre-120 | VLC | N/S | 102 | 114 | 120 | 156 | 192 |
| Spectre-135 | VLC | N/S | 115 | 128 | 135 | 176 | 216 |
| Spectre-150 | VLC | N/S | 135 | 150 | 165 | 195 | 240 |
| Spectre-170 | VLC | N/S | 153 | 170 | 187 | 221 | 255 |
| Spectre-190 | VLC | N/S** | 171 | 190 | 209 | 228 | 266 |
| Spectre-210 | VLC | N/S** | 189 | 210 | 231 | 252 | 273 |
| Spectre-230 | VLC | N/S** | 219 | 230 | 253 | 276 | 299 |

VLC = Varies with weather and landing conditions

N/S = Not Suggested

** = Although these canopies have been used successfully with students, Performance Designs has other models that may be more appropriate.