

**Atair**  
canopies



# Radical

## Canopy User Manual

Version 1.0 – January 2006

**Disclaimer:**

The following information must be read and understood before any use of this equipment.

The user knows the risks of skydiving and accepts that:

Skydiving causes deaths and serious injuries. Many of these deaths and injuries can be attributed to equipment malfunctions. Skydiving equipment can fail, even if the user takes all possible precautions.

Failure to open the main or reserve parachute (or to follow emergency procedures) at a safe altitude, and/or equipment failures can result in severe injury or death.

It is the user's responsibility to:

- Receive proper training before any use of all skydiving equipment.
- Be extremely careful and cautious.
- Read and understand all owner's and operations manuals for all skydiving equipment.
- Check all skydiving equipment and replace any defective or worn component prior to use.
- Review emergency procedures before each use of this and all skydiving equipment.
- Check equipment warnings - do not exceed equipment limitations.
- Never violate the training and experience requirements for the specific equipment in use.

Because of the unavoidable dangers involved in the use of this and all parachute equipment, Atair (including, but not limited to, all owners, officers, staff and employees) makes no warranties of any kind, expressed or implied. It is sold with all faults and without any warranty of fitness for any purpose. By using this equipment or allowing it to be used by others, owner/buyer waives any liability of Atair for personal injuries, death or damages from such use. Any promises or representations inconsistent with, or in addition to, this statement of warranty are not authorized by Atair and shall be not binding.

Skydiving is a high-risk activity, which may cause or result in serious injury or death.

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Dear Valued Customer,

We'd like to thank you for purchasing a new Atair Canopy. We're confident you'll be pleased with it in every way and that you'll enjoy how it opens, flies and lands.

We ask you and your rigger to carefully inspect your new canopy to completely familiarise yourself with its features and the quality workmanship. Should you find anything that does not seem right or if you have any questions please don't hesitate to contact us.

Thank you again for selecting an Atair canopy. With proper care it should last many years and hundreds of jumps.

Blue Skies!

Stane Krajnc  
The Atair Canopies Team

**CAUTION!** : Please read this manual regardless of your skydiving experience or how many jumps you have.

## **Read Before Assembly or Use**

Since parachutes are manufactured and inspected by people, there is always the possibility this parachute contains defects as a result of human error. Therefore, the entire parachute system – main and reserve canopies, harness, container, and other components – must be thoroughly inspected before their use and before each subsequent use.

Parachutes get weaker over time for a number of reasons. They receive wear during packing, deployment and landing. Exposure to many agents, including sunlight, heat and household chemicals, significantly weaken parachutes. The damage may or may not be obvious.

To help minimize the risk of parachute failure and possible serious injury or death, the entire parachute system should be thoroughly inspected at least every 120 days or 50 jumps, whichever comes first. It should be immediately inspected if at any time it is exposed to a degrading element, unusually hard opening, or at any time damage may be suspected.

Remember that some chemicals will continue to degrade the parachute long after their initial exposure. Regular and thorough inspections are necessary to insure structural integrity, reliability, and flight characteristics of the system are maintained.

Always know the entire life history of every part of your parachute system. That way you'll know no part has been exposed to an element that may seriously weaken or damage it.

## **Section 1: How to use this manual**

We know you are excited to receive your new canopy and will most likely be packing it now as you read this manual.

But please take time to read this manual completely, regardless of your experience level!

You will learn about:

How to assemble, pack and safely use your:

The great new features of your:

How to get the most out of your:

How to take care of your:

# R a d i c a l

### **WARNING**

#### **ATAIR RADICAL CANOPY - USER MANUAL**

This manual is **not** a course of instruction on how to make a parachute jump, nor does it contain regulations that govern sport parachuting and related activities.

## **Section 2: Introducing Atair**

<http://www.Atair.si>

Atair was founded in 1992 by Stane Krajnc and his wife Magdalena in Slovenia. With a strong background in paragliding design, Atair was formed to supply the paragliding industry with reserve canopies. With a strong passion for both paragliding and skydiving, Atair naturally dedicated their resources to developing new technological advances in Skydiving and BASE canopies. Atair manufactures over 650 main and reserve canopies in house per year. To date Atair has manufactured over 12,000 rounds and 4500 skydiving mains & reserves.

In the past, Atair canopies have been sold through private labelling (Alpha, Ace, Viper, Impulse, Space, etc.). Now all of the Atair products are available directly from Atair.

Stane Krajnc, the owner of Atair has been involved in air sports for the past 30 years. In 1973 Stane designed, constructed and flew his own hang glider. He has now accumulated thousands of hours on hang gliders & paragliders, 700 skydives and over 300 BASE jumps.

Atair does not only make canopies for skydiving and BASE jumping, recent special projects have included:

- Specialised large canopies, for cargo applications
- Drag chute for a speed skiing world record
- Special low glide ratio canopy for a cave BASE jump

### **Section 3: Features of your Radical Canopy**

Atair is proud to introduce the Radical canopy.



The Radical is a state of the art high performance elliptical 9-cell canopy that has been designed for experienced canopy pilots. The Radical is a delight to fly with soft openings, excellent speed range, low front riser pressure, gradual recovery arc and long powerful flare. The Radical is excellent for swooping but can also be flown conservatively and lands easily even on straight in approaches with out using front risers. High grade zero porosity fabric and top class manufacturing guarantee a canopy that performs excellently and will keep doing so for many hundreds of flights.

#### **Mission of the Radical Canopy**

A High Performance Elliptical Canopy that has:

- Atair 2-stage deployment technology- consistent soft on heading openings
- Excellent flare power
- Low front riser pressure
- Responsive to goggle turns
- A gradual recovery arc for high performance landings

#### **Features of the Radical**

- Optimised design created using specialised CAD software
- High quality long lasting ZP material
- Vectran lines
- First class production quality
- Special slider design to further improve opening consistency
- Elliptical leading edge and tapered trailing edge



## **Section 4: Recommended Sizing & Wing loading**

The **Radical** is available in six precisely scaled sizes: (Note – Atair measures surface area by measuring the span x chord of the bottom skin. Stane Krajnc, the designer of the Radical feels that this measurement best represents a flying canopy)

- \* 95 ft.<sup>2</sup> = PIA spec 100 ft.<sup>2</sup>
- \* 100 ft.<sup>2</sup> = PIA spec 105 ft.<sup>2</sup>
- \* 105 ft.<sup>2</sup> = PIA spec 110 ft.<sup>2</sup>
- \* 120 ft.<sup>2</sup> = PIA spec 130 ft.<sup>2</sup>
- \* 135 ft.<sup>2</sup> = PIA spec 145 ft.<sup>2</sup>
- \* 150 ft.<sup>2</sup> = PIA spec 160 ft.<sup>2</sup>

### **Radical Canopy Specifications:**

<b>Model</b>	<b>95</b>	<b>100</b>	<b>105</b>	<b>120</b>	<b>135</b>	<b>150</b>
<b>Number of Cells</b>	9	9	9	9	9	9
<b>Min Suspend weight kg</b>	50	55	60	65	75	85
<b>Max Suspend weight kg</b>	75	80	85	95	100	105
<b>Pack Volume in<sup>3</sup></b>	225	245	265	300	330	335
<b>Projected Surface area m<sup>2</sup></b>	8,8	9,3	9,8	11	12,6	14
<b>Inflated Surface area m<sup>2</sup></b>	7,7	8,1	8,5	9,6	11	12,2

### **Section 4.1: Picking the Right Canopy**

It is important for your safety and enjoyment that you match your canopy with your ability and weight. Our canopies are built in several models that span a wide range of canopy surface area. Any canopy's decent rate and forward speed increases as the weight it is carrying - the so-called suspended weight – increases. The canopy also becomes more responsive as forward speed increases. It also reacts more radically when it is stalled or turned.

Because of these aerodynamic facts, it is unsafe to put too much weight under any particular canopy. Safe and comfortable landings will be difficult to obtain, even for experienced jumpers under ideal conditions. Less experienced jumpers will have an even harder time and be at greater risk.

Determining the “wing loading” of the parachute you intend to jump or buy is a good guide to matching your weight to a particular canopy.

Wing loading is easily calculated by dividing the total suspended weight in pounds by the surface area of the canopy in square feet. Total suspended weight is the weight of the jumper plus all his clothing and gear – including the main parachute itself.

The surface area of our canopies is printed on the data panel, on the centre rib, or on the centre cell top surface near the tail. (Be sure to actually check the data panel – canopies of different sizes may be the same.)

A typical skydiving rig weighs 20 – 30 lb. Add this, plus the weight of your jumpsuit, clothing and accessories to your body weight to get the total suspended weight.

For example, a jumper who weighs 165 lb with his jumpsuit on and who jumps a packed rig that weighs 25 lb would have a suspended weight of 190 lb.

Here's an example of how to calculate wing loading of a 210 sq.ft. canopy and the jumper used in the example above:

$$190 \text{ lb} / 210 \text{ sq. ft} = 0.9 \text{ lb} / \text{sq. ft.}$$

Calculate the wing loading now for the canopy you intend to jump.

If this figure is below 0.9 the parachute will be relatively docile and easy to land. It will also have reduced penetration into the wind.

If this figure is between 0.9 and 1.2 the canopy will turn fast and have high forward speed. It will require skill to land well in many weather conditions or at high altitudes. Be sure your skill level is up to the demands of this wing loading.

If the wing loading is greater than 1.2 lb / sq. ft. you are exposing yourself to a dangerous situation. Turn rates, forward speed and rate of descent will all be very high. Control range may be very short with stalls happening very abruptly with little warning. Normal landing techniques may not work. Extra speed on approach to landing may be required to get enough flare to stop your rate of descent. Therefore, a double front riser approach, or front riser turn may be required, either of which are very dangerous.

We do not recommend that anyone jump a canopy that will result in the wing loading exceeding 1.2 lb. / sq. ft.

It also is useful to compare the wing loading of a canopy you intend to jump with the wing loading values of parachutes you've been jumping. If the difference is great, you should expect the new canopy to perform very differently than the ones you've jumped before.

Such introductory jumps will help you discover what makes your canopy respond violently. The canopy will let you know that it is about to do something violent by its "feel". You must be experienced in these flight modes to know what it is telling you.

Knowing this will help you avoid these situations close to the ground when they can be quite dangerous.

## **Section 5: Atair 2 Stage Opening Technology**

### 2 Stage Openings Explained

Atair canopies are designed to deploy in multiple stages. If you are not jumping an Atair canopy, you are used to single stage deployments. It is important that you read this to understand what to expect, and how to operate your Atair canopy through its unique multiple stage deployment.

Once our canopy is deployed from the bag, the 3 center cells will inflate. The ribs 4 lines from each side are substantially solid with no cross-ports. This prevents the air hitting the nose from inflating the outer cells. The slider is in the up position at this point and will prevent the outer cells from catching air and inflating. The 3 center cells are only slightly wider than the slider, so the force on the lines to push the slider down is low compared to a conventional canopy. The deployment process will pause in this position for a few seconds. The 3 center cells will decelerate you until the force pushing the slider down overcomes the wind pushing it up. Once the slider has moved substantially down the end cells are free to catch air and inflate for stage 2.

**How to operate:** Once you deploy your pilot chute, stage 1 will occur right away. The canopy will not snivel. The 3 center cells will inflate and you will feel light "opening force" that will pull you vertical in your harness. Keeping your weight symmetrical in your harness tilt your head evenly back and look at the canopy. You will see 3 center cells, square, stable and on heading, with the slider up. Stage 2, after a pause (exact timing of pause depends on airspeed and loading), you will see the slider move and the end cells deploy.

If you place your weight unevenly in your harness during the pause between stage 1 and 2 your canopy will deploy in a slow turn (not a spin) in the direction you leaned. This may happen often when you first are getting used to 2 stage deployments. Simply correct the turn by either shifting weight in your harness, or with your risers, or with your toggles. If you are lightly loaded or you deploy with a turn you may have end cell closure on one side. This will look as if the nose on 2 outer cells is tucked slightly under the canopy. This is nothing to worry about, simply perform a slow deep flare. When the canopy nears a stall the end cells will pop out and inflate. Quick short pumping of your toggles will not inflate closed end cells.

We recommend a straight pro-pack, leaving the nose in the middle of the pack job and to roll the tail tight. Rolling the nose is unnecessary; although some sky-surfers who deploy in stand positions at higher speeds, like to roll the nose symmetrically towards the center cell. Deployment height depends on airspeed and loading but is typically in the range of 800'-1000'. Rolling the nose can increase that height required for deployment.

### Why 2 stage openings?

The way a skydiving canopy deploys was designed decades ago, RW flying was the norm. Conventional main canopies are designed for maximum deployment speeds of 120 knots. Now since the advent of free flying, skydivers are substantially exceeding the design criteria of their canopies. Most free flyers do not deploy at 120 but rather at 140 and sometimes above. Atair's development of the 2 stage opening (patent pending) was created out of this necessity in our changing sport. Other canopy manufacturers have left this call unanswered and forced most jumpers to exceed the design limitations of their equipment. Atair has developed the 2 stage openings to create canopies that have lower opening force to your body and are safe to deploy at the higher speeds free flyers are practicing.

(NOTE: in the last 2 years, since Atair has been advertising higher speed ratings, many manufacturers have increased their placarded max speed listed on their canopies. It is important to note that this is not because they have redesigned or tested for higher speed safety of the jumper. The listed number is only a statement as to a max speed for canopy survival, not jumper survival. A fully functional canopy does you little good if your neck broke on opening.)

When skydiving there is always the risk of a premature deployment. At free fly speeds with conventional canopies you risk the serious possibility of severe injury or death from a premature deployment. The opening force can simply break your neck. With a 2 stage deployment Atair canopy, the 3 inflated center cells deployed in stage 1 will tend to decelerate the jumper until the air speed is low enough for the second stage to deploy the remaining 6 outer cells. This significantly lowers the opening force applied to the jumper and reduces potential harm in the event of a premature deployment.

The other safety advantage is that 2 stage deployments greatly eliminate the tendency of elliptical canopies to spin on deployment. A conventional canopy during deployment will inflate from the center cells out to the end cells, this will happen before the slider can fully move down. As a result of the lines running through the slider compressing the canopy, the leading edge of the canopy is not straight but rather snakes in an unstable manner until the slider is fully down. This violent movement of the leading edge will cause off-heading openings and frequently spins. With 2 stage openings the leading edge opens in stages, maintaining a straight non-snaking profile, ensuring a safer opening.

## **Section 6: Setting Up Your Radical Canopy**

**Assembly:** Do not assemble your canopy yourself unless you have the ability, if not, have this done by a qualified rigger. This operation must be done by a qualified person in accordance with the specific rules of each country.

Before installation, the canopy must be inspected and checked. Installation and packing implies that the canopy, its components and accessories are all in perfect condition and are totally airworthy.

### **List of Components**

- Canopy, lines and connector links
- Collapsible Slider

### **Attaching to risers, checking continuity**



Figure 1: Risers Left Rear Left Front Right Front Right Rear

Remember that each connector link has to show continuity from the lines to the canopy. Check each one for proper assembly. Each of the links will have five cascading lines. The two steering lines each cascade into four.

Once you have orientated the lines properly on the connector links, inspect them. Attach each connector link to the corresponding riser as shown in figures 1-7. Fingertighten all 4 connector links. Then apply a  $\frac{1}{4}$  turn with a wrench. Do not over tighten as this can strip or crack the link and cause it to fail. Slide the slider bumpers (covers) over the links.

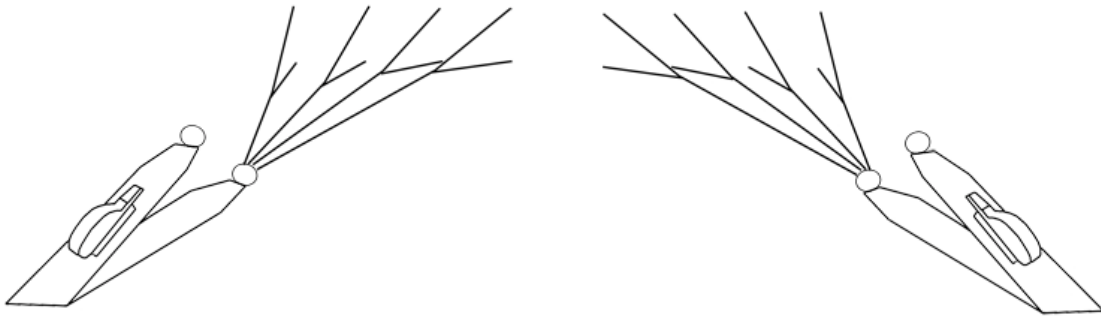


Figure 2: Correct attachment of front line sets to the front risers



Figure 3: Correct attachment of the rear line set to the rear risers

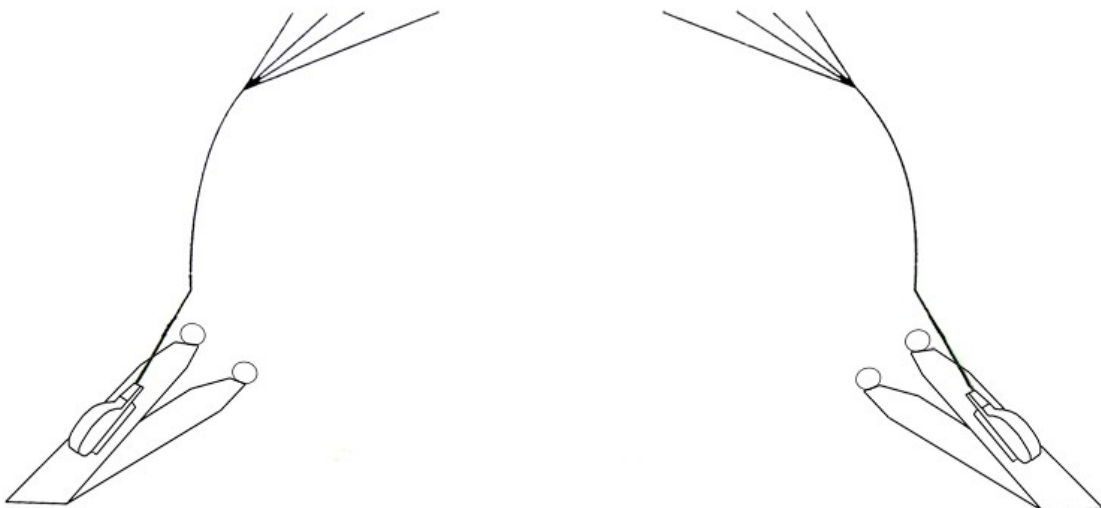


Figure 4: Correct attachment of the steering lines through guide rings on rear risers

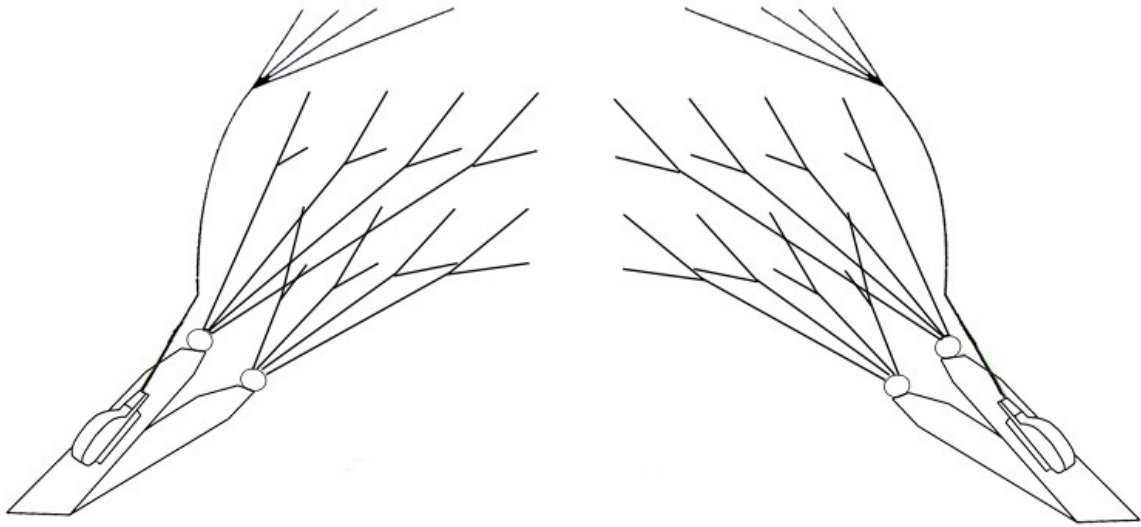


Figure 5: The complete line set attached.

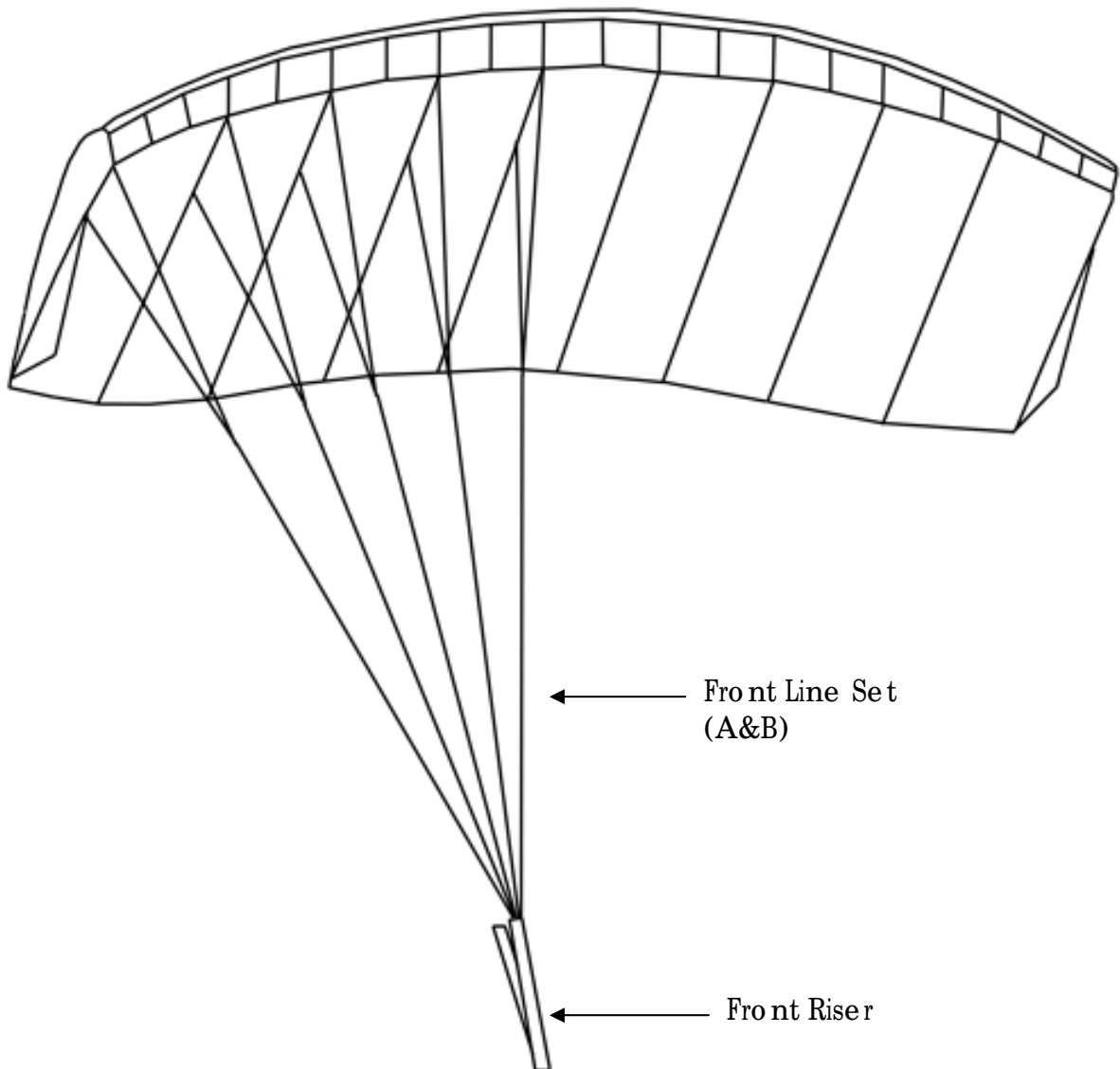


Fig 6: The front line set should look like this once inflated, (only right side shown):

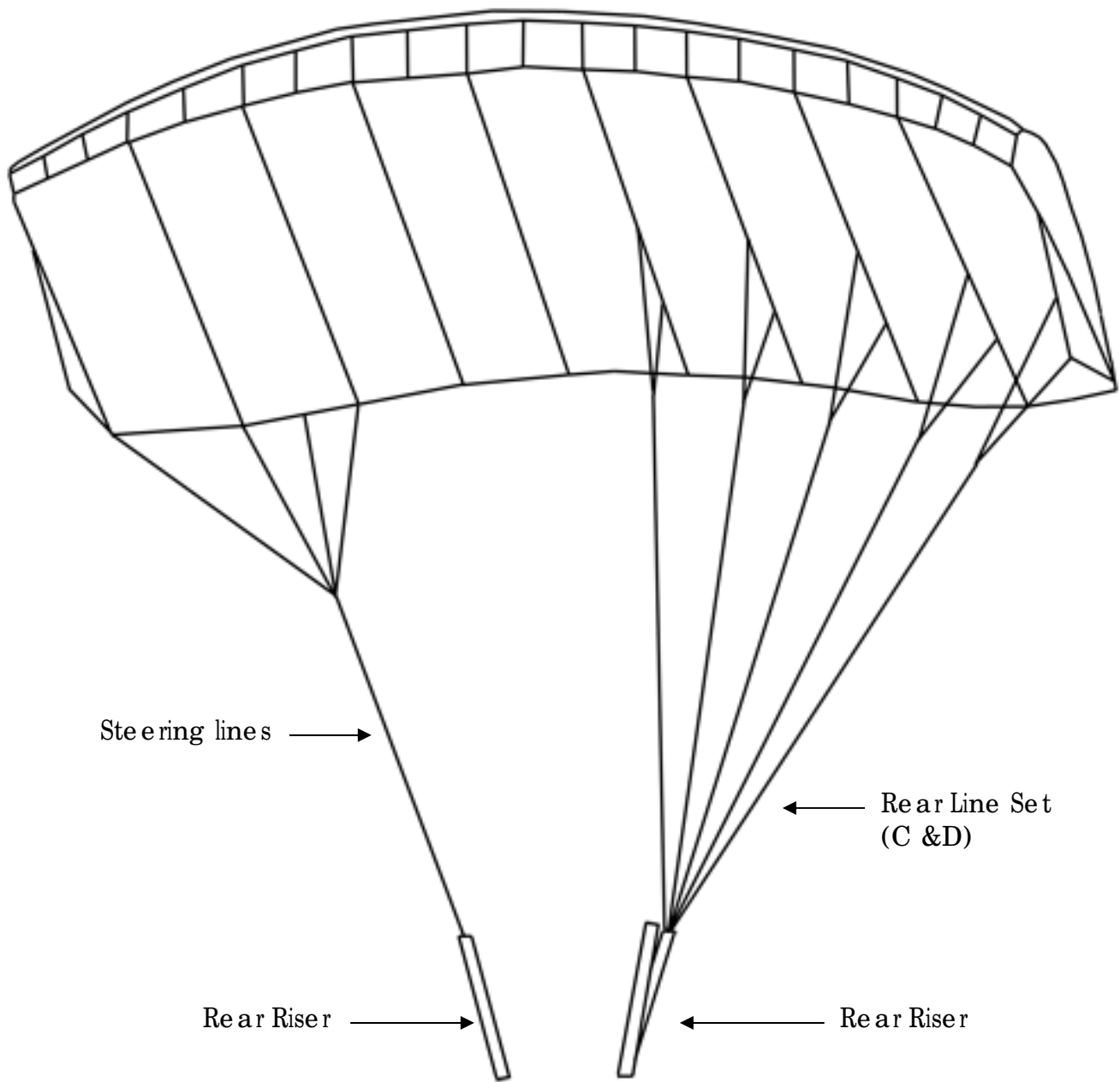


Fig 7: The rear line set and steering line should look like this when the canopy is inflated (only left rear line set and right steering line shown)



Once you have assembled and tightened each connector link on the corresponding riser it is time to focus on the steering lines. Starting from the trailing edge of the canopy take each steering line and follow it down to the risers, ensuring it is clear and not interfering with the other line sets. Route the left steering line through the guide rings on the left rear riser and repeat the process for right steering line / right riser.

## Section 6.1: Toggle Assembly

Figure 1: Pass the control line through the toggle's grommet from the Velcro side of the toggle.



Figure 1

Figure 2: Then thread the bottom of the toggle through the attachment loop, pulling the slack control line back through the grommet.



Figure 2

Figure 3: The assembled toggle should look like this.



Figure 3

Once the canopy is attached, check one more time that the connector links are tightened. A complete check of the canopy installation must be performed. It may be done on the ground following an order fixed by the rigger and/or by inflating the canopy on the ground for a sufficient time to check line continuity and all the elements.

## **Section 7: Recommended Drills for first flight**

Even if you are familiar with ram-air parachutes, your new parachute may handle differently.

Therefore, always make several jumps with the sole purpose of getting to know your new parachute. Pick a day with favourable wind conditions and jump by yourself.

Open high and find out how the canopy flies. Try slow turns and fast turns from no brakes, quarter brakes, half brakes, three-quarter brakes and full brakes. Determine if the canopy helicopter turns (stall turns) and, if so, under what conditions. Find out how the canopy recovers from various types of stalls.

Stall the canopy several times and see how this happens both from full flight and minimum air speed. Turn the canopy by pulling on the front or rear risers rather than the toggles.

Keep track of your location relative to your intended landing area as you “wring out” your canopy so you won’t drift too far away. Discontinue your experimenting when you’ve descended to 1000ft (300m) above the ground.

Plan and execute a conservative landing approach into a large unobstructed landing area. Steer, flare and land the canopy as you were taught by your instructor. Since you might misjudge your early landings be prepared to perform a “Parachute Landing Fall (PLF) rather than a stand-up. Most jumpers underestimate how far they will travel over the ground during the landing flare. Make sure you have enough open area ahead of your intended touchdown point.

During the first few jumps try the following drills:

- Gradual flare to locate stall point
- Full flare to simulate landing
- Full Stall and recovery by slowing and equally releasing brakes
- Flare from half brakes
- Flare from deep brakes
- Full toggle turns
- Elevation turns (in braked flight release one toggle slightly to turn)
- Half brake turns
- Deep brake turns
- Rear riser turns
- Front riser turns
- Check length of brake line between cats eye and toggle, are you getting a full flare?

**Remember to pay attention to your altitude and position relative to the dropzone.**

**Flight Characteristics:** This Atair canopy is not just a new canopy – you have just purchased a totally new product, featuring new design features, top class production quality and exceptional performance, making it incomparable to classical ram-air parachutes. It only requires light toggle input to turn.

It is unnecessary to pull a long way down on the toggles to obtain a quick rotation. You should learn to steer your canopy using smooth actions.

When rotating rapidly, the stall point is announced by a hard point when pulling the toggle. The flight range of your Atair canopy is ahead of this hard point; if you overcome it will put your canopy out of shape and it will progressively lose its performance. We advise you to test the reactions of your new canopy at a minimum height of 2000ft (600m).

**Landing:** Make sure that you are facing into wind, lined up with the landing area at a minimum of 300ft (100m).

Keep your arms high so as to keep full speed, then execute your flare at the moment selected.

The landing procedure is classical, however acting too abruptly the excellent flaring characteristics of this canopy will send you upwards.

Pay attention to this, steer smoothly and, should you come upwards too much, keep the toggles at the same level till you touch down, never release toggle pressure. Always remember that this canopy goes on flying until you touch down, never release toggle pressure.

**DO NOT TURN YOUR CANOPY JUST PRIOR TO LANDING, SUCH A MANOEUVRE IS EXTREMELY DANGEROUS AND CAN CAUSE SERIOUS INJURY OR DEATH.**

## **Section 8: Packing your Radical Canopy**

Before you begin this section, please read the entire manual. If there is any element that you don't understand, please contact us or a qualified rigger to help you with assembly.

Ensure that you have correctly assembled the canopy on to the risers (see section 6) and that you have proper line continuity. Be certain to secure the container so that it does move during the packing process. Make sure that the risers are even and remain even at all times.

### **Pre-packing Instructions**

#### **Introduction:**

Today's ram-air canopies are very reliable parachutes. If a ram-air canopy has straight lines – that is, if it is assembled correctly and untangled after the last time it was jumped – it will usually inflate even if folded in ways that are quite unusual.

In other words, it is difficult to pack a ram-air canopy so that it will not open.

We're not saying other packing methods won't work with your canopy. But the method shown here will probably help your canopy open more consistently.

#### **Before You Begin:**

Where you pack your canopy is important.

Since sunlight irreversibly damages nylon parachutes, an indoor or shady area is the best. Packing in the sunlight is unavoidable at most places, so try to reduce your canopy's exposure to direct sunlight as much as possible. Cover it with a packing mat or jumpsuit while you "debrief" a jump or critique a student.

Packing on concrete and asphalt should also be avoided because this will wear the fabric, lines and fittings that are used to build your parachute system. A dry lawn is best.

Packing behind a building or van will make packing easier because it blocks the wind.

Pack according to your country's regulations (by yourself – if you intend to jump your canopy on a particular jump, or by a certified rigger, or by the person who intends to jump the canopy)

## **A Word about help:**

When you are learning to pack, never hesitate to ask a rigger or your instructor for help. They will show you tips that will make the process faster and easier.

Be sure they refer to this manual, however, as they might not know our packing method.

Read this manual first. Doing so will give you a better idea of what you are doing, and it will help you go a little faster.

## **Packing Canopies Made of Zero Porosity**

Canopies made from ZP can be packed just like any other similar canopy. If you prefer to flat pack, and have been getting good results with a similar canopy, this method should work with your new canopy. There are many different pack jobs currently being used. We recommend the pro-pack detailed in this owner's manual.

This pack method consistently results in soft on-heading openings, with minimum risk of canopy damage. Others may not work as well. If you try a different pack method, you do so at your own risk. If you use a side or book pack, start at the tail and work forward to squeeze the air out.

Packing a canopy made of ZP is a new skill that must be learned. At first, it will be more difficult to pack than canopies made out of conventional materials. However, with practice it will become just as easy. You can make the pack job considerably easier to by getting a bag that is slightly larger than your main container. It is easier to squeeze a small amount of the air out after the canopy is in the bag. (Consult the container manufacturer about this).

The key to making the job easy is to pack fast and accurately. Each fold or roll must be done quickly and correctly the first time. This will only come with practice. Packing does not hurt the canopy, so please practice until you are good at getting a neatly folded canopy into the bag before you start jumping the canopy.

The fabric has a memory and always tries to open back up. Once you start, you must continue until the canopy is in the bag and the first locking stows are secure. You can't waste time at any point in the packing procedure because this gives the canopy time to move around, form a big mess, and you will have to start over.

After the folding and organizing portion that is done while standing is complete, you should roll the tail as tightly and as far as possible. Be careful not to let the tail unroll while squeezing the air out. If you kneel on the canopy facing the pilot chute attachment just above the warning label you will be in a better position to control this. Slowly lay down on the canopy while still containing it with your hands. The only place for the air to leak out is the stitching holes, so go slowly. If you go fast, the air will blow the pack job apart.

### **Inspection:**

To be performed before each pack job.

You must inspect your parachute system each time you pack it. The inspection takes only a few moments and will help prevent malfunctions and other problems. The inspection is best done when the rig and canopy are stretched out on the ground prior to packing. (The procedure outlined below is different than the thorough inspection that must be performed periodically and when the parachute is first assembled or if damage is suspected. The thorough procedure was presented earlier.)

If you discover any worn or improperly rigged components, bring them to the attention of a certified rigger before jumping the system again.

During the inspection of the entire system, pay special attention to the items listed below.

Any damaged or worn parts must be repaired or replaced before jumping the system again.

Start with the harness and container and work up to the canopy and pilot chute. Although the owner's manual that came with the rig contains specific inspection procedures, be sure to check the items listed below.

**Reserve:** It must be sealed and in date. The ripcord pin(s) must be seated properly and not bent. The cable must move freely in its housing. The ripcord handle must be properly stowed in its pocket. If the rig is equipped with an automatic activation device, it must be installed and calibrated correctly.

**Harness:** Inspect the entire harness for broken stitches and excessive wear.

**Main Container:** The closing loop must not be worn, as a problem with the closing system can result in a premature opening.

**Risers:** Check the risers carefully for any damage or excessive wear. Check the 3-ring releases, be sure the white locking loop is not worn (it must only pass through the smallest ring). Be sure the release cables are inserted correctly in the white loops.

Check the **steering lines and toggles**. Look for damage, check any knots are tight and that the toggles are securely attached. Serious injury could result if an incorrectly attached toggle detaches from the steering line during flare – don't let it happen to you.)

Check the **Velcro** for wear.

Check the **connector links**. The threaded barrels must be securely tightened and not cracked.

**Slider:** Be sure the slider isn't twisted and that its grommets are free of nicks or burrs that can damage the suspension lines and steering lines.

**Suspension and Steering Lines:** Inspect these lines for wear. Be sure they are "continuous" (not tangled). Each line must go straight from its link to the canopy without wrapping around other lines. The risers must not be twisted either.

**A tip:** Pick up your canopy neatly after each landing, and lay it down neatly when you reach the packing area. Doing this will make your packing go faster because the lines will stay "continuous" (or not passed through each other, as can happen if you walk through the lines after landing).

If you find any incorrectly routed or twisted lines, it is usually better to leave the risers attached to the harness while you correct the problem (unless the risers were attached incorrectly to start with). Disconnecting the risers usually makes it more difficult to straighten things out.

**Canopy:** Be sure the canopy is not on backwards. Inspect it for tears, especially at the line and pilot chute attachment points. (You should periodically look inside the centre cell to inspect the bridle attachment point.)

**Deployment Bag, Bridle and Pilot Chute:** The owner's manual for these items is the best source of inspection information. Tears or failing seams in the main pilot chute are especially hazardous. So is a worn bridle or one that is too short.

After packing your canopy a few times, you'll be able to combine the above inspection procedures with the packing procedures – you'll inspect it as you pack it.

### **Maintenance:**

Here is a little advice for using and maintaining your canopy.

Do not leave your canopy exposed to sunlight. Even though it has been protected against ultraviolet rays, the fabric remains sensitive to such exposure.

Some colours might change with time because pigments lose brightness when exposed to light but this will not change the resistance of the fabric.

Try to avoid packing on rough or abrasive surfaces like concrete or gravel. Use rather wooden flooring or dry grass. Avoid also packing on dirty mats that're dirtier than the floor itself.



Every 50 jumps check the following:

- Seams connecting the lines to the canopy and to the rapid links.
- Lines.
- Slider grommets.
- Deployment bag attachments.
- Steering lines and toggles.

As soon as wear is detected, have it repaired before it breaks or rips. Contact your rigger / dealer / Atair immediately.

## Section 8.1 :Packing the Canopy

The packing method described in this manual is the standard “PRO Pack” (Proper Ram air Orientation) packing method.

### Step 1

Secure the container, tying it to a fixed object or by using a packing weight. Straighten the canopy and lines. Perform a line check, check that the line sets are straight, no pack rotation, brake lines clear and on top, check the continuity above and below the slider.

### Step 2

Un-collapse the slider as shown below and cock your pilot chute

In order to ensure full flight performance and to avoid disturbing noise, the slider is collapsible. Once your canopy is opened, grab the tapes at the rear edge of the slider and pull them to collapse the slider. **YOU MUST REMEMBER TO COCK THE SLIDER DURING THE PACKING PROCESS! Failure to do so could result in serious bodily injury and or death.**



Figure 1: The slider collapsed



Figure 2: Tab detail



Figure 3: The slider 'cocked'

To 'cock' the slider thread the tabs on the draw strings inside the channel (as shown in figure 2) and pull the edges of slider so that it looks like figure 3 above.

### Step 3

Set the brakes for both steering lines as follows:



**Step 1:** Pull the cats eye through the guide ring



**Step 2:** Insert the toggle through the cats eye



**Step 3:** Secure the toggle onto the riser



**Step 4:** Stow the slack brake line



**Step 5:** Repeat the process for the other steering line

#### Step 4

Crouch next to the risers and face your canopy. Slip the fingers of your left hand between each left-hand riser and between the left-hand steering line and the risers. Do the same with your right hand. The idea is to have each line group and each steering line occupying a slot between two fingers. Stand between the right and left-hand riser groups and grasp the lines as shown. Be sure there are no twists in the risers. Start moving up the lines, allowing them to slide between your fingers. Push the slider ahead until you reach the bottom of the canopy.



#### Step 5

At this point, it's possible to determine if your canopy and lines aren't straight. If there are twists in the lines as shown, this means your rig did a loop through your risers at some point. To fix this, drop the lines, stretch the canopy and lines out again, and straighten the entanglement out. Get help from a rigger if you have any questions. Do a line check again to make sure you have done it correctly.



**Step 6**

If the lines look something like this, then a steering line or riser group passed around everything else.

A steering line that passes around everything else will result in a malfunction that will almost surely require a breakaway.

If you don't know how to fix this, get qualified assistance.

**Step 7**

When you reach your canopy, pull both hands apart as far as the slider will allow. Shake the canopy a couple of times to settle everything. If the canopy is clear there will be four distinct line groups going all the way to the stabilizers with no lines crossing each other and no twisted lines.



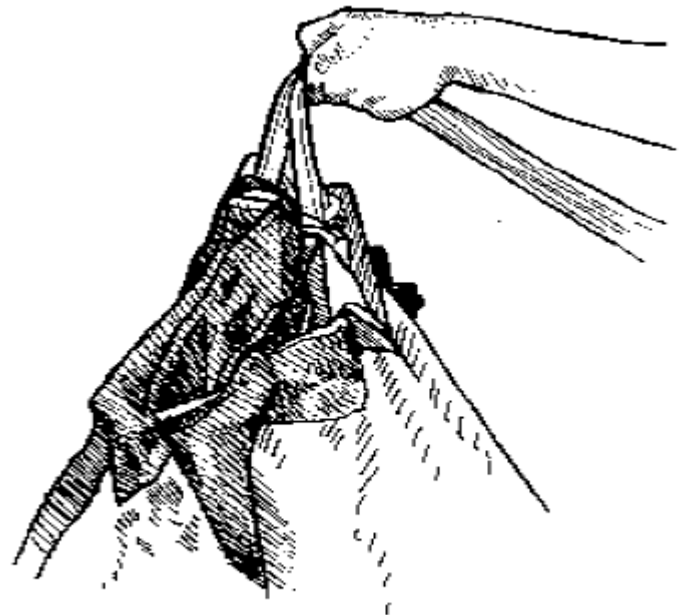
### Step 8

The nose openings should be facing the rig and the tail should be farthest from the rig. If the reverse is true, double check to be sure the rig is container-side up (the back pad is on the ground). If the rig is positioned correctly and the canopy is not oriented as described above, then the canopy was attached to the harness backwards!



### Step 9

Now step to one side outside the lines and transfer the lines to one hand so that the left and right sides of the canopy hang at the same height. It isn't necessary to keep the line groups separated by the fingers of your hand because you've already determined the lines and canopy are straight. Your canopy should look like the above illustration. All lines should be kept taut and the nose should still be facing the rig. The slider should be against the slider stops on the stabilizers.



**Step 10**

Starting with the end cell nearest your legs, flake the entire nose with one hand as shown.



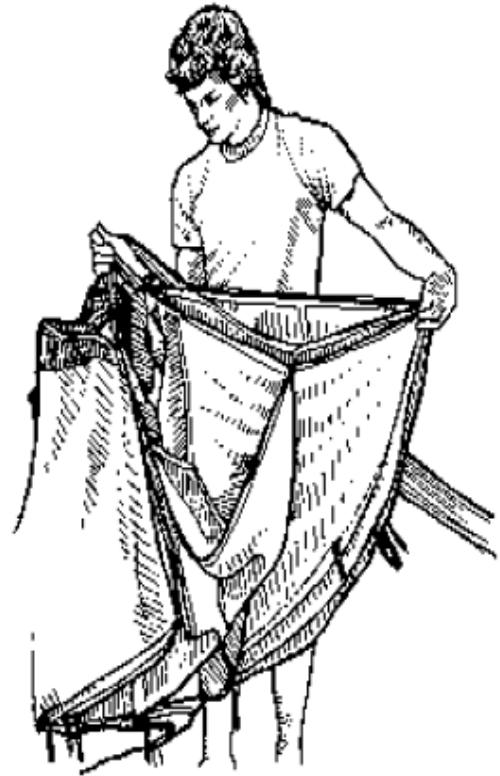
**Step 11**

Pull each cell completely out, and keep it in your hand.



**Step 12**

Then pick up the next, taking care not to miss any until all nine of them are in your hand.



**Step 13 & 14**

When you have the entire nose flaked, tuck it between your knees and hold it there.

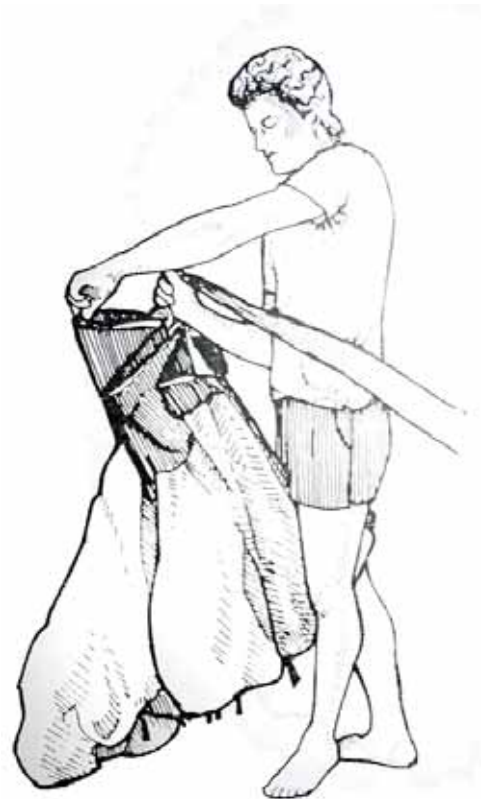


**Step 13 &14**  
Continued...



**Step 15**

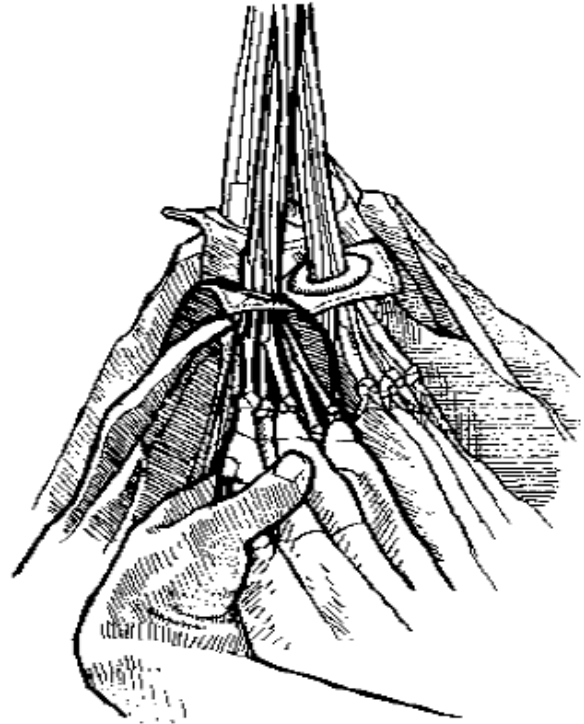
Clear the stabilizers. Since all the lines are bunched up in the middle, pull each stabilizer panel out one by one until they form an irregular shape resembling the petals of a flower when viewed from the top. Be sure none of the lines are wrapped around a slider stop on a stabilizer.





**Step 16**

Find the group of A lines on one side of the canopy. With the canopy held in front of you as you have it now, the A lines are the front part of the line group that go through the front slider grommets, the ones that should be closest to you.

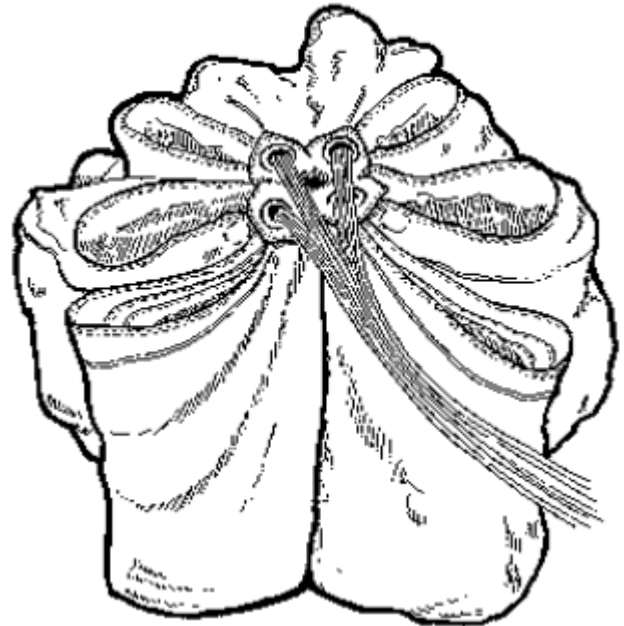
**Step 17**

Since there is a lot of fabric between the A and B line attachment points, it is easy to separate the two line groups: Look down inside the first small S fold of the stabilizer and find the A extra bunch of fabric. Now make the rest of the canopy into S folds like the stabilizers: Put your hand in between the A and B lines on one side (near where they pass their own grommet) and pull them out to the side. This will give the cells on one side the correct type of flaking. Now repeat the process with the other A and B groups, pulling the fold out to the other side.



**Step 18**

Now that you've pulled the canopy out to form 'S' folds between A and B line groups, do the same thing between B and C lines. Pull the fold of fabric between the two groups out to each side. When you look down in between the stabilizer folds after you've done the flaking, the folds should look neat like this.

**Step 19**

Now find the D line group, the group of lines nearest the tail. (Not the steering lines, they are attached at the trailing edge.) Pull the left-hand steering lines off to the left (to get them out of the way). Follow the stabilizer down to the D lines and pick up all the D lines on the left side. On the Radical there are four D lines on each side. All lines in your hand should go through the same grommet. If they don't you've picked up a wrong line.



**Step 20**

Now that you are holding only the correct D lines, you may let go of the steering lines. Take the whole D-line group on one side and pull it out gently.



**Step 21**

Fold the D-line group in with one motion to put a real fold in the fabric between the C and D lines. Do the same thing on the other side.



**Step 22**

Now grasp the steering lines where they attach to the tail, pull the entire tail out and drop it straight down

**IMPORTANT:**

As part of Step 23, be sure the stabilizers and their slider stops are correctly lying outside the suspension lines as described in Step 15. Canopy damage is likely if a stabilizer (or its slider stop) lies under a line.

**Step 23**

Now organize the steering lines and flake the tail so the canopy looks like this.

*(Even though it might seem like you've got a disorganized wad of canopy hanging down in front of you, it should actually be a neat pack job.)*



**Step 24**

Reach down and pick up the very middle point of the trailing edge; an identification marker is sewn at the middle point to help you. Raise the tail a couple inches above the slider and hold it in place with the same hand that is holding the lines.

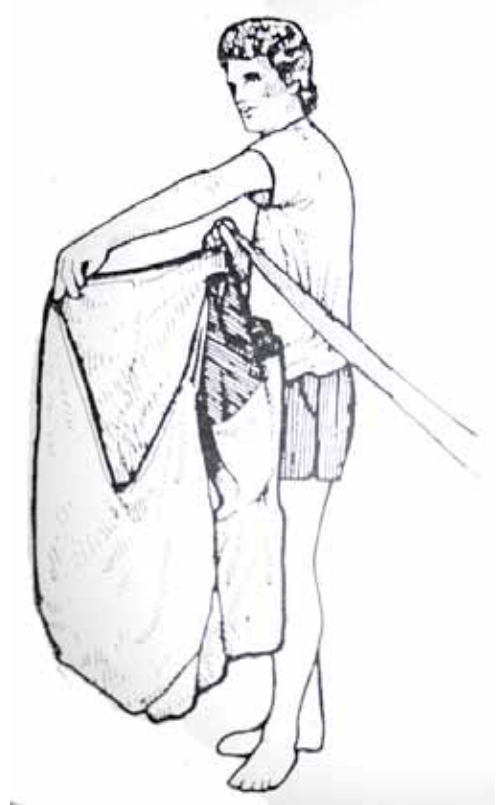
**CAUTION:**

The steering lines must stay positioned at the back of the canopy as shown in Step 23. If the steering lines are moved to the nose of the canopy (rather than being kept at the back), a line-over malfunction and canopy damage may result.



**Step 25**

On one side, start with the middle of the tail being held under your thumb and pull the excess material straight out. You're pulling out the trailing edge of the canopy that extends from the inside steering line to the very center of the trailing edge.

**Step 26 &27**

Wrap that part of the tail half way around the canopy. Hold in place with your knees. Fold the tail on the other side of the canopy the same way.

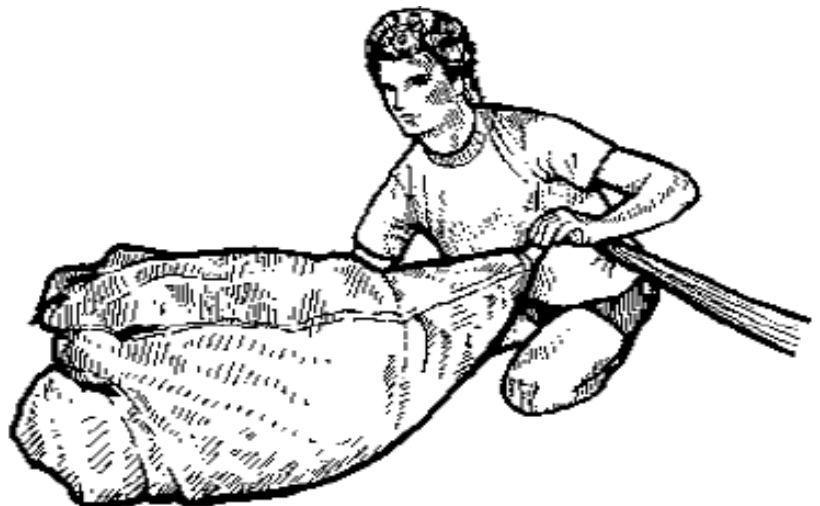


**Step 28**

Release your knee grip on the nose and tail. Take both tail pieces in one hand and roll them together in to the middle so they completely encase the rest of the canopy.

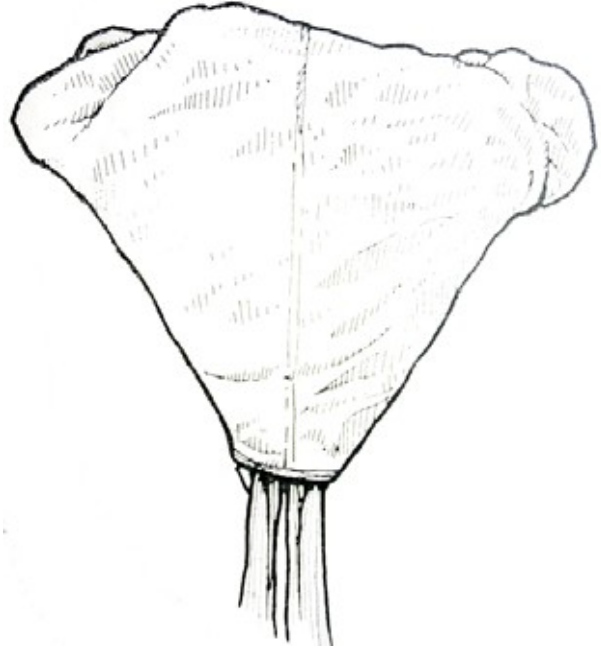
**Step 29 & 30**

Place your free hand carefully under the bundle. Swing it out slightly so that the lines stay taught and gently lay it on the floor.



**Step 31**

As it lies on the floor, the bundle should be triangular in shape, as shown. Note: The slider should be wrapped up in the tail and should stay that way as you stuff the canopy into the deployment bag.

**Step 32**

Dress the canopy to a width slightly wider than the width of the bag. All the slider should stay inside the rolled tail. The slider must not be allowed to move down the lines - even the smallest downward movement the slider may increase opening shock and decrease reliability. Pay extra attention to the position of the slider until the bag is closed.





**Step 33 & 34**

Move to the side of the canopy and put one hand right under the slider edge of the bundle. Place the other hand on top a little farther up and make a small S fold as shown.

Be sure the slider stays up against the stabilizers; don't let it move down the lines.



**Step 35**

Now put one hand under the top of the bundle and make an S fold in the opposite direction as shown. The remaining material can be rolled under the fold.



**Step 36**

You should now have a neat compact bundle. Try to make the folds so that the bundle is only a little wider than the bag.



**Step 37**

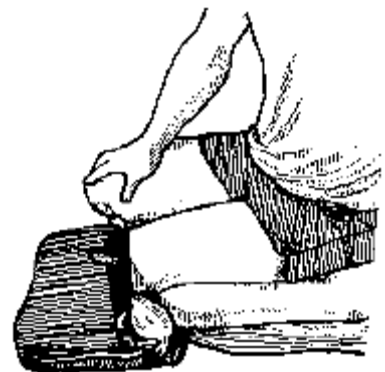
Place your knee in the middle of the canopy to keep it together while you pull the bag over it.

**Step 38 & 39**

With your knee still in place, pull the bag over the canopy one side at a time. Hold the corner of the canopy bundle up while you pull the bag over it, and then roll the canopy into the corner of the bag. This helps get the canopy firmly into the corners, making a neater pack job. The whole canopy should be in the bag before you remove your knee. This helps completely fill the corners of the bag by keeping the middle compressed.

Follow your rig manufacturer's instructions for closing the bag, stowing the lines, placing it in the pack tray, and closing container. It takes practice to pack quickly and neatly.

Every jumper has his own system to make the job easier, and you'll quickly develop one of your own.



## **Section 9: High Performance Landings**

At most dropzones there are some jumpers who like to do high performance (swoop) landings. These landings look impressive, travelling long distance inches off the ground and then going back up before landing. The problem is that these landings can be very dangerous for the jumper and anyone else around the jumper.

Many of these swoop landings are started by initiating a low turn. If timed incorrectly the jumper can hit the ground hard enough to be fatal. Many jumpers have been hurt by having another canopy pilot turn into them.

To minimize the danger involved in skydiving you should avoid all turns close to the ground, and turns that should bring you close to another jumper in the air. It is recommended that all jumpers limit their turns to only minor course corrections below 500 ft (150m). If you insist on performing a swoop landing make sure you are alone in the air. DO NOT attempt a swoop landing if there are other jumpers in the air or the landing area.

The following advice is not intended to recommend that you try swoop landings, rather, they are only included because we recognise the fact that some people will try to do swoop landings even though we recommend not to. We have included this section to minimize the risk of those that are going to attempt swoop landings.

Do not try any swoop landings until you are very familiar with your canopy and the landing area. Even people who are very skilled occasionally hurt themselves. You do not need any more speed than full glide when first learning. Never try a swoop landing unless the weather conditions are suitable. As you become more familiar with your canopy, you may want to start using a faster approach. If so, increase your speed in small increments over many jumps. Most people get hurt by trying too much too soon. Try several practice approaches while at high altitude, going through everything up to landing. Do not attempt a high speed landing until you are sure you can deal with the high initial sink rate.

The best weather for practicing is a smooth, calm, low wind day. On such days, the canopy will be relatively stable and will be responding only to pilot control. It is important to avoid the possibility of the canopy being influenced by changes in wind direction or speed.

The idea in a swoop landing is to skim your feet across the ground or to make the canopy go back up. There is a very small section of the control range of the canopy where this is possible. If you pull the toggle down just a little beyond what is necessary to skim across the ground the canopy may start to climb. However, just a little more toggle may cause the canopy to do a high speed stall. In other words, if you pull your toggle down any more than it is necessary you will pass right through the control range you want. The result of this could be dangerous. The exact position of this small area of control range of the canopy is different on almost every jump.

You must have a complete and intrinsic understanding of your canopy to know exactly what to do for every approach.

Remember that the last thing you do in a swoop landing is land. If you let yourself get in a position where the canopy does not have enough air speed to fly, you drop from that altitude. If that happens to be ten feet high, you fall ten feet!

Once you have mastered the canopy, you may decide to try approaches at high air speeds. It's logical that the faster you go, the harder you will hit, so be careful. There are three methods to gain extra airspeed on approach: pulling both front risers, front riser turns and toggle hook turns.

**Pulling down both front risers** on a straight in approach is the least dangerous method. A minimal pull down on the front risers (less than two inches) will result in a very large increase in airspeed (increasing the flare power on almost any landing). The flare then begins with a smooth release of the front risers, and continues by smoothly pulling the toggles down as much as necessary. The altitude to begin the flare varies with each approach and how fast the flare is executed. It takes practice to determine these factors. This practice can be hazardous to your health! When using front risers to gain extra speed, never let go of the toggles for any reason. Also, be sure not to use front risers in gusty or turbulent winds. Pulling on front risers in these conditions could cause your canopy to collapse.

**Front riser turns are very dangerous.** The forward speed gained with this manoeuvre is much more dramatic than with a straight front riser approach. The big disadvantage is that it is much more difficult to judge correctly. If you misjudge this type of approach, you could easily hurt yourself. We recommend that you do not try this. If you choose to ignore our advice it would be prudent to seek professional canopy piloting tuition.

**Toggle hook turns are the most dangerous** of the three options and offer no advantage in terms of performance. Because both the bank angle and the altitude at the start of the turn must be exact, toggle hook turns are very difficult to perform correctly. They are also very unpredictable in turbulence. **DO NOT** try a toggle hook turn under any circumstances.

## **Section 10: Inspecting and Maintaining your Equipment**

**Note:** This periodic inspection procedure should be performed at assembly and after every 50 jumps or 120 days, whichever comes first.

Your canopy must be inspected thoroughly before it is jumped the first time and periodically thereafter. This procedure is more thorough than the inspection which should be completed each time the parachute is packed.

You or your rigger should inspect your parachute system in a clean well lit area that will allow you to spread the main canopy out.

Here is one recommended procedure for inspecting your main canopy. Consult the owner's manual from your rig and other components for instructions on inspecting them.

It's best to inspect your canopy in a careful and systematic way. We recommend starting at the top of the canopy and working down to the risers. You should leave the canopy attached to the rig.

1. **Bridle attachment:** Check to be sure the bridle is correctly attached to the canopy. Check the integrity of the canopy fabric and reinforcement tapes in the area where the bridle ring is attached.
2. **Top surface:** Spread the canopy out on its bottom surface and inspect the top surface. Look for rips, stains, or failed seams. Check the fabric strength by grabbing a handful of fabric in each hand and trying to tear the canopy with a moderate tug.
3. **Bottom surface:** Turn the canopy over and spread it out to inspect the bottom surface. Check for rips, stains, and failed seams. Check the fabric strength (see #2 above). Check the line attachment points.
4. **Inspect each rib:** from the leading edge to the tail by looking inside each cell. Pay extra attention to the line and bridle attachment points.
5. **Lay the canopy neatly on one side, stacking each rib on top of the others.** Check that all the lines in each line group are the same length and that the trim differential between each line group is correct for this canopy. Check the condition of the stabilizers and slider stops.
6. **Suspension lines:** Check the full length of each line for damage and wear. Look for fraying at all cascades (the Y-shaped junction of two lines) and where each line attaches to the connector link.

7. Slider: Be sure the fabric isn't torn, that the grommets are undamaged and have no sharp edges, and that they are securely attached to the slider.

8. Risers: Be sure the barrels of the connector links are tightened and the slider stops are properly positioned.

The toggles must be installed correctly and must match the guide ring and Velcro on the risers. Checking this installation must be done by a rigger. Be sure the riser release system is assembled correctly and that it will function when activated.

9. The rest of the assembly: Follow the instructions in the rig manufacturer's owner's manual to inspect the rest of your parachute system.

## **Section 10.1: Cleaning Your Canopy**

### **Standard Materials**

Avoid washing or cleaning your canopy if at all possible. Cleaning the material will increase the porosity, causing reduced performance. Only clean areas that are contaminated with a substance that will degrade the material. Mild soap and water will remove most contaminants. If necessary, mineral spirits may be used for grease or oil. Do not use any other cleaning products. Do not use cleaning agents that contain bleach! Avoid agitating the canopy, especially when wet. Agitation will cause reduction in canopy performance.

### **Zero Porosity Fabric**

The ZP fabric is not affected by water. However, the reinforcement tapes may be. All tapes used in these canopies are pre-shrunk at the factory to make them more dimensionally stable.

However, if they get wet this does not mean that they will come back to the exact size when dry. Small changes in length may make a large difference in canopy performance. To maintain the best performance, avoid getting the canopy wet. Water jumps are not recommended.

If you need to clean your canopy, please wash only the dirty or contaminated areas. Use a mild soap and water only. Oil and grease usually do not penetrate the coating surface so solvents are not normally necessary. Also, some solvents may affect the coating. Avoid getting the tapes wet if possible. Do not machine wash.

## **Section 10.2: Storage**

Store your parachute in a cool, dry place in a container through which light can not pass. This will prevent the permanent and difficult to detect damage caused by ultraviolet light from sunlight and other sources.

Certain other agents – notable acids – will quickly cause great damage to your parachute. Do not store your parachute where it might come into contact with such substances. For example, automobile trunks contaminated with battery acid have destroyed many parachutes.



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**Appendix A: Contact details**



Atair Aerodynamic s d.o.o  
Stane Krajnc  
Partizanska cesta 9,  
4220 Skofja Loka,  
Slovenia

Phone: + 386 451 265 65

Fax: + 386 451 265 60

Email: [stane@basetroll.com](mailto:stane@basetroll.com)

<http://www.basetroll.com> or <http://www.ataircanopies.com>

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The Atair team are proud to be associated with:



**Morpheus Technologies**  
**North America Distributors of the Troll Canopy**  
5107 Lantana Street  
Zephyrhills, FL 33542. USA  
Phone : (813) 780-8961  
Fax: (813) 788-7072  
[info@baserigs.com](mailto:info@baserigs.com)  
<http://www.BaseRigs.com>



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**European distributors for the Troll canopy**  
**Jean-Noel Itzstein**  
22 chemin du Bois de la Bossenaz  
74310 Les Houches. France  
Phone / Fax : +33(0) 450.54.36.18  
Mobile : +33(0) 613.03.31.60  
[adrenalin@adrenalinbase.com](mailto:adrenalin@adrenalinbase.com)  
<http://www.Adrenalinbase.com/>



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**Phoenix-Fly**  
Ul. Platana 2  
10434 Strmec  
Phone: + 385 98 326 123  
Fax: + 385 1 6346 964  
[info@phoenix-fly.com](mailto:info@phoenix-fly.com)  
<http://www.Phoenix-Fly.com/>

**Appendix B:**

**Recommended reading:**

**The safety articles on canopy piloting on Dropzone.com:**

[http://www.dropzone.com/safety/Canopy\\_Control/index.shtml](http://www.dropzone.com/safety/Canopy_Control/index.shtml)

End