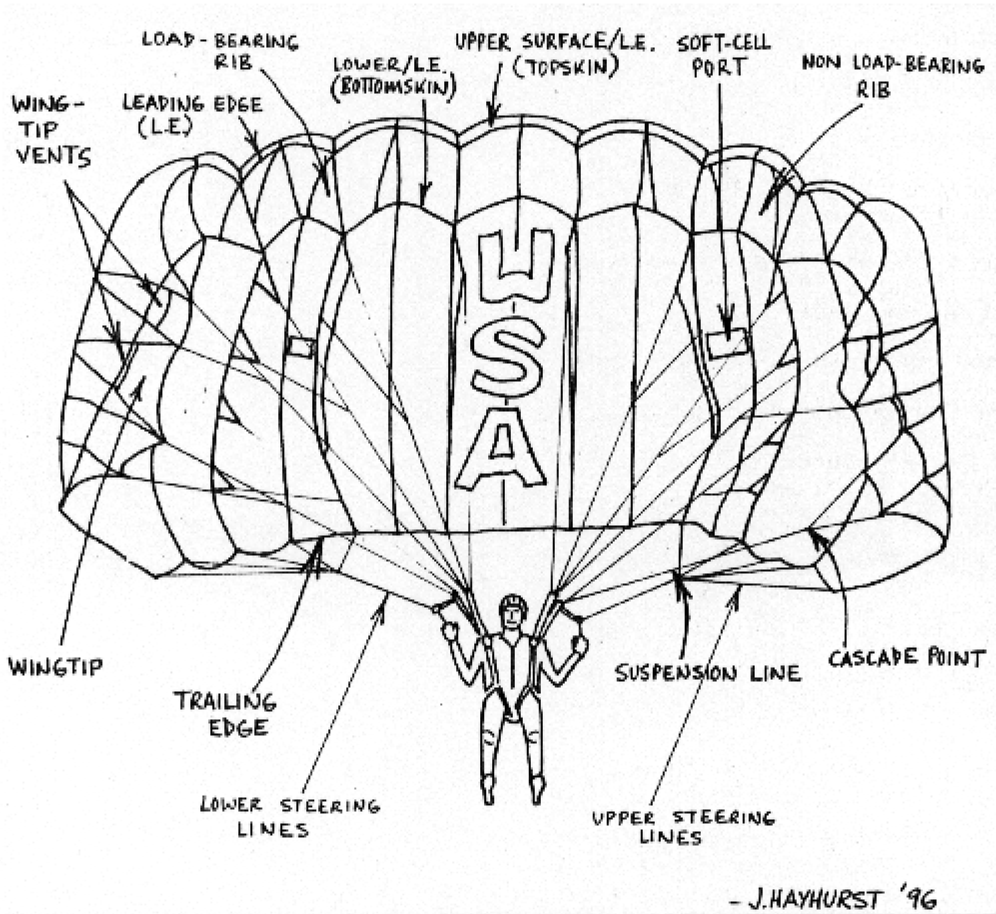
Anatomy of the Eiff Classic



Glossary of Terms

Angle of attack	The angle created by the relative wind and an airfoil's mean aerodynamic chord line.
Aspect ratio	Expressed as span (tip to tip) divided by chord (nose to tail). The *Classic* A/R is approx. 1.8:1.
Assembly	For the purpose of this manual, attachment of the canopy to risers, threading the suspension lines/steering lines through the slider to the connector links/risers.
Cascade	The point where a suspension line branches out into two load carrying lines.
Chord	The distance from the leading edge (L.E.) to the trailing edge (T.E.), drawn along the mean aerodynamic chord (M.A.C.) line.
Exit Weight	The weight of the jumper, his clothing, harness, parachutes and all equipment.
FAA Parachute Rigger	A person certificated by the FAA for packing and maintenance of reserve/emergency parachutes, generally competent to assemble the parachute and determine if the system is compatible with specific manufacturer's requirements.
Glide ratio	A function of the lift to drag ratio; the lift generated by an airfoil divided by the drag produced. Varies with the deflection of the tail of a ram air canopy.
Leading Edge (L.E.)	The forward surface of an airfoil. For a ram air canopy, this is a projection, the point where free stream air is deflected by "stagnant" ram air.
Load bearing ribs	Ribs to which suspension lines are attached, bearing the weight of the jumper.
Lower steering line(s)	The lines, which join the upper steering lines to the jumper's steering handles/toggles.
Non load bearing rib	A rib between two load bearing ribs; maintains airfoil shape.
Soft cell	A half cell, fourth inboard from the wingtip, with a port cut on the bottom skin surface. Reduces inner cell pressure, modifying flight and steering characteristics.
Span	The distance from one wingtip to the other wingtip; the left to right dimension of an airfoil.
Suspension line	Load bearing line, which connects the canopy to the risers.

Trailing edge	The rear edge of the canopy, where top skin and bottom skin join. Upper steering lines attach here.
Wing loading	The weight supported by an airfoil, expressed as a ratio; e.g., pounds per square foot.
Wingtips	Frequently referred to as the "stabilizers." The wingtip is a crucial component which influences lift, drag, and control response.

Classic Heritage

Note: The following article was written by James Hayhurst, and the contents represent his opinion only. Eiff Aerodynamics makes no claims to the factual accuracy of this material, offering it only for the sake of giving the reader some insight to the rich legacy of the accuracy event, and the story behind the *Classic*.

"A Brief History of Accuracy Parachutes"

In 1971, sophisticated round parachutes dominated the precision accuracy event. The new ram air inflated "square" parachutes were an unproven novelty. It was an exciting time for the sport, an historic era in which new technology lowered scores by two orders of magnitude over a five year period.

In 1971 there were three competitive round parachutes: the Pioneer "Competition" Para Commander, the French Pappion, made by EFA, and the Russian UT 15. The battle between the Competition P.C. and the Pappion was fierce. Their performance was very close, and they enjoyed similar jumper loyalty and market share.

But the UT 15 was actually the superior canopy, it had a better top speed, better glide, crisper turns, and sank better than the Pap or the P.C. However, it was almost impossible to get one in the west, with rigid cold war trade embargoes between the Soviet Union/Eastern Block countries and the west.

While the debate went on over which was the better round parachute, a revolution was already underway. In began with an Air Force sponsored research project at Notre Dame. The Head of the Aeronautics Department, Professor Nicolaitis, collaborated with Dominic Jalbert to see if they could adapt Jalbert's ram air kites for payload delivery and manned parachuting.

One of the Notre Dame test jumpers was John Eiff. Eiff was one of the first persons to learn the design and assembly aspects of ram air parafoils, and one of the first to jump a parafoil in competition. The Notre Dame Foil he jumped in meets during the late Sixties was about 180 square feet, with speed comparable to today's medium performance sport canopies, such as the PD 170.

At the time, it was said these new winged shaped canopies came in the "back door" the "front door" being the way round parachutes traditionally flew on approach downwind.

Steve Snider was an early skydiver turned entrepreneur who saw the commercial/sport potential of the ram air canopy. Snider formed Para Flite to market advanced canopies. Its first product was the Delta 2 Para Wing a triangular Rogallo canopy that enjoyed moderate market success. The next canopy was a ram air, dubbed the "Para Plane."

The Para Plane was almost identical to the Notre Dame Foil, only the line attachment was shifted up into the rib itself, to avoid possible legal action by Jalbert. Thus was borne "direct line attachment," which Para Flite subsequently patented.

The Para Plane was really fast, close to the speed of a Sabre, and as such, was not much of a accuracy parachute. But it was a thrill to jump, a real crowd pleaser at demos. The pack volume was enormous by today's standards, but by far the biggest shortcoming was a brutal opening shock, enough to leave serious bruises at any speed above a sub terminal exit.

Para Flite's next canopy, called the Para Plane "Silver Cloud," was a viable accuracy machine. It was bigger than the original "baby" Para Plane, and slower and more docile on final. But it still had the enormous pack volume and hard openings.

By 1972, a few accuracy jumpers in the United States had mastered "back door" accuracy. Bill Hayes won accuracy at the nationals that year, and then as a U.S. Team alternate he jumped his Cloud on "wind dummy" loads at the World Meet in Tahlequah, Oklahoma. Clayton Schopple was the overall men's world champion that year, still jumping a Competition P.C.

In 1973, John Wolfe won the U.S. Nationals, jumping a Silver Cloud. The next three places were also taken by Silver Clouds. Wolfe's winning score of 0.06m was a full order of magnitude better than the typical winning 10 round accuracy totals of round parachutes. It was a stunning development, and one that signaled the impending demise of the round parachute for accuracy.

In 1974, Jimmy Lowe made the U.S. Team jumping a parafoil (one of John Eiff's Notre Dame based designs). At the 1974 World Meet in Solnok, Hungary, Lowe piloted his parafoil to a close second, behind a UT 15. It was the last time a round parachute would ever win accuracy at the world championships.

The round canopy era was over.

What observations can be drawn from this period? One is that parachute design, while generally evolutionary, is sometimes revolutionary. The blank gore 28' "cheapos" of the early Sixties gave way to the 7 TU Lo Po, which in turn was eclipsed by the Para Commander, which gave way to the Pappion, which was matched by the Competition P.C. Both canopies were transcended by the UT 15, the evolutionary culmination of round parachute design.

Then the ram air revolution made even the UT 15 obsolete.

But let us not forget what made the UT 15 best in its class: better penetration and glide, crisper turn response, slower slow flight, and more stable sink. Downwind or upwind, these flight characteristics are the goal of all winning accuracy canopies.

In 1975, Para Flite came out with the "Strato Star," with the "pilot chute controlled reefing line" deployment system, also known as "rings and ropes." The Strato Star became the first ram air canopy that had comfortable terminal openings, and most of the leading style and accuracy competitors jumped it at the 1975 U. S. Nationals. With only five cells, it came down quite hard, which led many observers to comment it was simply an upwind version of the Pappion.

1975 also marked the entry of the first canopy to compete with any credibility against Para Flite: the North American Aerodynamics "We're the Other Guys" parafoil, a seven celled canopy based on John Eiff's 9 cell design, the "Parafoil III".

In truth, this first NAA effort was not yet equal to the competition, and unlike the Strato Star, it wasn't reefed for terminal openings. Para Flite had the patent on "rings and ropes," and the slider was an unproven idea. In 1975, if you wanted to jump a ram air canopy at high style airspeeds, it had to be reefed with "rings and ropes."

So NAA went back to the drawing boards with a vengeance.

Meanwhile, Para Flite came out with a fabulous new canopy called the Strato Cloud. The Strato Cloud, reefed with "rings and ropes" like the Strato Star, seemed huge (at 230 square feet) compared to its little brother. It had large detached wingtips, called stabilizers that helped give it excellent slow flight and sink characteristics. The Strato Star became instantly passe.

The Strato Cloud lowered accuracy totals down another order of magnitude. Ten men dead centered out on the 1O cm raised disk at the 1976 U.S. Nationals, making the disk obsolete and ushering in the era of the flush dead center and the electronic pad.

In 1976, the Strato Cloud was clearly the best accuracy parachute in the world. At the World Championships, the U.S. men (my first U.S. Team) won team accuracy with the Strato Cloud, a decisive technological victory that forced the Soviet Union and Eastern Block nations to retire their round parachutes for good.

In 1978, NAA delivered its reply to the Strato Cloud. NAA's new accuracy canopy, known as the Jalbert Parafoil, was developed by Johnny Higgins and Mark Limond (with some help from the U.S. Team). NAA's design started to come together at the 1978 Spring U.S. Team training camp at Kissimmee, Florida. The Parafoil was 252 square feet bigger than a Strato Cloud, with traditional flares for line attachment and large wingtips. The toggle pressure was high, and it steered "like a truck," but the canopy was stable, and it came down slower and steeper than the Cloud.

Under the NAA Jalbert Parafoil, Cheryl Stearns won the 1978 World Meet, and in 1980, Belgium's Dirk Bodine dead centered out at the World Meet, leading to a reduction in dead center size to the current five centimeter diameter target. The Parafoil became the most popular accuracy canopy from the early 1980s on.

In the 1980s, the only canopy to seriously contest the Parafoil's supremacy was the Challenger. The Challenger was conceived at the 1982 WPC, at Lucenec, Czechoslovakia, while I watched Bernt Wiesner jump an East German canopy that featured leading edge slots. Wiesner flew fairly lean gliding approaches that transitioned to 2 3 second sinking arrivals on the pad.

I really admired how Wiesner's canopy both glided *and* sank. I was intrigued by the leading edge slot it made the canopy act much "larger" than 230 square feet when it came down in a sink. Wiesner ran nine dead centers, and his only miss was a "penny" (one centimeter), this on the new five centimeter pad.

Another observation I made that summer was that major European accuracy meets were rarely conducted in winds above five meters per second (12mph). If the conditions got ugly or the winds bumped the limit, the meet director would switch events, or go on hold. Why not design a canopy for "European conditions"?

Back in the U.S., I persuaded John Eiff to design a canopy that could glide and sink, and tailored for the lighter winds of European competition. John felt a 9 cell canopy was the key to good gliding performance, and that a thick, 16.5% airfoil with a "droop nose" would give it stable slow flight and sink.

We both agreed that making more than one size canopy so that the jumper would have an ideal wing loading was equally important. We guessed the ideal sink rate to close on the pad was about 6 8 fps, about the speed you attain when you jump off a chair. The loading would be about .60 pounds per square foot.

John built the first prototype in March of 1984. With some minor modifications, we had it flying to design specifications by early summer. In July, I won the 1984 Canadian Nationals with it, and was eager to show off the Challenger in September at the 1984 World Meet in Vichy, France.

An untimely injury cost me a month of jumping before the meet in Vichy, and my proficiency suffered. Despite my lack of practice, the Challenger performed beautifully and my misses were due to erratic foot placement. I still managed to make the accuracy finals, placing in the top 20.

A few observant jumpers took notice of the new prototype. One was a member of our women's team, Carol "Chris" Christensen. She expressed an interest in getting involved with the project, and I put her in touch with John Eiff. Ultimately, Chris and a top CPI accuracy jumper, Randy Thompson, formed the New England Parachute Company in 1984 to build the Challenger.

In June of 1985, Randy Thompson won the U.S. Nationals with a 0.02 total for 10 rounds. Challengers soon multiplied around the world. The 9 cell Challenger had a better glide and slower descent than the Parafoil, and closed at a slower speed in light winds. The toggle pressure was much lower than a Parafoil, and it was much more responsive to turn inputs. It was a "pilot's canopy." With it you could fly up to the transition point, and then sink down just like Bernt Wiesner had done in Lucenec.

With eight different sizes, at last there was a canopy that fit the jumper an end to the "one size fits all" mentality that had long been the norm for accuracy parachutes. The Challenger's excellent quality control and performance soon made it a popular alternative to the Foil. By the 1987 U.S. Nationals, 45% of the American field were jumping Challengers.

Challengers were being jumped in Europe, too. A number of elite European jumpers had switched over. The Swiss Team bought Challengers, as did the Czechoslovakian Team. It was these top European jumpers who were to discover the Challenger's weakness: it was a "flatland" accuracy parachute. Of course, that was also its strength, precisely what I had asked John Eiff to design a canopy for "smooth European conditions."

But most top European jumpers also jumped pare ski in the winter, and in turbulent conditions, they found the Parafoil had an advantage. The Challenger was a better calm air canopy than the Foil, but the Parafoil did better in gusty air, low level cross currents and turbulence what I call "combat accuracy."

Another problem with the Challenger was that with the glide of a 9 cell canopy, glidepath control to set up proper arrival on the pad was more complicated than the simple "parabolic" arrival of a Parafoil. For a new jumper, glidepath control is difficult enough, and the flat glide of the Challenger was hard to manage.

Compounding the situation, by the late 80s there was a move in Europe to run meets where the public could see the action in town squares and stadiums. This necessitated the development of portable landing pits, at first little more than a stack of gymnastic mats. These foam landing pits let Parafoil drivers to get away with doing what the Parafoil did best: drop down on the pad in a deep sink.

To the question, "Which came first, the Parafoil or the tuffet?" the answer is: the Foil definitely came first. The tuffet made the high sink vertical arrival of the Parafoil more tolerable, and it literally saved the rear ends of many top accuracy competitors who jumped it.

Fast forward to the Verona Cup in Italy, May of 1992. At this meet I observed that the Parafoil now enjoyed more than just market dominance it also enjoyed "psychological dominance."

The more competitors jump a certain kind of canopy, the more likely it is to win. Competitors want to jump the winning canopy, and so it becomes a self fulfilling cycle. For a jumper new to accuracy competition, there is no way he can go against the grain and not suffer a psychological penalty. Psychological dominance: the Challenger was "out," the Parafoil was "in."

At Verona I concluded that the Challenger, no matter its performance, was on the way out for psychological and marketing reasons, but also because in the era of the tuffet, there was no longer a price to be paid for a high rate of sink arrival on the pad. The tuffet allowed more vertical (hence, more accurate) arrivals something the Parafoil did better than the Challenger.

I shared these observations with John Eiff in May of 1992, and he agreed to design a new canopy, one that would combine the best features of the old Challenger and the Parafoil. We agreed it would be a 7 cell canopy, with re designed wingtips and a new airfoil, and we committed ourselves to the goal of developing a canopy which would match or better the Parafoil in every kind of accuracy condition a very tall order!

By June of 1992, John had built the first prototype. We dubbed it the "RS 2000." The "R" stood for "Redesign," the "S" stood for "Series," and "2000" stood for the year 2000, the year we hoped our new canopy would be dominant in the accuracy event. At the time, I don't think either one of us anticipated just how hard it would be to surpass the performance of the Parafoil.

After two years and into our eighth prototype, I joked that "2000" stood for the number of canopies we were going to have to build before we had the performance we wanted. Along with multiple combinations of airfoil, planform, and wingtip design, we tried just about everything from zero porosity fabric (in every conceivable location), to leading edge slots, to spoilers, undercamber you name it.

During the process, I earned the well deserved title of "Master Diddler" I rarely made a jump without making some change to our current prototype.

In the end, it took us three years and more than a dozen design evolutions, and together we made well over 2000 test jumps. John built the twelfth prototype in December of 1994, and the final design, "lucky 13," was built in the Spring of 1995.

We named our canopy the "Classic," and it debuted at the 1995 U.S. Nationals, where it took five of the top ten spots in men's accuracy. More recently, at the 1st USA Cup, at Clewiston, FL, *Classics* took seven of the first ten places, with long time Parafoil pilot Mark Jones taking first place, jumping a *Classic* for the first time in competition.

To be fair, Mark Jones could probably jump a postage stamp and still win accuracy meets, but it is nice to see how easily he and other long time Parafoil pilots transition to the *Classic.*

Your first jumps on the *Classic* will bring many pleasant surprises. First, pack volume is 20% less than a Parafoil or a Challenger. The *Classic* has a soft opening shock, even at style speeds. It has 1O m/s forward speed, and a glide ratio that will get you back from bad spots, with moderate steering forces and a fairly crisp (for an accuracy parachute) turn rate.

Getting down to the "nitty gritty" of an accuracy parachute (or a parachute used for "demos"), the *Classic* has a stable sink regime that can be held almost indefinitely. In the first eight seconds of sink, the closure is comfortable and steady state (no acceleration) making for more accurate foot placement, which is especially important as the accuracy discipline moves on to the 3cm dead center electronic pad.

John Eiff has met the design goals we set forth in 1992: an accuracy parachute that is deadly accurate in every condition, is comfortable to jump, and is easy for new jumpers to learn to fly. I believe the *Classic* has achieved the same kind of evolutionary improvement that the Russian UT 15 made over the Competition P.C. and the Pappion, twenty five years ago. I believe the *Classic is* the best precision accuracy canopy in the history of the sport, and that it's going to dominate the event into the next century.

As a new *Classic* owner, you have joined an elite band of jumpers at the leading edge of the sport. We'll be looking for you on the winner's stand in years to come. The ultimate proof of the *Classic's* superiority will be in the results, and we hope you will play a role in making it happen!

A word from John Eiff, designer of the *Classic:*

The *Classic* was designed for precision accuracy, but from the start I insisted that it pack smaller, open softer, and steer easier than existing accuracy parachutes. These features make the *Classic* a great all around canopy, safe and predictable for new jumpers, great for demos, and deadly for accuracy. Thank you for choosing my parachute, and welcome to *TEAM Classic*

Control Response

The *Classic* has conventional 2x2 suspension geometry. Lines from the front risers cascade to the A & B attach points. Lines from the rear risers cascade to the C & D attach points. The weight is distributed approximately 60% on the front risers, and 40% on the rear risers.

The *Classic* has excellent rear riser flare capability, and if you pull down one front riser, a really good diving spiral (good to separate the stack on team accuracy jumps). A front riser "spiral line" has been provided to make front riser spirals easier. The line goes from the right front riser to just below the outside right A/B cascade point. By pulling in on this line (about three feet), you can achieve a really effective diving spiral. Complete all spirals above a "hard floor" of 1000 feet above the ground, to be safe!

With a thick airfoil, the Classic has a long control range. That means from full flight (with no tension from the tail on the steering lines) to the stall requires a control stroke that exceeds the arm length of most jumpers. Most accuracy jumpers prefer their canopy enter full sink/stall with their hands just at, or slightly below, waist level. This means the forearms are horizontal, or depressed slightly below horizontal, as the canopy goes into a sink.

To achieve this setting, the tail of your canopy will have to be pulled down slightly while in full flight (see figure 1). The mark (made at the factory) on the lower control line is an approximate setting which you may have to adjust up or down a few inches to achieve sink/stall at the desired point.

With the sink/stall point at this setting, **you must use extreme caution to not abruptly stall the canopy at low altitude!** A waist high stall point allows experienced accuracy jumpers to "finesse" entry into sink and control their glidepath as they finish their approach. It gives experienced accuracy jumpers a last ditch "salvage" ability if they find themselves going over the top of the pad because they have 12 to 18 inches of control stroke downward, below the steady state sink/stall entry point.

Do not stall or sink your ***Classic*** **below 500 feet** unless you have at least 100 jumps on the canopy, and are comfortable in this control regime! Even then, do not stall or sink your canopy below 500 feet unless you are below 50 feet, and your glidepath will positively end with an impact centered on a foam landing mat or soft pea gravel pit. **A low altitude stall and/or rock back could cause you serious bodily injury or even death.**

Steering: The *Classic* has moderate steering forces. You'll find that turns above 1/2 brakes require six to twelve inches of toggle deflection, and should be made with smooth but positive movements Below 1/2 brakes, as the wingtips fill out, you will find that steering is more precise, and that a "cross control" turn is most effective Instead of simply pushing down on the desired turn side toggle, let up on the "outside" toggle in equal measure, for a flat, responsive turn (See figure 2 below)

Figure 1 - Control Range

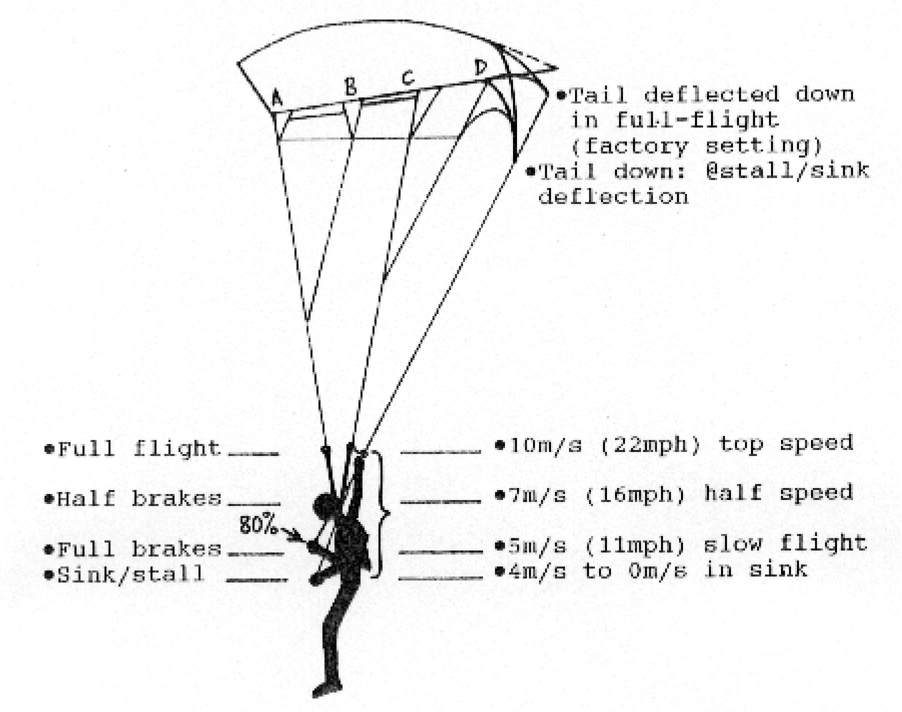
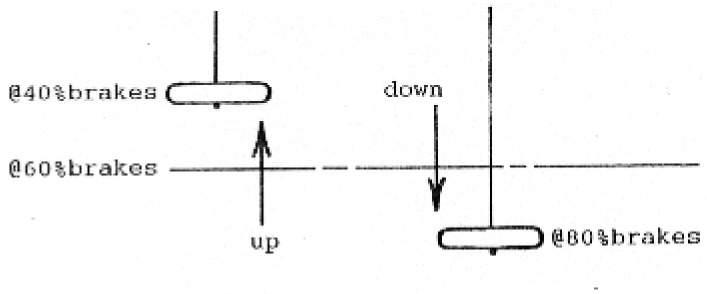


Figure 2 - Cross Control Steering



Fundamentals of Accuracy

Equipment

1. Parachute: Congratulations, you have chosen the finest!

2. Harness: Don't waste jumps. Get "set up" properly in a suspended harness on the ground. Your harness should be snug, symmetrical (hanging evenly left/right), and a plumb line dropped from your chin should pass abeam your insteps meaning that you are hanging upright, not leaning back. Select a harness with diagonal straps or a container design that forces you against the chest strap and main support webbing (figure 3, below).

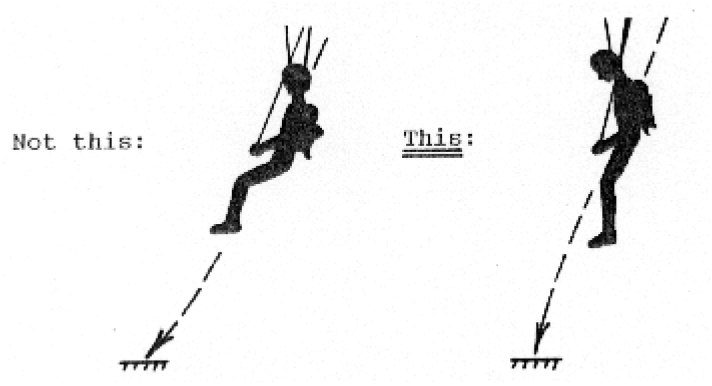
3. Jumpsuit: Fabric should be snug from knees to ankles. No loose material blocking your view of shoe or heel.

4. Shoes: The heel should be flat and well defined, with a maximum radius of 3cm. The rear strike point should be visible, not hidden under the heel cup. Find a veteran accuracy jumper and ask him where he has his shoes modified, and get yours done in similar fashion. A good shoe is to accuracy what a good putter is to golf. Make sure you have one that works for you!

5. Toggles & Gloves: We recommend hard toggles with an offset hole (available from Eiff Aerodynamics as an option). Combined with thin leather gloves, this **will provide you** with optimum **ergonomics and** "feel" for your *Classic*.

6. Glasses & Goggles (Vision): You need 20/20 vision to shoot good accuracy. You should see the pad at around 1000 feet. If your eyes water excessively, wear goggles many top accuracy jumpers do. If you wear glasses, you'll want to wear goggles on rainy or misty days. It's hard to see through water spots!

Figure 3 - Harness Position:



B. Pattern

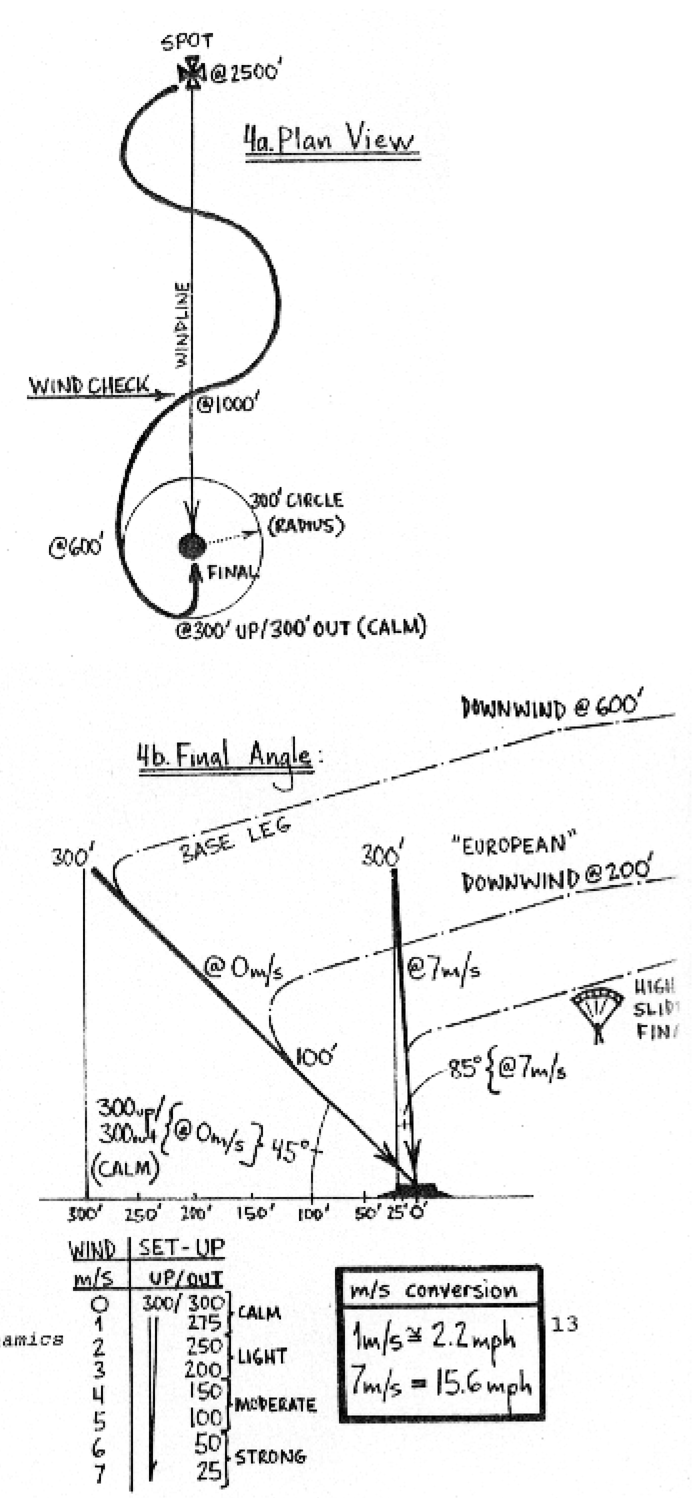
1. The Basic Flight Pattern (see figure 4a & 4b): Figure 4a shows a plan view of the flight, from opening to final approach. Maneuver as desired (crabbing, S turns, holding and running) but stay fairly close to the windline. It's basic, but the times you don't are jumps that go bad.

Plan your maneuvering to position yourself for a windcheck at 1000 feet. The stronger the winds, the further upwind this check must occur.

Hold into the wind at half brakes and check your *Classic's* penetration at 1000 feet. Half brake airspeed, with your hands at **"ear level,"** is about 7m/s (16mph). Use this information to gauge the winds. For example, if your groundspeed is zero, the winds are 7m/s. Consistently make this check and you will soon become proficient at estimating the winds you'll face on final.

Now turn downwind at half brakes. Start your base turn so as to end up behind the target at the correct angle for the winds. Figure 4b depicts "set up" points based on a starting altitude of 300 feet for your final approach. Also shown is a shorter "European" style (approximately 100') final. If the winds are strong, start your approach well upwind of the target, sliding sideways into position only slightly behind the target.

Figure 4a & 4b - Pattern and Angles:



The Classic Approach

The "Classic" parabolic or "round off" approach was invented long before the *Classic*, but the *Classic* makes it a snap to fly. Complete your base leg to final turn so as to pass through the first "window" of your final approach, the "set up" described at figure 4b. Spend the next 200 feet (about 20 seconds) working to achieve a glideslope that will carry you beyond the target to +5 meters, at 66% brakes. Work hard be a pilot, not a passenger.

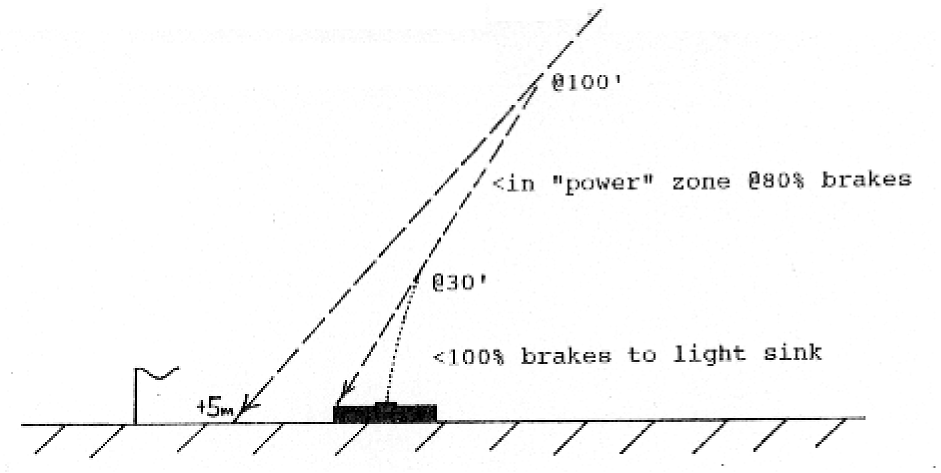
If you are high, try S turns, sustained deep braking, or tap in and out of light sink to get down. Avoid stalling the canopy; it's unsafe and will only confuse matters. If you are low, let up and fly at 25% brakes. Keep correcting until you have both 66% brakes and a glidepath that will overfly the target.

As you approach 100' you are about 10 seconds from landing The "European" or short final approach intersects your glidepath at this point, completing a curving downwind approach that aims to pass through the same "window in the sky" you are now flying through. It's time to aim a little closer to the pad, which you/ do by increasing brakes to 80%, hands level with your sternum, forearms about 30° above a horizontal position (see figure 1).'

This is the "power zone" the canopy is flying, your control pressures firm, and the canopy responds in linear fashion to your inputs. Let up, and you move forward. Push down, and you slow down, steepening your angle of approach. You are flying to just beyond the pad, aiming at the far side of the tuffet, about +2.5 meters (+78 feet) beyond the dead center. You are approaching the third and final "window" of your final: the transition point.

"Transition" simply means transitioning from your slight "overfly" glidepath, increasing your braking, steepening your angle, and aiming for the dead center dot. If you've flown your approach well, you'll arrive at 100% brakes, or very light sink. The canopy will remain stable, over your head, with no pre stall "rockback" or acceleration. This steep but controlled arrival is designed to maximize the accuracy of you~ foot placement.

Figure 5 Transition:



Planning

1. Always plan your jump. Base your plan on the conditions you observe at the DZ in the moments before you jump, plus an awareness of any trends. Your plan should be specific and clear in your mind visualize executing it yet have flexibility for unexpected changes. The *process* of planning is important: it prepares you, connects you to the here and now, and forces you to anticipate what might happen. Specific planning for a jump should begin about ten minutes prior to the jump, not earlier. If you fret for hours before a jump, you'll wear yourself out!

2. How to plan? First, learn to "read" a DZ. Locate the target, windsocks, flags, streamers, trees that reveal the wind, and so forth. Study terrain, note buildings and trees that will generate turbulence on particular approach windlines. Pace out the distance to prominent features, and note where an approximate 300' radius circle falls around the target. Study the DZ map, learn the cardinal headings (north, south, east, west), and talk to locals about typical wind patterns and exit points.

You've "read" the DZ now "read" the conditions. Observe low level clouds, cloud shadow movement, jump plane drift and speed over the ground, the wind streamer, canopies in the air, and surface wind indications. Next answer these three questions: A Where is the exit point? B. What is the average wind velocity around 1000 feet? C. What is the surface windline and velocity? These questions inherently break your plan into three segments:

A) Exit to your 1000' wind check

B) 1000' to the base leg & turn to final

C) Final Approach: from 300' to landing

3. Now, think through how you will fly each segment of your jump. For example, you might say to yourself:

"Exit to 1000': I will exit over the end of the runway, then face west while stowing my slider and adjusting my harness. I'll stay near the windline, practice sinks and stalls to get comfortable with my *Classic,* then position myself just upwind of the target to do my 1000' wind check. I expect to move forward steadily at 1/2 brakes, because the winds are only 2m/s.

"1000' to my turn to final: After the wind check, I will turn downwind and fly past the target at 600' up, offset 300' to the right side (left pattern) then turn base leg and play my turn to final to set up for 2m/s winds, at 250 feet back, 300 feet up.

"Final: No thermals on final expected, but if I do hit one, I will S turn to lose any extra altitude I gain, then continue my approach. Watch for left slide in the transition (having seen some recent jumpers slide left of the pad and reach right). Make it smooth and deliberate at the end . . . focus on the dot!"

Execution

Visualization: We go to school to learn to read and write, we go to a university for advanced studies, or a trade school to learn a technical skill, but nowhere do we go to school to learn to use our unconscious mind. Using the mind correctly is as important as learning the strategies and techniques of accuracy. An easy chair is the place to read and digest the contents of this manual. At the DZ, you can "draw pictures in the dirt," or verbalize your intentions outloud in your mind. But during the crucial last seconds of the jump, you must have mental imagery of yourself flying down to the pad, guiding your heel to the dot. You must see it happen in advance, frame by frame!

Programming: Pre programming yourself to handle expected conditions is a smart thing to do. Then, when it happens, you will react quickly and with assurance. When under canopy, fly your pattern for the winds you planned on, but with constant vigilance, knowing that conditions frequently change, that each jump is unique, and having confidence that you can and will negotiate the conditions however you find them.

Below 300 feet, your flying must become progressively less "rational" and increasingly more "intuitive." In aviation, we call it "seat of the pants" flying. Whatever you call it, the closer you get to the pad, the less time you have for "mind talk" (verbalizing your perceptions and the correct responses in your head), and the more you need to "just do it."

Below 100 feet, there is absolutely no time for mind talk! The conscious mind focuses on the goal (the yellow dot) allowing the unconscious mind to do the steering. Only experience will teach you the best responses to each situation, and early on you must learn to quiet your (verbal) mind, letting the unconscious mind learn to achieve success by trial and error.

Let your rational mind go to work after the jump, analyzing what went well and what can be improved. But avoid judgmental comments or harsh criticism if you miss the mark! Imagine how you would destroy a baby's learning process if you criticized her for falling down! A child learns to walk via trial and error, and no one criticizes the child for falling down. Don't you owe yourself the same kindness and respect, after missing the target?

What happens above 30 feet is not the most important part of *precision (* measured in centimeters) accuracy. What happens below 30 feet ~s. There **are many ways** to navigate your *Cl assic* into a workable short final position. Learn a method that works for you, and stick to it, so that you consistently arrive at the "transition point" (that 30' short final window above and behind the pad) in stable flight and ready to go to work, shifting into intense "fine focus" for your flight down to the dead center.

Starting Out

If you are new to the sport, you may have chosen the *Classic* because it is a great all around canopy, not for making precision accuracy landings. If so, you have chosen well: designed to operate in the slowest of flight regimes, the *Classic is* closer to the student canopies you have been flying than the fast, "high performance" canopies crowding today's market. And despite the draconian warnings we're required by law to present at the front of this manual, this canopy won't kill you if you make a simple mistake; the *Classic is* very docile, predictable, and forgiving.

With a reasonable 1Om/s (22mph) forward speed, the *Classic* also makes a terrific demo canopy very stable even in turbulent conditions, and capable of flying steeply down to a landing in the tightest imaginable spots, with a sink rate that will allow for easy stand up landings. That's the name of the demo game!

If you are new to the sport, and have chosen the *Classic* for its precision accuracy capability, you surely know it is the most advanced, state of the art accuracy canopy for the job. So what next? First of all, let us welcome you and invite you to join the small but enthusiastic community of accuracy jumpers here in the U.S. and Canada, or the large and very active community of accuracy jumpers in Europe and Asia. Now how to learn accuracy?

In Europe and Asia, there are many clubs that focus largely on accuracy, and in the summertime, there is a big accuracy meet every weekend in Europe. It shouldn't be too difficult to find a club that will welcome you to their fold. In the United States and Canada, learning accuracy is harder there are currently only a few "hot beds" of activity. As a norm, many DZs currently have nothing to offer you. So where to begin?

Eiff Aerodynamics suggests you begin by contacting ISSA, the International School of Style & Accuracy. Jim Hayhurst, Director of ISSA, will be glad to put you in contact with the nearest "accuracy friendly" DZ. ISSA also conducts seminars at several locations throughout the year, and hosts the "Arizona Classic" and other meets. You can write to ISSA at: 1405 Parkview Dr., Allison Park, PA 15101. E mail: 70774,1146@Compuserve.com

Precision accuracy is a lot like golf. The two games are remarkably similar; both are congenial games, played in a social milieu, yet both require intense focus and concentration. "Par" in accuracy is about one centimeter per jump, if you land on the 5cm dead center electronic pad. When you start, just landing on the 16cm radius pad is a ambitious goal, like shooting 15 over par (high eighties) in golf. So you may want to set a more attainable goa l at first, like breaking 100 in golf. Ten jumps in a row landed inside a 10 meter circle would be an attainable standard for a new A license parachutist jumping a *Classic*.

Using the instruction offered in this manual, and jumping at your home DZ without any coaching, you will probably achieve the "10 ~ lOm" standard in less than 100 jumps. Attend one of the ISSA seminars, and you'll become proficient much faster. There are already some videos on basic canopy control available; ISSA will release its own video in late 1996, along with a book by Jim Hayhurst, *Competition Style & Accuracy*.

If you decide to get serious about accuracy, you'll want to train at DZs that support precision accuracy, and have resources (people, equipment, airplanes) you'll require. Contact ISSA to learn if a DZ near you can offer you a good training environment. You have to go where accuracy is done, and jump with top jumpers. Watch and ask questions, get critiques, both verbal and video. You'll want to develop a training plan and set some goals, goals that will bring you personal satisfaction, and are within grasp.

Here is an example of an ambitious yet achievable set of accuracy goals, if you are training with a *Classic*:

1	10 jumps inside 10 meters	@	100 jumps
2	10 jumps inside 5 meters	@	300 jumps
3	10 jumps with a 15cm average	@	500 jumps
4	10 jumps with a 7cm average	@	700 jumps
5	10 jumps with a 4cm average	@	900 jumps
6	10 jumps with a 1cm average	@	1000+jumps

Everyone has a unique set of life circumstances; the one common denominator among fine accuracy jumpers is commitment. You have to share your commitment with loved ones, and keep work, family, and other priorities in mind as you embark on a training program. You'll always do better if you set realistic goals, and keep your life in balance. If you can, plan to attend at least one intensive 10 day training camp a year. You'll elevate your game quickly at a camp, and then you can maintain with weekend jumping at home. You need to compete, too to measure progress.

Success in competition comes from making each practice jump at a high level of concentration, with the same intensity and focus as if it was a competition jump for "all the marbles." In competition, jump as you do in practice no more, no less. As much as possible, a competition jump should be "just another jump," with no more inherent value or importance than a training jump. Make each accuracy jump the jump of your life, and you'll find that competition holds no terror for you.

Ultimately, accuracy is a game, a form of play, not too far removed from the playground of your childhood. (Which, by the way, is not a bad place to practice your foot placement.) Keep it in perspective, wish your fellow competitor only the best, and let each competition be an opportunity to grow. Good jumping!

Selecting the Right Canopy

Wing Loading

A *Classic* can be safely jumped at a wing loading as low a 0.50 pounds per square foot (.50 lbs/sq ft) and as high as 0.90 pounds per square foot (.90 lbs/sq ft). The desired wing loading range for accuracy is 0.65 to 0.75 lbs/sq ft, and the optimum wing loading for accuracy is 0.70 lbs/sq ft.

The table below shows the recommended size *Classic* for use in the precision accuracy event, based on the weight of a jumper fully geared (ready to climb into the aircraft). Subtract about 30 lbs (14 kilo) from the weight shown in the table to compare your body weight to the recommended canopy size.

Unusually light or heavy jumpers will find they fall outside the recommended accuracy wing loading range. The *Classic* will perform very well for non competitive purposes at weights within the safe min/max range. (* = This size available in lg97)

Fully Equipped Weight:

Kilos	Pounds	Size
65	143	218
66	145	218
67	147	218
68	150	218
69	152	218
70	154	218
71	156	218
72	158	218
73	161	238
74	163	238
75	165	238
76	167	238
77	169	238

78	172	238
79	174	259
80	176	259
81	178	259
82	180	259
83	183	259
84	185	259
85	187	270
86	189	270
87	191	270
88	194	270
89	196	281
96	211	304
97	213	304
98	216	304
99	218	304
100	220	304
101	222	304
102	224	304
103	227	304
104	229	304

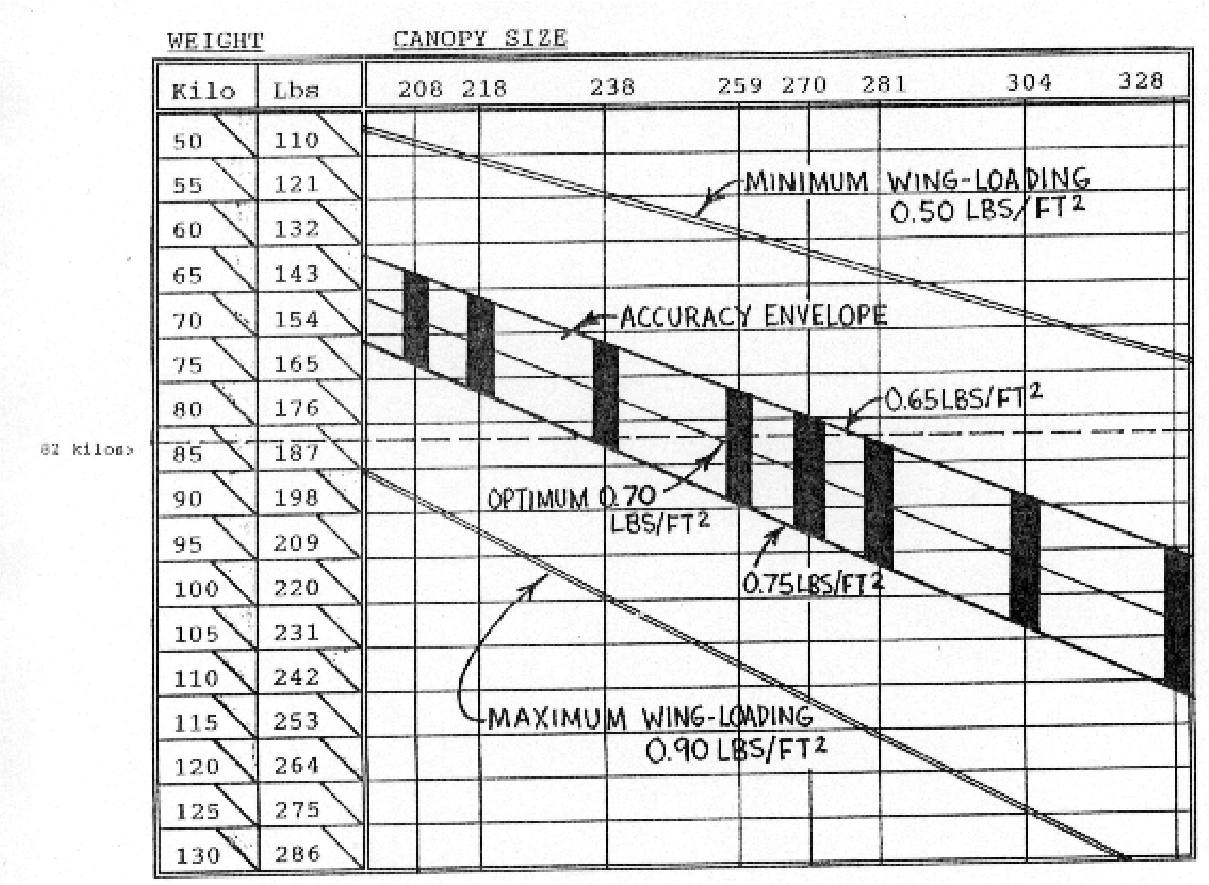
Note: See the graph, next page, for further guidance.

Choosing the right sized canopy for the accuracy event is part science, part art. Many personal factors can drive your decision. The wing loading table on the previous page is a good place to start. The recommended sizes are based on experience in the field with a wide cross section of accuracy jumpers.

Another way to evaluate the right sized *Classic* for you is the graph **below.** Find your weight on the left margin, and draw a straight horizontal line across the graph.

Study where your line intercepts the "heart of the envelope" for one of the canopy sizes . That’s probably the correct size for you.

For example: You weigh 68 kilos, or 150 lbs, "dripping wet" out of the shower. To enter the graph, add 14 kilos, or 30 lbs, for your gear: 68 + 14 = 82 kilos, or 180 lbs. Now draw a horizontal line across the graph. It most nearly crosses the "heart" of the optimum wing loading for a 259 sized *Classic*.



Risers, Toggles & Sliders

Risers

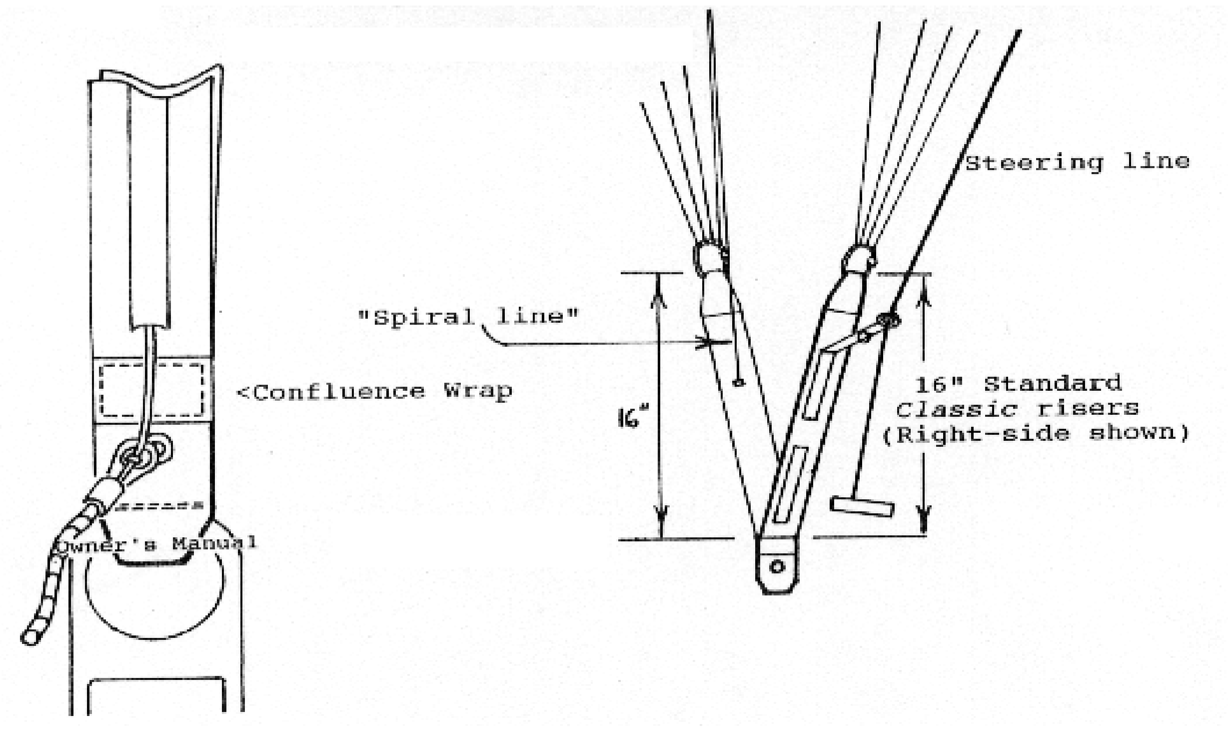
The angle of incidence of a canopy is set by the suspension geometry (we often call it the "line program") as measured from the bottom of the canopy, through the keel or flare, including lines, connector links and risers, down to the "node" point of the risers that is, to the point where the risers "split" into front and back risers, just above the 3 ring confluence wrap.

The suspension geometry of the *Classic* is based on 16 inch (40 cm) risers, measured from the top of the riser to the top of the confluence wrap. If you use longer risers, the center of gravity will move forward. The canopy will fly more nose down, and will be more difficult to stop. If you use shorter risers, the center of gravity will move aft. The canopy will fly more nose up, stalling with less brake deflection.

Risers are considered part of the harness, and are provided by your harness/container manufacturer. Therein lies a potential problem. If your system comes with very long (20") or very short (12") risers, your *Classic* will not fly as designed. The maximum variance from the 16" riser length figured into your *Classic* line program is plus or minus 2 inches (+/ 5cm).

This means you can use a riser as long as 18" or as short as 14" and it shouldn't significantly degrade your performance. But to get the optimum performance, you'll want to use a 16" **riser.** Your harness/container manufacturer may build risers in various sizes, or a master rigger can modify your existing risers, or you can purchase factory standard 16" risers from Eiff Aerodynamics.

Figure 6 - *Classic* Risers:



Referring to Figure 6, note that the steering ring is mounted on a third, "flying" mini riser. Many accuracy jumpers believe this geometry provides a superior feel for the canopy. How much this mini riser "flies" off the main rear riser can be adjusted, simply by sewing it down progressively higher on the main riser, up to just below the ring itself. Typically, the mini riser is between 4" and 8" long, and may extend beyond the connector link, depending on the riser length and your reach.

Please keep in mind that any canopy, including the *Classic*, is sold "links up." The risers, deployment bag, bridle and pilot chute must be compatible with the container system you jump, and must comply with the manufacturer's instructions. Check with a FAA rigger before you install any risers or other components that are not original equipment on your system.

Toggles

Steering toggles is an oft debated issue, one that boils down to personal preference. If you have jumped soft toggles all your life, it may be difficult to switch over to hard toggles, but you should try. One reason is that soft toggles require a deployment brake "cat's eye" to be sewn into the steering line, usually at 12" to 16" up the steering line from the soft loop steering handle right where you will feel it "bump" against the steering ring again and again, as you maneuver your *Classic* at 40% to 80% brakes on the final approach phase of flight.

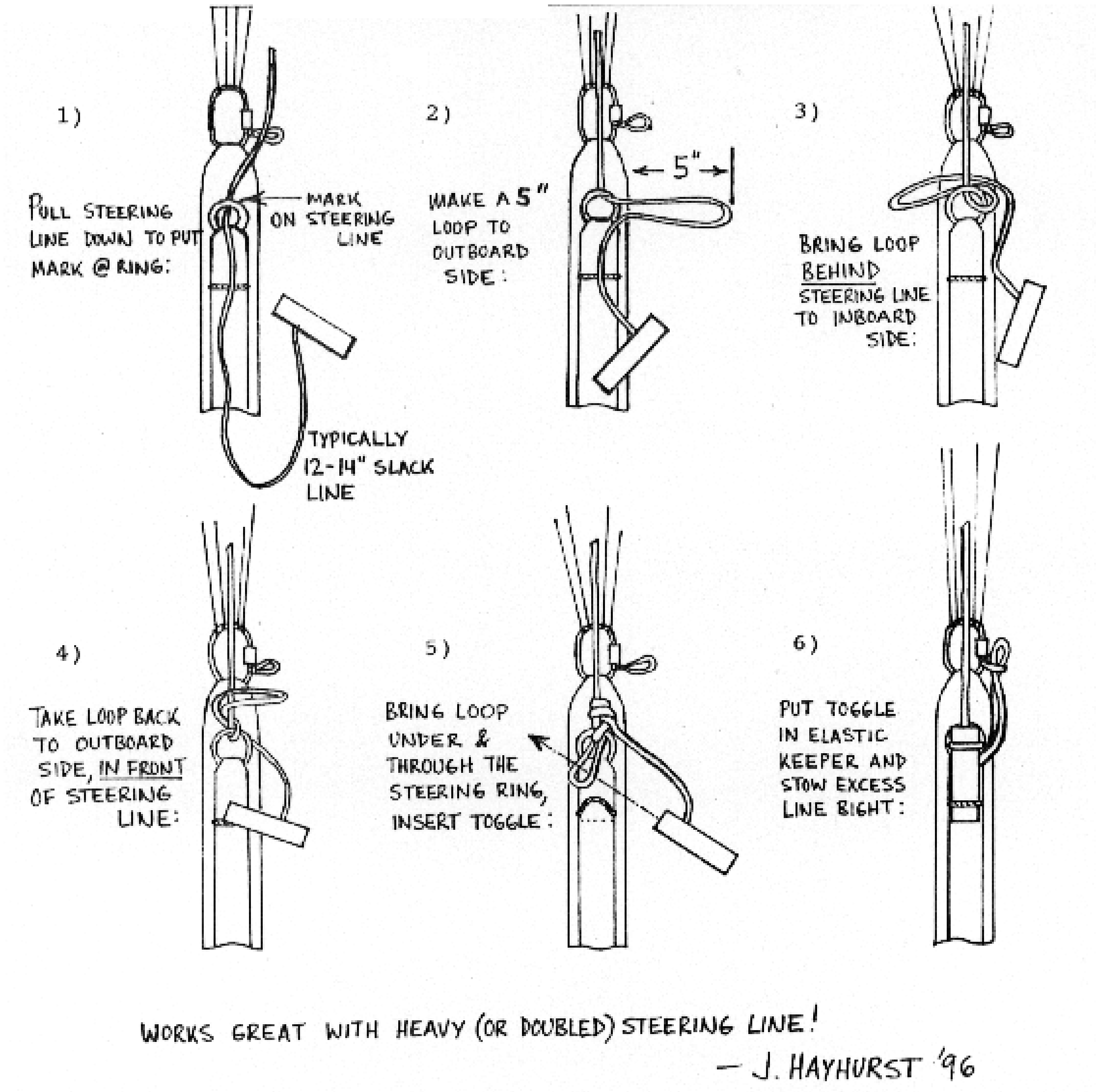
Deployment "lanyards" can be sewn into the steering line far enough up that they won't foul on the steering rings, enabling you to use soft toggles (or for that matter, hard toggles) but this is not a standard feature and you will have to request it.

By far, the most common toggle used by *Classic* pilots is the hard toggle, and many use one with a slightly offset hole, which positions the steering line to emerge comfortably between the index and middle finger, and tilts the hands "thumb high" while in brakes, a more **ergonomically** efficient position.

A custom designed hard toggle with offset steering line hole is available as an accessory from Eiff Aerodynamics. Assuming you use it, or a similar hard toggle, we strongly recommend you learn to use the "Justin Schilling" knot to set your deployment brakes. Find a *Classic* pilot to show you the knot. It is far superior to "daisy chaining," especially if you use 1'doubled" or other heavy weight steering lines. The sequence of tying the knot is shown on the following page, figure 7.

Once again, remember that whatever toggle and deployment brake system you pick, make certain your rigger has inspected it, that it is compatible with the harness/container manufacturer's design and meets all instructions supplied by the manufacturer!

Figure 7 - The "Justin Schillinq" knot



Justin Schilling was on the U.S. Team in 1982, '84 & '86 a superb athlete and a great sportsman. Thanks, Justin!

Sliders

The *Classic* comes with a large D ring slider. This gives the canopy a comfortable opening shock, even at style airspeeds, and allows you to pull the slider down over the risers and stow it behind your head (less flapping and better forward speed). Once the canopy is open, you may find that you have to reach up and grasp the rear risers at the top, pumping the slider down the final few feet to the top of the risers.

Putting your hands up on the rear risers after opening is a good habit to get into it allows you to make a quick rear riser turn to avoid any canopy that threatens your airspace. (Yes, you can jump your *Classic* on relative work jumps!) Once you have the slider down, leave the deployment brakes set while you make your accuracy "nest" (adjust your harness, stow goggles, etc.).

Now release the toggles, push them up through the D rings, and pull the slider down the risers to eye level. Grasping the center of the slider in front of your face with both hands, twist it with a forward "wringing" motion into a tight roll, then stow it behind your head. Now you are ready to shoot some accuracy!

If accuracy is not your game, and you chose the *Classic* because it is a safe and delightful alternative to high speed canopies, and because it makes a great demo canopy, then you may not want to bother with a big D ring slider. A standard or split slider with stainless steel grommets is available as an option. The same goes for all the "serious accuracy" features that are standard on the *Classic if* they don't suit your needs, if you want spectra lines, soft toggles, a split slider and 1" risers, Eiff Aerodynamics will be glad to set up your canopy that way!

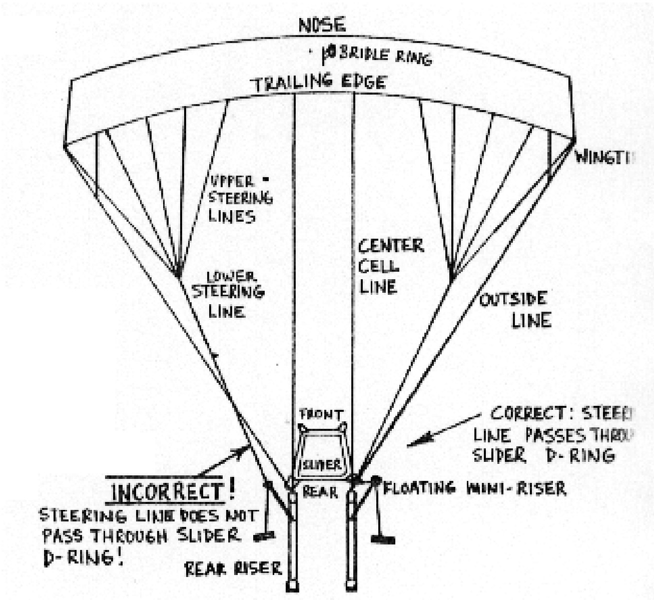
Pack Volume & Weight Table

Canopy Size	**Volume (Cubic Inches)**	**Weight (lbs)**
218	625	9.50
238	655	9.75
259	695	10.00
270	725	10.15
281	750	10.25
304	775	10.50

Assembling & Packing the *Classic*

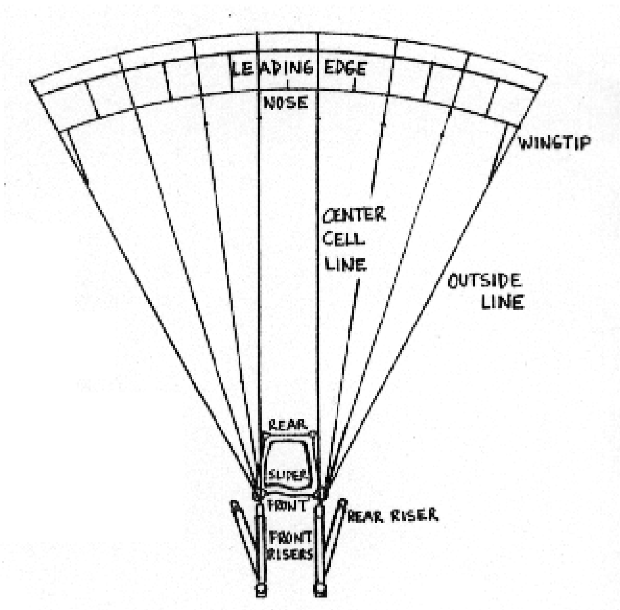
Lay your *Classic* on a clean surface with the leading edge , (nose) facing the floor, and the trailing edge (tail) on the top. Locate the rear connector links. Fasten these to the rear risers. The outside line (goes to wingtip) should be on the outboard side of the link, and the center cell line should be on the inboard side of the link. No lines should cross each other.

The slider should already be on the lines, properly oriented. If you are not sure of this, have a rigger check it out. With the slider on correctly, thread the steering line through the slider D-ring (or grommet), then thread it through the steering ring on the rear riser, and tie off your toggloes securely on the lowest mark on the lower steering line.



Turn the parachute over so the leading edge (nose) is face up, and the front risers are facing up, with no twists in the rear lines. Locate the front connector links and fasten them to the front risers. The outside lines (go to the wingtips) must go to the outboard side of the link, and the center cell lines must go to the inboard side of the link. No lines should cross over any others.

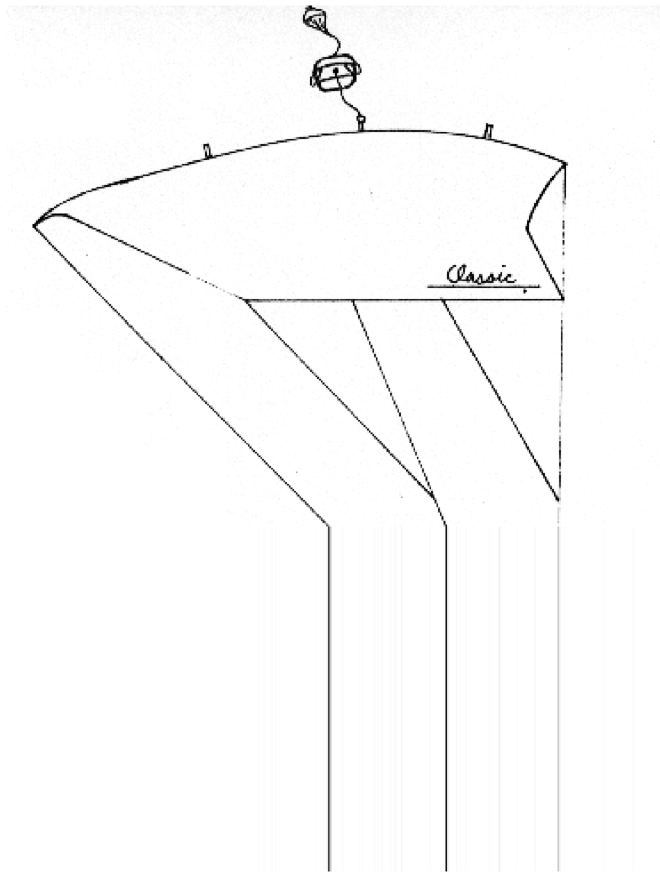
Read the harness/container manufacturer's instructions and make sure you have complied with any unique requirements.

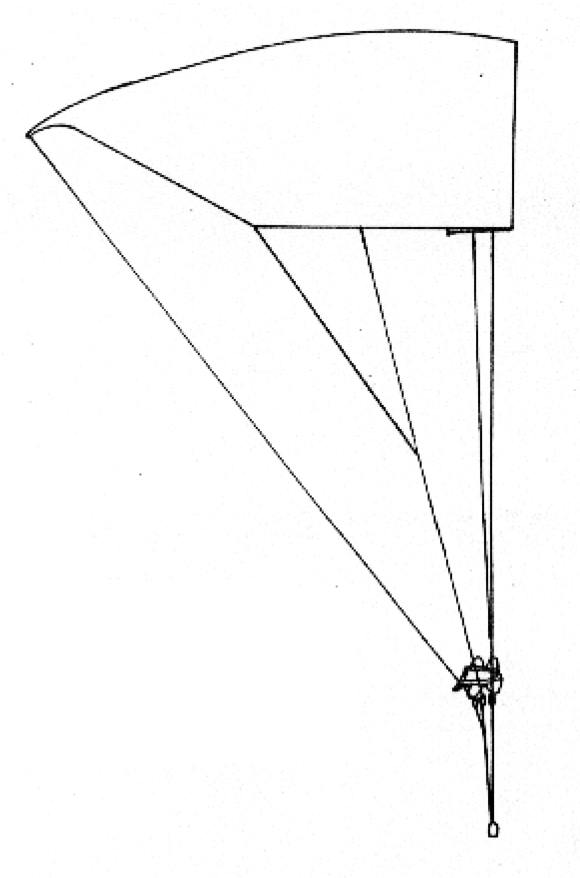
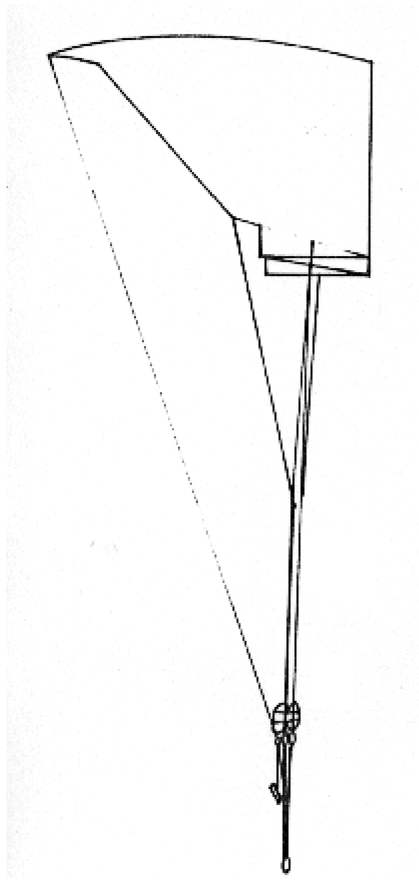


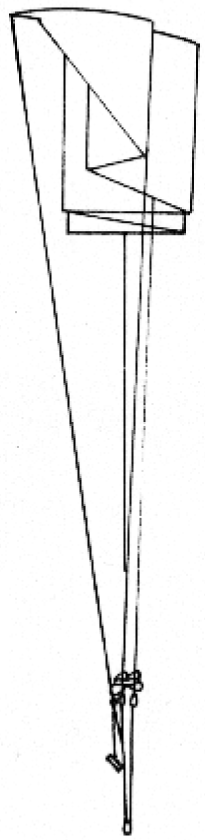
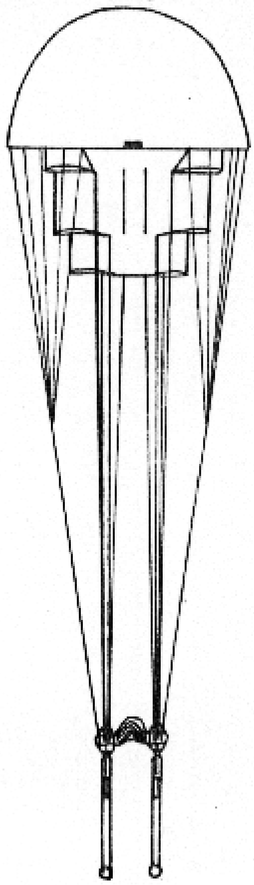
We recommend you take your *Classic* outside in a breeze and inflate it at this point. Make sure you have "continuity": the lines are straight, with no twists or crossing of any kind. If in doubt, check with your rigger. When you are certain your canopy is mated to the harness correctly, use a wrench and carefully tighten the connector links. The barrel should thread snugly against the barrel stop, then tighten one quarter turn more DO NOT OVERTIGHTEN! Over tightening the connector links can strip the threads or crack the barrel. Inspect each link carefully for signs of damage which could reduce structural integrity.

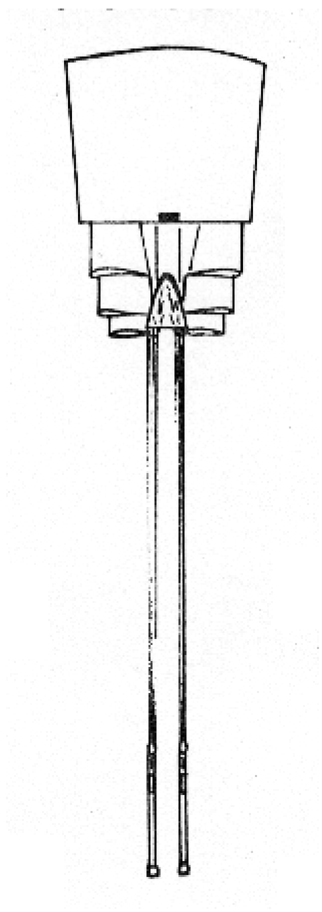
Install your bag, bridle, and pilot chute, using the bridle attachment ring on the top of the center cell. Attach the risers to the harness/container in accordance with the manufacturer's instructions.

Pull the slider down by the connector links. Using the packing tabs, flake the canopy and lay it on the left side. Be sure all the lines are taut. Fold the nose back on top of the canopy approximately 10 inches as shown. You can vary the amount of fold to tailor your openings. More than two folds may cause excessively long (sniveling) openings.

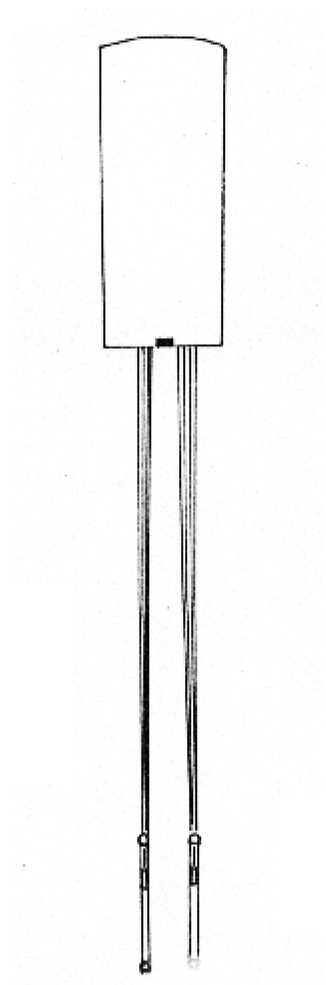


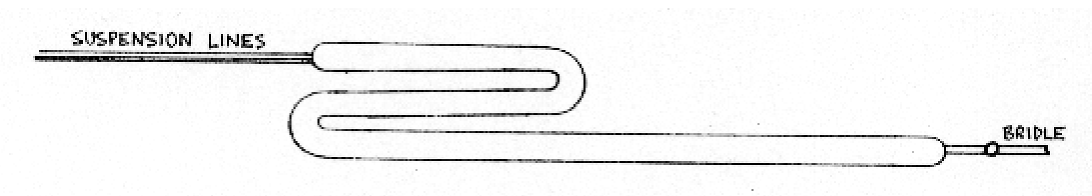
Grab the "B" line group at the top of the canopy and place it on top of the "A" line group. Be sure to keep tension on the line groups while packing to keep the lines straight.	
Fold the "C" line group on top of the A & B groups. Keep tension on all lines.	

Fold "D" line group on top of A/B/C groups, being sure to keep lines taut.	
Split the tail of the canopy in the center as shown, so the right and left steering lines are on either side. Clear the wingtips on both sides. Leave them out for normal openings; fold them for slower openings on high speed jumps. Set the deployment brake lines according to the manufacturer's instructions. (See figure 7 on page 23.) If you are jumping a canopy with deployment brake lanyards, bring them down through the slider D ring and then through the steering ring on your riser. Be sure this line does not wrap around any other line. Insert the toggle through the lanyard loop and stow the toggle on the riser. Stow excess steering line in a rubber band on the connector link.	

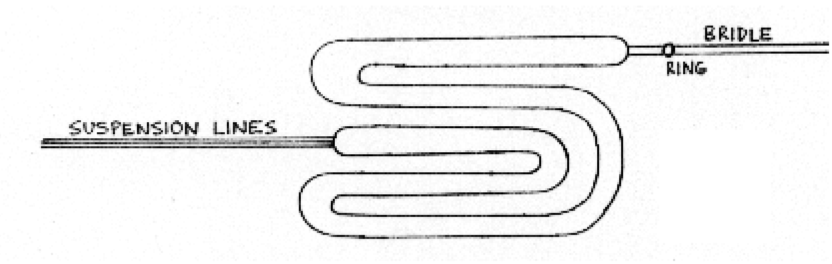
Flakes the tail on either side so the center cell remains in the middle. Be sure to keep all steering lines taut. Pull the slider up to the skirt of the canopy until it rests against the stops.	

Bring the center of the tail down so it is even with the bottom of the canopy. Cocoon the tail to bag width.

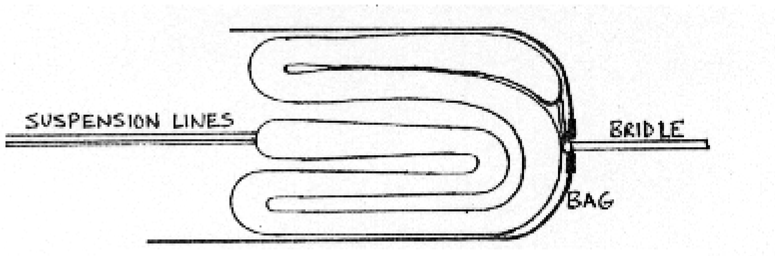




Grab the lines near the slider and make one stack as shown above, keeping the D rings and slider in the same relative position. The fold should be about 2/3rds of the length (mouth to grommet) of the bag.



Grab the top portion of the canopy and fold it over on top of the previous stack.

 Insert the stacked canopy into the bag. Be sure the bridle is pulled snugly so that the ring on top of the canopy can be seen against the grommet at the top of the bag, and the area is free of any fabric.
Proceed packing according to the container manufacturer's instructions. **Close Page**

Care & Maintenance

Preflight Inspection

Before jumping your *Classic*, inspect these items, working from top to bottom:

Bridle Attachment Point	Check the integrity of the ring, bridle, bridle attachment to canopy, and surrounding seams and reinforcement tapes in the area.
Canopy	Free from holes, rips, or snags. Check exposed seams and reinforcement tapes, look for stitch rows that have snagged or been broken.
Slider Stops	Missing or excessively worn stops can allow the slider D ring to rise over the stop during opening sequence, which locks the slider to the canopy. A guaranteed malfunction.
Suspension Lines	Check for frays or cuts. Check the cascade points. Pay special attention to the line attachment points on the canopy and connector links.
Slider	Check the fabric for tears, broken stitch rows, or loose reinforcement tape. Check the D rings (or grommets) for damage, and that they are securely in place.
Connector Links	Must be secure and undamaged. Check the barrels are not split, or the threads stripped. It is important to check these frequently.
Lower Steering Lines	Check for wear or damage, the toggle securely tied off. If a deployment brake lanyard is installed check the attachment point stitching and general condition.

Risers	Check the steering guide ring and "mini" riser for wear or damage. Check the toggle keepers are in good condition. Refer to your harness/container manufacturer's riser inspection checklist. 3 ring releases are crucial components and require frequent inspection and lubrication!

Care

A few simple precautions will save you costly repairs and prolong the life of your *Classic*:

Pick It Up	Don't drag your canopy from the landing spot to the packing area. Don't subject your canopy to abrasion or contamination with harmful substances on the ground.
Avoid the Sun	Ultra Violet radiation is damaging to nylon. Keep your canopy out of the sun as much as possible.
Keep it Dry	Don't wash your canopy; don't intentionally let your canopy get wet. If it does get wet, hang it to dry away from sunlight. Store your Classic in a cool, dry place.