*IC Main Canopy Manual – June 2017 v.2*

# Dear Customer

**Welcome to the ICARUS WORLD…**

We would like to thank you for trusting ICARUS and its products. By purchasing an ICARUS canopy, you have made a choice for TECHNOLOGY, QUALITY & RELIABILITY.
Your ICARUS canopy has been designed, tested and built to today's highest industry standards established in ISO 9000/1. Whether your ICARUS canopy is brand new or used, we strongly recommend that you and your rigger inspect with detail your ICARUS canopy and get familiar with its characteristics and workmanship quality. With proper care and maintenance, your ICARUS canopy should provide you many years of use and service. Once again, we would like to thank you for choosing ICARUS and its products.

**Sincerely,**
ICARUS

INDEX

## DISCLAIMER - NO WARRANTY

Because of the unavoidable danger associated with the use of parachutes, the manufacturer makes no warranty, either expressed or implied. It is sold with all faults and without any warranty of fitness for any purpose.
The manufacturer also disclaims any liability in tort for damages, direct or consequential, including personal injuries resulting from a defect in design, material or workmanship or manufacturing or otherwise. By using this parachute assembly, or allowing it to be used by others, the user waives any manufacturer liability for personal injuries or other damages arising from such use.

If buyer declines to waive manufacturer liability, buyer may obtain a full purchase price refund by returning the parachute to our authorized dealer through whom the parachute was bought, before use within 30 days from original purchase date with a letter stating why it was returned.

## WARNING

Each time you use this parachute you risk serious bodily injury or death. You can substantially reduce this risk by:

assuring every component of the parachute system has been assembled and packed in strict compliance with manufacturer instructions
obtaining proper instruction in the use of this parachute and the rest of your equipment
operating each component in strict compliance with the operations handbook and safe parachuting practices.

A parachute system was designed to operate and function within specific weight and speed parameters, while oriented in a "belly to earth" body position. Some body positions during freefall (i.e. head down, stand up, long dives etc.) may enable the user of this parachute to reach speeds beyond those for which the equipment has been designed and tested. In the event of a premature or unintentional deployment while in these body positions you are risking any / all of the following:

Extremely hard openings
Equipment failure
Light to severe injuries
Death

Never exceed the operational speed or weight limits of the parachute system. You should avoid deploying in an attitude that the equipment was not designed for.

# PREFACE TO THIS OPERATIONS HANDBOOK (read before assembly or use!)

This handbook is not designed to teach any person how to safely inspect, assemble, maintain, pack or operate this parachute. We recommend to use the service of riggers who are educated and qualified professionals with experience. Persons attempting to jump this parachute without first receiving comprehensive personal training by qualified instructors, seriously increase their risk of serious injury or death.

The US Parachute Association (USPA) and similar organization in other countries publish recommended training procedures for basic parachuting competency. We urge you to learn and follow these procedures.
Before using this parachute the first time, we recommend you to obtain instruction from a competent instructor who is properly rated by your countries organization.

Because parachutes are made by people, there is always a chance this product contains human error based defects. Accordingly, this product must be inspected before first use and before each use thereafter. However, parachute systems sometimes fail to operate properly, even when properly assembled, packed and operated, so you risk serious injury or death each time you use the system.

Because sport parachuting technology and procedures continue to advance, this handbook may contain information that, through time, may become obsolete or otherwise inaccurate.
**For these reasons, we encourage you to work closely with qualified experts and instructors to help you inspect, pack, use and maintain this parachute.**

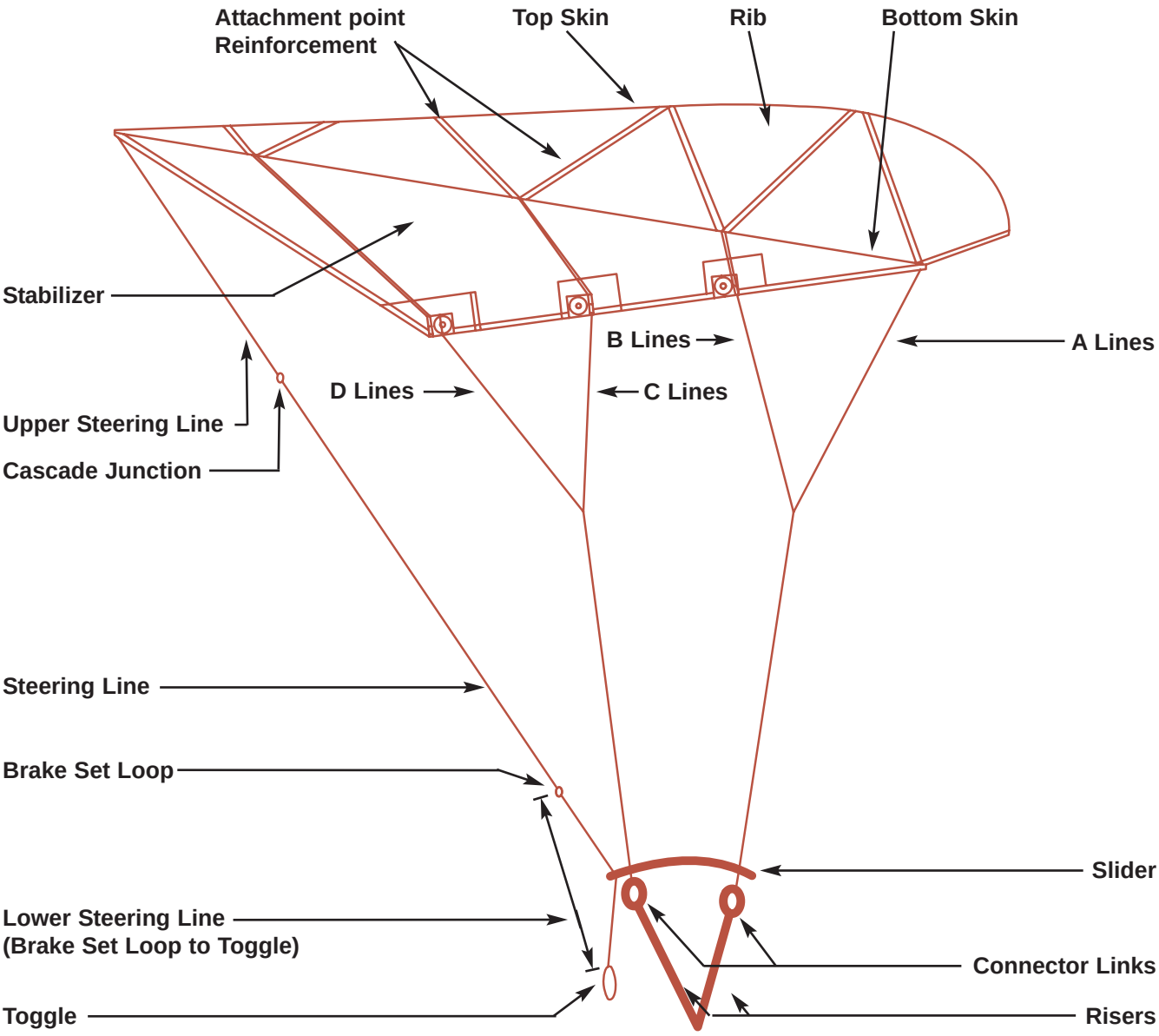
## Introductory Jumps

Even if you are familiar with ram air parachutes, your new parachute may handle differently from what you are used to. Therefore, we strongly recommend to perform several jumps with the sole purpose of getting to know your new parachute. Open high and find out how the parachute flies, learn about his turn rate, recovery arc, stall point and flare attitude at a safe altitude rather than getting surprises on landing.
**Do not try a toggle hook turn under any circumstances!**

## ASSEMBLY

Your parachute should be assembled by and connected to the harness/container system by a properly rated and certified FAA parachute rigger or an equivalent of your country.
The rigger should also agree that your choices for risers, toggles, bridle, deployment bag, pilot chute, harness/container and other components are all compatible with each other as well as with your new ICARUS canopy.

## CANOPY PARTS



# INSPECTION & MAINTENANCE

Forecast your canopies needs for maintenance! If you plan ahead and contact your local ICARUS dealer/rigger in advance, the downtime of your canopy can be kept to a minimum.
You probably don't drive your car till the tank is empty and then start looking for a fuel station, right? How to order/request maintenance like:

- Reline
- Slider
- Major repairs
  1) contact your local ICARUS dealer/rigger (http://www.icarusworld.net/)
  2) always provide the following details:
- Model and size
- S/N (serial number)
- DOM (date of manufacturing)
- Line material (we do recommend Vectran®)

Your parachute should be inspected thoroughly every 120 days or 50 jumps, whichever comes first or immediately if it is exposed to a degrading element, unusually hard opening or whenever damage is suspected (tree or bush landing for example). The better condition your parachute is in, the more likely it is to open properly, fly properly and land properly. Many malfunctions can be reduced or eliminated completely by properly inspecting your parachute to find wear or other damage before it fails during use.

**A word about line material in general.**

All ICARUS parachutes (except ICARUS reserve, NANO and EQUINOX) come standard with Vectran® suspension lines. On non-high-performance canopies, we offer other materials optional. We found that Vectran® is by far superior in terms of dimensional integrity. In other words, if you make 500 jumps with Vectran® lines they won't shrink or distort nearly as much as will Spectra® or Dacron® lines.

Line shrinkage with Spectra® is principally caused by the friction of the sliders grommets, generating heat as the slider moves down the lines on opening. Outboard suspension line and control lines are particularly susceptible to line shrinkage. It is not uncommon to see Spectra® control lines shrink in excess of 10 cm and outboard cell lines shrink several cm, more than enough to influence performance by bowing the canopy and distorting the planform only after 200 jumps. Vectran® does not have as much abrasion resistance as Spectra®, so the lines will "fuzz out" sooner than Spectra®, but tensile strength loss due to line fuzz has not shown itself to be a significant problem, especially when compared to the gain in long term performance.

## Pre-Pack Inspection

A parachute system should be inspected each time it is packed. A pre-pack inspection takes only a few minutes and is best done when harness/container and canopy are stretched out prior to packing.
The pre-pack inspection is not a substitute for the more comprehensive periodic or rigger inspections that must be done when the system is first assembled or damage is suspected.
During your 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.

## Main Parachute

The main parachute and its associated components are the part of your system that get the hardest workout and thus are most likely to get worn or suffer damage. Begin with the pilot chute and bridle. If you have a kill-line pilot chute (recommended) inspect the pilot chute center line for wear, check all sewing for broken stitches, examine the mesh or fabric for tears and wear, and ensure that the pilot chute is securely connected to the bridle. Now inspect the bridle for damage, make sure the pin attachment point is solidly sewn, and that the bridle attachment point is not worn or damaged. After inspecting the pilot chute and bridle, look at the canopy itself, checking for any tears or damaged seams. Pay extra attention to the slider stops; make sure they are neither damaged nor bent. Now move down the lines. In particular, check out the lower control lines, they wear out fastest and are sometimes twisted because, unlike suspension lines, they are not anchored. Remove all twists from your lower control lines before packing. This reduces the chance of tension knot/slider hang up malfunctions.
If your canopy is equipped with brake set loops, check them periodically for wear. These fingers trapped loops are especially susceptible to wear and, if not in top shape, can result in premature brake release or even worst, failure during flare for landing. Check the slider for damage, in particular, check that the grommets have no sharp edges or kinks that will slowly but surely cut your lines. Then check that your riser links are in good shape and tight, even if you have rubber protectors on them, they can work loose. After that, examine the risers for broken stitches and excessive wear. Pay particular attention to the 3-ring closing loop condition. Be sure it is:
a) not worn
b) that it passes over only the small ring.
Check the cutaway cable for kinks or other damage.

## Reserve Container

Make sure the seal is intact and the ripcord pin(s) are seated properly and not bent. The cable must move freely in its housing. The ripcord handle must be properly stowed. If the reserve container is equipped with an automatic activation device (AAD), check it for damage and make sure it still self-tests.

## Harness

Inspect the entire harness for broken stitches and excessive wear.

## Main Container

The main container closing loop gets the most use and if it is worn out, it can break and result in a premature opening. If there are plastic stiffeners in the main container flaps, inspect them for warping or breakage. **Be sure to check your harness-container owner's manual for inspection information specific to that system.** If during your pre-pack inspection you find any excessively worn, damaged or improperly rigged components, bring them to the attention of an appropriately rated and certified parachute rigger before jumping the system again.
A word about "hired" packers: Many jumpers today do not pack their own parachutes, they trust that task to a professional packer. If you choose to use a packer, however, it is important to remember that many of them do not inspect your rig before every pack job. It is still your responsibility to make sure your parachute system is in top shape before you give it to a packer.

## Periodic User Inspection

This procedure should be performed during initial assembly and periodically thereafter. To be precise, every 120 days or 50 jumps, whichever comes first. It is more thorough than the pre-pack inspection. Take your time doing it and do it in a clean, well-lighted area large enough to spread the parachute out or hang it up. Inspect your canopy in a careful, systematic way. We recommend starting at the top and working down to the risers, with the canopy attached to the harness/container.

## Bridle attachment

Ensure the bridle is correctly attached to the canopy, then check the integrity of the canopy fabric and reinforcement tapes in the area where the bridle ring is attached.

## Upper surface

Spread the canopy out on its lower surface and inspect the upper surface for rips, stains, or failed seams.

## Lower surface

Turn the canopy over and spread it out to inspect the lower surface for rips, stains, and failed seams. Check the line attachment points and associated stitching for any damage or broken stitches.

## Cells and seams

Look inside each cell and inspect each rib from the leading edge to the trailing edge for tears and seam failures. Pay extra attention to line and bridle attachment points.

## Suspension lines

Check the condition of the slider stops. 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.

## Slider

Be sure that the slider isn't twisted, the fabric isn't torn, that the grommets are undamaged and have no sharp edges or kinks, which will slowly but surely cut the lines and that they are securely attached to the slider. Be sure every suspension line and both control lines pass through the proper grommet on the slider.

## Risers

Inspect the entire risers for broken stitches and excessive wear.

Soft Links: Be sure that the Soft Links are properly installed and check for fraying

Connector Links: Be sure the barrels of the connector links are tightened properly (industry standard is finger-tight plus a quarter turn with a wrench). The key here is:
a) if you tighten the link too much, you can easily crack the barrel
b) if you don't tighten the links enough, they can come loose and potentially cause a malfunction.
Then make sure that the slider stops are properly positioned, and the toggles are installed correctly and must match the guide ring and stowage system on the risers.

## The rest of the assembly

Follow the instructions in the harness/container manufacturer's owner's manual for inspecting the rest of your parachute system.

## Fabric Care

Several factors weaken parachutes over time. Parachutes receive wear during packing, deployment and landing. Exposure to sunlight, heat and some household chemicals significantly weaken parachutes. Damage may or may not be obvious. To reduce the risk of parachute failure and possible serious injury or death, the entire parachute system should be thoroughly inspected every 120 days or 50 jumps, whichever comes first. It should also be inspected whenever it is exposed to a degrading element or damage is suspected for whatever reason. Remember that some chemicals will continue to degrade the parachute long after initial exposure. Regular and thorough inspections are necessary to ensure the parachute's integrity, reliability, and flight characteristics. 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 weaken or damage it.

## Cleaning Your Canopy

If possible at all, avoid washing or cleaning your canopy.
We do recommend consulting a properly rated and certified rigger before cleaning your parachute.
Cleaning 0-3 CFM ripstop (known as F-111) material will increase his porosity, causing reduced performance. Only clean areas that are contaminated with a substance that will degrade the material. Mild soap and clean non-contaminated water will remove most contaminants. Do not use any other cleansers. Do not use cleansers that contain bleach. 0 CFM ripstop fabric (known as ZP or zero porosity) is not affected by clean non contaminated water. However, the reinforcement tapes may be. Reinforcement tapes used in these canopies are pre shrunk at the factory to make them more dimensionally stable which does not guarantee that they will come back to the exact same size when dry. Small changes in their dimensions may make a large difference in canopy performance, especially on high performance or highly loaded canopies. Avoid getting the canopy wet. Water jumps are not recommended. **Never machine wash or tumble dry your parachute!**

## Storage

Store your parachute unpacked in a cool, dry place in a lightproof container. This will prevent the permanent and hard-to-detect damage caused by ultraviolet light from sunlight and other sources. Certain other agents, notably 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, car trunks contaminated long ago with battery acid have destroyed many parachutes). The same goes for airplane hangars. Check your surface to be sure it's free from battery acid or other contaminants from maintenance days gone by.

## Repair

If your parachute is damaged, take it to an appropriately rated FAA rigger or equivalent of your country.

**Do not try to fix it yourself!** It may look like simple sewing, but many other factors are involved and do it yourself repairs generally mean trouble, whether they are major or appear to be minor. Don't ignore small tears, broken stitches, or other minor damage.

A small problem left untended can become a catastrophic or at least expensive problem if you keep jumping the canopy Parachute opening forces and flight stresses are significant, so you must always maintain your ICARUS canopy in top condition.

# MODIFICATIONS

Any owner or rigger modification of ICARUS products is **not approved** under any circumstances and voids all guarantees from the manufacturer.

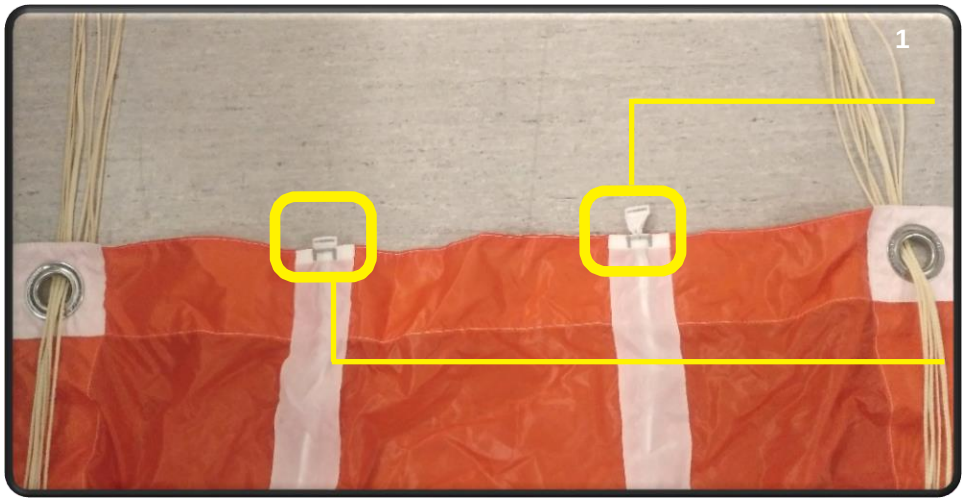
# PRE-PACK PREPARATIONS

Where you pack your canopy is important. Since sunlight irreversibly damages nylon parachutes, an indoor or shady area is best. Packing in the sunlight is unavoidable at some 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 debriefing your jump.

Packing on concrete, asphalt and even carpet should be avoided; these materials will wear the fabric, lines and fittings of your parachute system. A dry lawn is best. Also be aware that humidity affects pack volume, it can even change between the less humid mid-day and the more humid time right around sunset.

# PACKING

Stretch your parachute system out on the ground with the container facing up, as if someone would be wearing the rig at this point, he'd be laying face down with his head towards the parachute. Make sure that your slider is not collapsed and that both of the strings are pulled back all the way, like the left one shown in the picture 3.



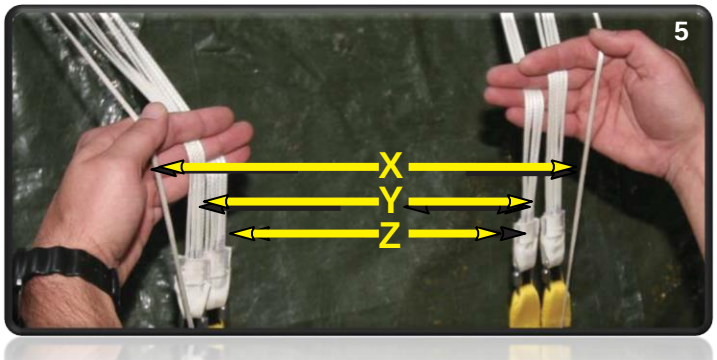

**Wrong !**


**Correct !**


Set the deployment brakes according to the manufacturer instruction of your harness container system or riser manufacturer.

Crouch next to the risers (facing the parachute) and grab the left line groups with your left hand and the right line groups with your right hand. Be sure, that the risers are not twisted! Separate the line groups using the slots between your fingers.

X - steering lines
Y - rear riser line group
Z - front riser line group



Start moving up the lines, allowing them to slide between your fingers while pushing the slider ahead until you reach the bottom of the parachute. While doing this make sure that the steering lines and the lines of front and rear riser groups run free and are not entangled with each other. When you reach the parachute, pull both hands apart approximately the width of the slider.
Shake the parachute a few times to settle everything.
If there are any twisted lines and or the parachute is not clear and you do not know how to solve this problem, get qualified assistance from a FAA rated rigger / instructor or a proper rated equivalent of your country.


The tail should be farthest from the rig and the nose openings should be facing the rig. If the reverse is true and the rig is positioned correctly as described earlier, then the parachute was attached to the harness backwards! If you do not know how to solve this problem, get qualified assistance from a FAA rated rigger / instructor or a proper rated equivalent of your country.



Now step outside the lines, transfer the lines to one hand and lay them over your shoulder, so that the left and right sides of the canopy hang at the same height.

The parachute should look something alike then in the picture 7. All lines should be kept taut and the nose should still be facing the rig, while all Slider grommets should be against the slider stops on the stabilizers.

Starting with the end cell nearest your legs, flake the entire nose with one hand. Then pick up the next, taking care not to miss any.

There should be 7, if you have a 7 cell parachute like the ICARUS OMNI for example, or 9, if you have a 9 cell parachute like the ICARUS S-FIRE for example.

When you have the entire nose flaked, rest it against your leg and pull the slider out, so he will be more or less aligned with the entire nose of your parachute. It should look something alike then in the picture 10.
Grab the entire nose, tuck it between your legs and hold it there








Since all the lines are bunched up in the middle, pull each sta bilizer panel out one by one until they form an irregular shape and be sure that none of the lines are wrapped around a slider stop on a stabilizer.
Clear the canopy fabric away from the "wind channel" by folding separately the A-B sections, the B-C sections and the C-D sections. The lines should be toward the center, while the fabric should not be. Clear the stabilizers.

Make sure that each slider grommet rests against its appropriate slider stop. Make sure that the stabilizers and the slider stops ( those white squares which you can see in the picture 14) lying outside the suspension lines.

Now take the last fold of the stabilizer and fold it towards the center till the slider, so the lines also the steering lines will be covered like in the picture 15.


Reach down and pick up the center of the parachutes tail, where the warning label is sewn on. Raise the tail just above the slider and hold it in place with the same hand that is holding the lines. Now start on one side to pull the excess material straight out and wrap that part of the tail half way around the canopy. Repeat that procedure on the other side of the parachute in the same manner.

Take both tail pieces in one hand and roll them together in to the middle so they completely encase the rest of the canopy.


Take both tail pieces in one hand and roll them together in to the middle so they completely encase the rest of the canopy.

Carefully place your free hand under the bundle, swing it out slightly so that the lines stay taught while you gently lay it on the floor. As it lies on the floor, the bundle should be kind of triangular in shape, as shown in the picture 18.

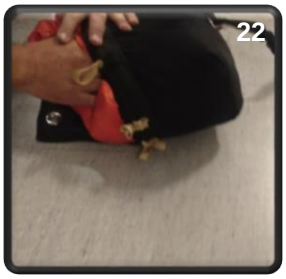
**NOTE:**
During this and all off the following steps until the parachute is inside the deployment bag and the lines are stowed, the slider should be wrapped up in the tail and stay like that. The slider must rest against the slider stops and must not be allowed to move down the lines, since even the smallest downward movement may increase the opening shock excessively.

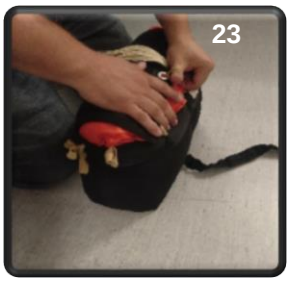
Now dress the parachute to a width slightly wider than the width of the deployment bag. The slider must stay inside the rolled tail! **Pay extra attention to the position of the slider until the bag is closed.**

Move to one side of the canopy and put one hand right under the slider edge of the bundle and put the other hand on top a little farther up and make a small S fold as shown in the picture 19.
**Don't let the slider move down the lines!**

Kneel on that first S-fold and put one hand under the top of the bundle and make an S fold in the opposite direction while the remaining material can be rolled under the fold as shown in the picture 20.
Now you should have a neat compact bundle, over which you can pull the deployment bag.






It takes practice to pack quickly and neatly. Every jumper has his own technique to make this easier and you'll quickly develop your own. The whole canopy should be in the bag before you follow your rig manufacturer's instructions for closing the bag, stowing, the lines, placing it in the pack tray, and closing container.

If you are not absolutely sure that you've understood and followed the previously described process entirely, get qualified assistance from a FAA rated rigger / instructor or a proper rated equivalent of your country.

**Sincerely,**
ICARUS