# Owner's Manual

## For packing and maintenance of

# Dual Hawk Tandem System

with

## SET 400 & SET 366 Main Canopies

Part number: 411540 & 411366

and

## Master Reserve Canopy

Part number: 430085


**Strong Enterprises**

*"The parachute company with imagination"*

**Division of S.E. Inc.**

**11236 Satellite Blvd. Orlando, FL 32837**

**Tel. (407) 859-9317 Fax: (407) 850-6978**

**www.strongparachutes.com sales@strongparachutes.com**



Manual P/N 510045

Price $25.00

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# ! WARNING !

**Parachuting is a hazardous activity that can result in serious injury or death. Failure to follow all warnings, instructions and required procedures may result in serious injury or death. Parachutes sometimes malfunction even when they are properly designed, built, assembled, packed, maintained and used. The results of such malfunctions are sometimes serious injury or death. There are so many factors, both human and natural beyond our control, that we want you to clearly understand that by using or intending to use our equipment, you are assuming a considerable risk of personal injury or death. If you are not willing to assume that risk, please return the equipment to the dealer where it was purchased for a full refund.**

# DISCLAIMER

**There are NO WARRANTIES that extend beyond the description of the products in this manual and neither the seller nor any agent of the seller has made any affirmation of the fact or promise with respect to the products except those that appear therein.**

**The liability of the seller is limited to the duty to replace defective parts found upon examination by the manufacturer to be defective in material or workmanship within 7 days after purchase and found not to have been caused by any accident, improper use, alteration, tampering, abuse or lack of care on the part of the purchaser.**

**This is a high performance parachute system and must be packed in accordance with the instructions in this manual and in accordance with service Bulletin #22.**

**Any person using this equipment must have successfully completed a Strong Enterprises Certification Course (TICC). The correct use of this equipment shall be the responsibility of the Strong Enterprises Certified Tandem Instructor.**

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## Warning/Disclaimer

## Table of Contents

# 1.0 Introduction

The chronicle of tandem skydiving, like so many elements of our sport, began with the vision and enthusiasm of an experienced skydiver to try something new and, more significantly, to share the thrill of freefall skydiving with someone else. It was 1977 and most parachutes in use were "rounds". Parachute technology was evolving but still far behind today's sophisticated equipment and procedures.

The skydiver took his wife as his first "Tandem Student," strapping her into the same harness with him for the experiment. Encouraged by the relative success, other skydivers made more jumps.

Intrigued by the possibilities of an actual training program centered on tandem skydiving, Ted Strong and Bill Morrissey began engineering the tandem concept into real equipment made specifically for tandem jumping.

The first tandem jump made on this newly engineered equipment was made in January 1983 with Ted Strong as the tandem pilot and Ricky Meadows, an employee at Strong Enterprises, the passenger.

Two and a half years and hundreds of experimental tandem jumps resulted in tandem skydiving equipment and procedures reaching an acceptable level of feasibility and more importantly, safety. In the process, further development produced major equipment innovations and advancements. In 1987, US Patent #4,746,084 was issued to Strong Enterprises for this original and pioneering work on three major tandem concepts.

Today, almost one million tandem skydives are made each year, bringing the thrill of freefall skydiving to a vast and more diverse audience than ever before.

Commitment to development and innovation continues at Strong Enterprises every day in everything we do. We are proud to be the parachute company with imagination!

## 1.1 Scope

This owner's manual constitutes the manufacturer's instructions for the assembly, operation, packing, and maintenance of the Strong Enterprises Dual Hawk Tandem Parachute System.

## 1.2 Operational Limitations

The Strong Enterprises Dual Hawk Tandem System is specifically designed for two people with loads up to 500 lbs with SET 400 (460 lbs with SET 366) and up to 175 knots IAS.

## 1.3 Parachute Repack Interval

The Strong Enterprises Master Reserve Canopy is subject to a 120-day repack cycle. When necessitated by climate, storage, or condition, the Master Reserve may require additional maintenance.

# 1.4 Model Description

See also section 1.12 for system specifications.

The Strong Enterprises Dual Hawk Tandem Parachute System is designed for freefall and open canopy dual instructional applications. It is protected under U.S. patent numbers 4,399,969 and 4,746,084. It allows two people, a Strong Enterprises Certified Tandem Instructor in the rear and a passenger in the front, to jump using one extra large main parachute while having the back up reliability of a compatible reserve parachute.

The assembly consists of the Dual Hawk Tandem instructor harness and container assembly, and a passenger harness assembly. A choice of 4 ram-air main parachutes are available: the 425 sq. ft. Master main canopy, the 520 sq. ft. T520 canopy, and the SET 400 and SET 366 zero porosity, semi elliptical canopies. The Dual Hawk Tandem System utilizes a drogue chute with a deflation line and deployment bag. The reserve is the 425 sq. ft. Master ram-air reserve canopy, with Grabber Pilot Chute and free type deployment bag (freebag). The packed system, ready to jump, measures 26 inches long by 16 inches wide by 8 inches thick. It weighs 53-1/2 lbs when packed with the 425 sq.ft. Master canopy, 55-1/2 lbs when packed with the 520 sq. ft. T520 canopy, 54 lbs when packed with the SET 400 canopy, and 53 lbs with the SET 366.

## *1.4.1 Dual Hawk Harness/Container Description (U.S. patent 4,746,084)*

The Dual Hawk Tandem container is made of 1000 denier nylon Cordura material. The container has a Spandura pouch built onto the bottom of the pack to house the drogue. The drogue is attached to the instructor's harness between the main and reserve containers. The harness is made of type VII webbing throughout. The main riser attachment point is a single piece, forged 3-D ring designed specifically for Strong Enterprises Tandem applications. This 3-D ring allows for independent loading of the instructor and passenger harnesses under the main or reserve canopy. The assembly includes instructor main ripcord, passenger main ripcord, reserve ripcord, and cutaway handle. The use of a 2-Pin Tandem Cypres is required.

## *1.4.2 Dual Hawk Passenger Harness Description*

The passenger harness is made of type VII webbing throughout and uses two 5000-pound butterfly snaps for the primary attachment to the instructor harness, and two 2500-pound adjustable quick ejector snaps for the side attachments. The passenger harness features a shoulder forward suspension point that reduces fatigue to the passenger's legs, thick padding, and an articulated ringed harness. The passenger Harness comes standard with a Y-shaped strap modification (Y-Mod). The modification has undergone three months of field tests.

The Dual Hawk Passenger Harness also incorporates the "Y-Mod" leg strap feature. The "Y-Mod" anchors the leg straps and back pad together, interlocking the lower half of the passenger harness together. Adjustment of the "Y-Mod" is the final step in proper passenger harness fitting and is performed after all other webbing adjustments have been properly fitted.

## *1.4.3 Main Canopy*

The SET (Semi-Elliptical Tandem) 400, max wt. 500 lb, and SET 366, max wt. 460 lb, are high performance zero-porosity 9-cell elliptical canopies. The planform is a double taper elliptical with a leading edge that is essentially straight while the trailing edge tapers forward and the airfoil becomes thinner toward each wingtip. The five center cells have a single soft rib, while the four end cells each have two soft ribs. Using the maximum chord (the center cell), the canopy has an aspect

ratio of 2.7; using the mean chord, the aspect ratio is 2.9. The canopy is reefed with a flag slider, and features a combination of cascaded and continuous suspension lines. Materials include 1.18 oz, 0 cfm and 1.12 oz, 0-3 cfm ripstop nylon fabric, 1500 test Spectra lines, 1500 lb Spectra control lines, and a combination of 3/8-, 1/2- and 1-inch wide nylon reinforcing tapes.

### *1.4.4 Reserve Canopy*

The Master Reserve is specifically designed to handle two people and loads up to 500 pounds. The canopy has nine cells with a planform of 425 square feet. Fabric is 1.12 oz, 0-3 cfm ripstop nylon.. The Master reserve uses 700 pound test Kevlar cord for all lines.

### *1.4.5 Reserve Deployment System*

The deployment bag is a wedge shaped "free" type bag made from ripstop nylon with four grommets on the locking flap and four stows on each side. The suspension lines are stowed with bungee and plastic chokers. The bridle consists of a 13-foot length of type XII nylon webbing. The Grabber Reserve Pilot Chute is a spring type, 36-inch diameter, high drag pilot chute made of ripstop nylon with a meshed lower portion.

### *1.4.6 Main Ripcords*

The Dual Hawk Tandem Parachute System comes with four PVC main ripcords (two are spares) made from 5/32 inch coated aircraft cable, 41 inches long. Both the main ripcords (instructor and passenger) are located on the instructor's right main lift web. The passenger's ripcord and ripcord cable housing is designed to be detached from the instructor's main lift web and attached to the passenger's main lift web as the passenger is being connected to the instructor.

### *1.4.7 Reserve Ripcord*

The reserve ripcord is a dual cable type utilizing a small angled "D" (Raft) handle. It is located outboard on the instructor's left main lift web. The shorter cable is 25-1/4 inches while the longer cable is 26-1/2 inches. A single locking ripcord pin terminates both cables.

### *1.4.8 Breakaway Drogue Release Handle (Mandatory as of January 1, 1995)*

The breakaway drogue release handle has been designed to activate the drogue release ripcord in addition to releasing the main canopy. This is an important improvement to ensure release of the drogue, prior to reserve activation. No modifications are required to the Dual Hawk in order to install this system. The soft Cordura "pillow" attaches outboard on the instructor's right main lift web and protrudes two coated 3/32" stainless steel cables. The easy grip "finger pocket" handle allows an easier, no-slip pull.

### *1.4.9 Main Deployment Bag*

The ALS (Anti Line Slump) main deployment bag eliminates line slump while allowing the use of rubber bands to stow the lines. One extra flap has been added to cradle the stowed lines during bag snatch. Velcro sides allow easy and orderly placement of the canopy into the bag without disrupting the canopy folds.

### *1.4.10 Drogue*

The drogue chute incorporates a hemispherical design with an open diameter of 3 feet. A deployment handle (drogue pud) is located at the apex. The drogue bridle is 12 feet long, made of 1-1/2 inch Kevlar, with a deflation system that runs from the apex of the drogue canopy to the main canopy bridle attachment point.

## 1.5 Harness Adjustment

The following information is provided as a general guideline and is not intended to be used as a Tandem Instructor Certification Course.

**1.5.1 Instructor Harness**

1. Ensure that all straps are adjusted all the way out and not twisted.
2. Unhook B-12 snaps and let the leg straps hang free.
3. Lift the rig up by its main lift web and put it on as you would a coat.
4. Thread the chest strap through the friction adapter and tighten until both main lift webs are parallel with each other. Be sure it is not routed through the reserve ripcord handle.
5. Fold and stow the excess chest strap in the supplied elastic keeper.
6. Route the leg straps between your legs, removing all twists and fasten the B-12 snaps to their V-rings.
7. Tighten the leg straps evenly until they are snug but not uncomfortable and stow their excess webbing in the elastic keepers.
8. Adjust both horizontal straps for comfort and stow the ends in the elastic keepers.
9. Be sure both main ripcord handles are properly routed and stowed.

**! WARNING !**

**The passenger harness must be donned and adjusted completely while on the ground - NEVER in the airplane. Check and double-check proper fit BEFORE boarding the aircraft. Once the passenger is properly fitted, you should resist the urge to further tighten the MLW in the airplane while the passenger is seated. Doing so may inhibit the passenger's ability to arch. Keep other minor adjustments (such as rear diagonals) to an absolute minimum.**

# 1.5.2 Instructions for fitting the Standard Tandem Passenger Harness

PN 240075-5

For use with the Strong Tandem Systems

Congratulations on your purchase of a Strong Enterprises Standard Passenger Harness. Following the nine simple steps below will assure your passengers safety, and offer them a comfortable Tandem Skydiving experience.

1) Extend all 8 adjustments completely out to the stops.

2) Help the student step into the leg straps (or fasten B-12 snaps) and position the harness on the student's shoulders.

3) Fasten the chest strap securely.

4) Fasten the bellyband so that the hip rings are to the front of the wearer's hips and the chest strap and bellyband are equally snug. The main lift webs should be parallel from shoulders to hip.

5) Tighten the leg straps with the flat leg pad just under the butt and the apex of the leg strap at the hip.

6) Begin adjusting the main lift web so the sewn risers is centered on the shoulder, and that the Butterfly snap rests just rear of the shoulder.

7) Tighten the rear diagonals so that the passenger harness is secre against the passenger's back.

8) Tighten the horizontal back strap. The lower harness should now be fitted and snug.

9) Follow Y-Mod instructions on page 9.

Your student should now be comfortable and secure in the harness. Be certain to stow the extra webbing in the keepers provided.

*Note!*

*As of December 31st 2007, all Deluxe Tandem Passenger Harness are required to be retrofitted with the Y-Mod passenger Harness Modification. This 8th adjustment is to prevent a poorly fitted passenger harness form creating an unsafe situation for tandem passengers.*

# 1.5.2.1 Y-MOD HARNESS INSTRUCTIONS Ref. Service Bulletin # 24

The addition of the Y-Mod passenger harness modification does not change the original fitting instructions of the Dual Hawk Tandem System passenger harness. The Y-Mod should be treated as an additional step in proper harness fitting when installed.

The Y-Mod allows the horizonal back strap to pass through it's webbing and be securely tightened, as per normal passenger harness fitting instructions.

Once the horizontal back strap has been securely tightened, and all other traditional webbing adjustments have been made, the Y-Mod can then be tightened by pulling down on the excess webbing protruding from the friction adaptor located just below the harness back pad.

The tightening of the Y-Mod webbing will secure the Y-Mod webbing and leg straps in place. The excess Y-Mod webbing can then be stowed under the fabric keeper.

# 1.6 System Function

### *Main Deployment*

The drogue must be deployed before activating the main canopy. NO DROGUE = NO MAIN! While in stable drogue-fall, wave off and clear the air above you. Look-Reach-Grasp one of the two main ripcord handles and pull.

**! WARNING !**
**NO DROGUE = NO MAIN**

### *1.6.1 Malfunctions*

This section is only to be used as a general guideline for identifying and dealing with malfunctions. It is not a course of instruction. Only professional training from a qualified Examiner using a suspended harness can properly prepare you to manage a malfunction.

Malfunctions are divided into two categories: total malfunctions and partial malfunctions.
A total malfunction is the failure to initiate deployment of the main parachute. Reasons for a total malfunction may include, but are not limited to, a lost or floating ripcord handle or a hard ripcord pull. Because you will be at or near terminal velocity, a total malfunction requires immediate action. The proper procedure is to promptly activate the reserve while remaining in a stable, face-to-earth position. See section 1.6.4 Reserve Deployment.

A partial malfunction is the partial deployment of the main parachute. Partial malfunctions can be further subcategorized as high-speed and low-speed. High-speed malfunctions (drogue-in-tow, bag lock, streamer) require quick thinking and immediate action. Low-speed malfunctions (hung slider, line over, broken lines, torn cells and any spinning malfunction) typically allow more time to assess and react to the circumstances. If the decision is made to cutaway from a malfunctioning main parachute and deploy the reserve parachute, use the following procedure.

1. Look at and grasp the cutaway handle with your right hand.
2. Look at and grasp the reserve ripcord handle with your left hand.
3. Peel the cutaway handle from the main lift web and pull to full arm extension.
4. **Immediately** pull the reserve ripcord handle to full arm extension.

**! WARNING !**
**If the drogue did not release after pulling one of the two main ripcord handles, attempt to release the drogue by pulling the second main ripcord handle before implementing the emergency procedure described above.**

### *1.6.2 Reserve Deployment*

This section is not intended to be a course in dealing with skydiving emergencies. It is simply a general description of how the Strong Enterprises Dual Hawk Tandem Parachute System emergency parachute is deployed.

When deploying the reserve parachute, it is recommended that the tandem pair be in a stable, face to earth position. However, some instances require immediate reserve deployment.
**Priority One – Pull.**
**Priority Two – if possible, pull stable.**

1. Assume a hard arch position.
2. Look at and grasp the reserve ripcord handle.
3. Pull the reserve ripcord handle to full arm extension.

**! WARNING !**
**Consult the training materials of the Strong Enterprises Tandem Instructor Certification Course or contact Strong Enterprises directly for more detailed emergency procedures.**

## 1.7 Packing Data Card

The Packing Data Card is a historical packing document that accompanies the reserve parachute canopy throughout its service life. The packing data card provides a means of recording scheduled and unscheduled canopy or AAD actions performed during the reserve parachute's life cycle. A prepared packing data card should remain with the reserve canopy, not the container. When full, the data card should be retained and attached to a new card.

## 1.8 Care of your Dual Hawk Tandem System

Observe these precautions to maximize the service life of your Strong Enterprises Dual Hawk Tandem Parachute System. Use care in handling packed parachutes as metal parts could cause personal injury. Remove all jewelry when packing or performing maintenance on the parachute. Damage to the canopy materials could result from watches, rings, bracelets, etc. Avoid handling the ripcord grip when working with a packed parachute. Use every effort to protect the parachute from the weather elements, dust, dirt, oil, grease, and acids. Place unpacked parachutes in appropriate kit bags. Cover canopy during periods of inactivity. Avoid prolonged exposure to sunlight, inspection lights, or fluorescent lights. Nylon material is subject to deterioration under ultraviolet light. Use a heated building to store parachutes when available. Store parachutes in a dry, well-ventilated location, protected from theft, dampness, fire, dirt, insects, rodents, and direct sunlight.

**CAUTION**
**LEAVING THE PACKED PARACHUTE SYSTEM EXPOSED TO THE SUN WILL GREATLY DECREASE ITS SERVICE LIFE!**

# 1.9 Service Life

The expected service life of the Strong Enterprises Dual Hawk Tandem Parachute System components are as follows:

| Component | Expected Service Life | |
|---|---|---|
| Harness/Container/Passenger Harness | 2000 | Jumps |
| SET 400-366 main canopy | 1200 | Jumps |
| Master and T520 main canopies | 1200 | Jumps |
| Drogue | 1200 | Jumps |
| Lines on main canopy | 400 | Jumps |
| Lines on reserve canopy | 20 | Jumps |
| Master Reserve | 20 | Deployments |

# 1.10 Inspection

### *1.10.1 General Inspection*

We are justifiably proud of our quality assurance methods, however, prior to assembly of any parachute system, a current and qualified rigger should perform a complete inspection, examining for any defects or oversights in construction. Line lengths (especially critical in ram-air canopies) should also be checked. See Sections 12 & 13 for line length and trim data (also includes control line and brake settings).

### *1.10.2 Left - Right References*

All references to left or right in this manual are based on the wearer's perspective unless otherwise specified.

### *1.10.3 Suspension Line References*

The "A" lines are at the leading edge (nose) of the canopy, with the "B", "C", and "D" lines progressing back toward the trailing edge (tail). Upper and lower control lines are identified as "E" and "F" lines, respectively, and "G" lines connect the lower control lines to the toggles.

### *1.10.4 Reserve Pre-Packing Inspection*

A thorough inspection is required during every reserve canopy repack. This can be done by turning the complete system (harness and canopy) face up. Standing on a chair, hold the top leading edge (nose) of the canopy at shoulder height, spreading each cell apart to look inside. Inspect each seam and panel for damage. Check to make sure the risers are not twisted while verifying proper line continuity. The slider grommets should be closely inspected for imperfections.

### *1.10.5 Pre-Jump Inspection*

Prior to donning the system, perform an airworthy inspection. Include at a minimum, the harnesses and container, ripcords and cutaway handle, drogue riser, drogue bridle routing, 3-ring release assemblies, harness adjustments, reserve ripcord pins, and packing data card.

# 1.11 25-Jump Inspection Check List

| | 1.11.1 Harnesses |
|---|---|
| ☐ | Hardware functional and tacked (leg strap B-12s). |
| ☐ | Return springs on snaps still functional. |
| ☐ | Drogue riser "L" link screws tight. |
| ☐ | No cuts, fraying or broken stitches on webbing. |

| | 1.11.2 Container |
|---|---|
| ☐ | Grommets secure and in place. |
| ☐ | No holes in Cordura. |
| ☐ | No broken stitches. |
| ☐ | Velcro is clean and in place. |
| ☐ | Passenger side attachments are secure with no broken stitches. |
| ☐ | Housings securely tacked. |
| ☐ | Drogue pouch secure, no holes. |

| | 1.11.3 Ripcords and 3 Ring Release Handle |
|---|---|
| ☐ | No kinks or frays in ripcord cables. |
| ☐ | Terminal balls are secure. |
| ☐ | Pins straight. |
| ☐ | No kinks, dents or loose strands in the 3-ring release cable. Remove and clean cables. |

| | 1.11.4 Main Canopy |
|---|---|
| ☐ | No holes or tears in the fabric, stitch integrity good. |
| ☐ | No excessive wear or stretching/shrinkage of the lines. |
| ☐ | No broken stitching at cascade line junction. |
| ☐ | No cracks in Rapide links. |
| ☐ | Swedish link good. |
| ☐ | No holes in slider, stitching good, no burrs on grommets. |
| ☐ | Grommets secure. |

| | 1.11.5 Drogue and Main Bag |
|---|---|
| ☐ | Reinforcing tape on drogue body good. |
| ☐ | Stitching and zigzag at base of drogue canopy complete. |
| ☐ | No holes or excessive wear in the bridle. |
| ☐ | No excessive wear and no twists in the Y-deflation line. |
| ☐ | Bungee stows not broken or frayed, and not stretched out longer than 3 inches. |
| ☐ | Grommets secure. |
| ☐ | Flex Pin smooth, no nicks in coating, not frayed. |

## 1.12 System Specifications

| Component | With SET400 | With SET366 | With Master 425 | With T520 |
|---|---|---|---|---|
| System Weight, lbs | 54 | 53 | 53-1/2 | 55-1/2 |
| Span, ft | 34 | 34 | 31-1/2 | 38-1/2 |
| Chord, ft | 12.6 to 10.4 | 11.8 to 9.7 | 13-1/2 | 13-1/2 |
| Area, sq.ft. | 402 | 360 | 425 | 520 |
| Aspect Ratio | See sec. 1.5.3 | See sec. 1.5.3 | 2.3 | 2.85 |
| Weight (less risers), lbs | 15 | 14 | 14 | 16-1/2 |
| Canopy Fabric | 1.18 oz, 0 cfm | 1.18 oz, 0 cfm | 1.1 oz, 0-3 cfm | 1.1 oz, 0-3 cfm |
| Slider Dimensions, in x in | 34 x 34 | 34 x 34 | 33 x 33 | 33 x 36 |
| Forward Speed (400 lbs), mph | 30 | 30 | 26 | 20 |
| Rate of Descent, fps | 12-14 | 14-16 | 12-14 | 10-12 |
| Max Suspended Weight, lbs | 500 | 460 | 500 | 500 |

## 1.13 Reporting of Equipment Improvement Recommendations

In our effort to continuously improve our products, processes, and services, we invite you to send us your comments. As a properly trained and qualified user of this equipment, you are uniquely suited to provide us with valuable feedback regarding design and/or performance. Tell us what you like as well as what you don't like. Send us an email or mail us a letter to:

Strong Enterprises
11236 Satellite Blvd.
Orlando, Florida 32837
tandem@strongparachutes.com
www.strongparachutes.com

# 2.0 Parts list

*430085 Canopy,*
*Master Reserve, 1 ea*

*411540 Canopy,*
*SET 400, 1 ea*


*411536 Canopy,*
*SET 366, 1 ea*

*114702 Instructor Harness/*
*Container/*
*Passenger Harness, 1 ea*

*240075-5 Passenger Harness with*
*Y-Mod modification, 1 ea*

*990063 AAD, Cypres 2-Pin*
*Tandem, 1 ea*

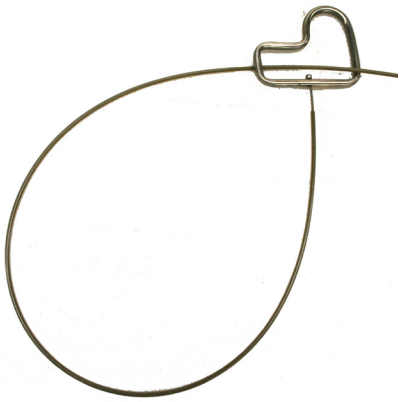
*480026 Drogue*
*w/ Y-Deflation line*
*and 20.5" flex pin, 1 ea*

*780624 Reserve static line*
*lanyard w/ring, 1 ea*

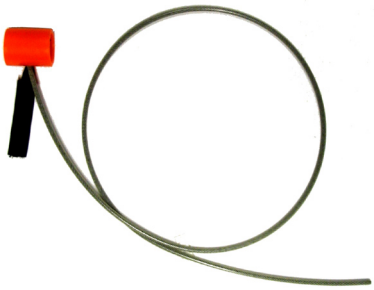
*834608 Risers, Main, Type VII*
*w/toggle pockets, 1 pr*

*866061 Toggles, Reserve, 2 ea*

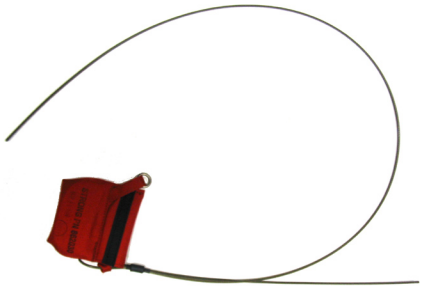
*627264 Ripcord, Reserve, 1 ea*



*673410 Ripcord, Main Drogue Release (MB)(Option), 2 ea*



*678410 Ripcord, Main Drogue Release (PVC) (Optional), 2 ea*



*862030 Breakaway/Drogue Release Handle, 3-ring (red) 2 ea*

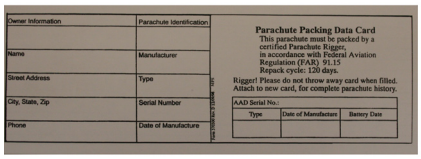
*730324 Deployment Free Bag with bridle, Reserve, 1 ea*

*866071 Toggles, Master, SET 400, and SET 366 Yellow, 2 ea*

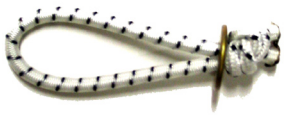
*790130 Pilot Chute, Grabber, 1 ea*

*861515 Drogue Riser through loops (4 spare), 5 ea*

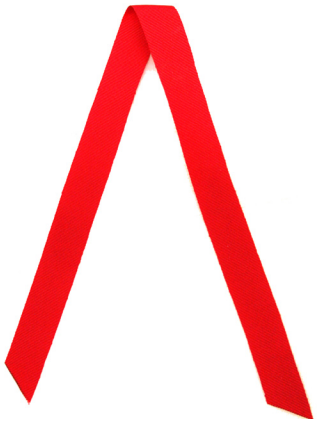
*720531 Deployment Bag #2, Fits #2 main container, 1 ea*
*720532 Deployment Bag #3, Fits #3 main container, 1 ea*




*580502 Packing Data Card, 1 ea*



*861035 Reserve Hesitator Loop w/washer, 1 ea*



*984119 Pull-up cord, 1 ea*

*861517 Closing Loop, Main, 2", Spectra 1800 lb, 2 ea*

*861014 Reserve Closing Loop, w/Cypres washer 1-1/2", 2 ea*


*813016 Y-Deflation Line (Spare), 1 ea*

*816003 Carrying Bag, 1 ea*


*510045 rev. H Owner's Manual, Dual Hawk Tandem Parachute System, 1 ea*

# 3.0 Required Packing Tools and Consumables

**Tools:**

**A - Packing paddle, 1 ea**

**B – Cypres approved pull-up cord, 2 ea**

**C - Temporary locking pin, 2 ea**

**D – Screwdriver, flat head**

**E – Seal press**

**F - Knee plate**

**G - Positive leverage closing device**

**Consumables:**

**H – Lead seal**

**I – Seal thread**

# 4.0 Inspection: Technician/Rigger

Perform inspections as follows:

## 4.1 Overall Inspection

An overall inspection will be made on the Dual Hawk Tandem System to ascertain the following:

- **Packing Data Card.** Examine the Packing Data Card to verify the Master Reserve Canopy is in date (i.e., ensure it has been inspected and repacked by a qualified FAA certificated rigger within the last 120 days).
- **Assembly completeness.** Ensure that the applicable assembly is complete and no components or parts are missing.
- **Operational adequacy.** Check item components and parts to ensure proper assembly, which includes attachment and alignment, and that assembled product functions in prescribed manner. Further, ensure that no stitch formation or sewn seam has been omitted.
- **Markings and stenciling.** Inspect each assembly and components for faded, illegible, obliterated, or missing informational data or identification numbers.
- **Foreign material and stains.** Inspect each assembly and related components for presence of dirt or similar type foreign material. Also check for evidence of mildew, moisture, oil, grease, pitch, resin, or contamination by salt water.

## 4.2 Detailed Inspection

In addition to the overall inspection performed in section 4.1, a detailed inspection will be performed on materials, which constitute assembly or component construction using the following criteria, as applicable:

- **Metal.** Inspect for corrosion, dents, bends, breaks, burrs, rough spots, sharp edges, wear, deterioration; damage, loose, or missing grommets, safety pins, connector snap, hook eye, pack fastener, improper swaging or welding; loss of spring tension.
- **Cloth.** Inspect for breaks, burns, cuts, frays, holes, rips, snags, tears; loose, missing or broken stitching or tacking; weak spots, wear, or deterioration.
- **Fabric tape, webbing, and cordage.** Inspect for breaks, burns, cuts, frays, holes, rips, snags, tears, incorrect weaving, and sharp edges formed from searing; loose, missing, or broken stitching, tacking, whipping, and weaving; weak spots, wear, and deterioration.
- **Rubber and elastic.** Inspect for burns, cuts, holes, tears, weak spots; loss of elasticity and deterioration.

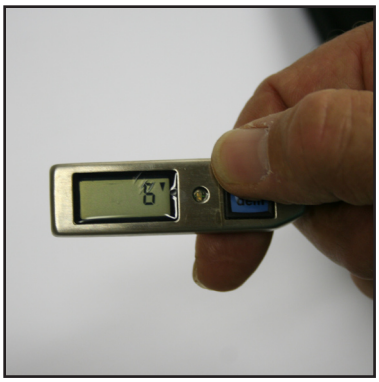
# 5.0 Packing the Master Reserve Canopy

Rigger Qualifications

FAR Part 105.43 (2) states that only a certificated and appropriately rated senior or master parachute rigger may pack a reserve parachute that will be carried for use aboard an aircraft in the U.S. By following the instructions in this manual, any current, appropriately rated rigger should be able to assemble and pack the Strong Enterprises Master Reserve canopy.

## 5.1 AAD Installation

Currently, the CYPRES AAD is the only unit that is approved for use with the Strong Enterprises Dual Hawk Tandem Parachute System. All CYPRES channels and pockets are factory-stitched into the rig and no modifications are necessary. Installation requires no tools and can be accomplished by a senior or master rigger in under five minutes using the following technique.



**1.** Following Airtec GmbH Safety System's manufacturer instructions, test the Cypres unit before installation.

**2.** Place the processing unit in the pouch.

**3.** Route the control unit out from the right side of the pouch, through the channel, up to the top of the container and place it in the clear pocket, on top of the reserve

**4.** Route right and left cutters, through the left and right channels (1 ea), under the Velcro and place in the elastic keepers on each side flap.

***Note!***

*Use only special CYPRES closing loop with washer when installing this AAD.*
*See Cypress Owners manual for battery life.*

# 5.2 Assembly

### *5.2.1 Reserve Risers*

The Dual Hawk Tandem harness is built with four reserve risers to accommodate the Master Reserve canopy on "L" links. The back of each rear riser is equipped with a guide ring and Velcro for steering toggles.

### *5.2.2 Layout and Assembly*

Lay the harness and container on a smooth clean surface as if the wearer were face down, head toward the canopy. Lay the canopy out and straighten the line groups. The front "A" and "B" line groups go to the front risers; the "C" and "D" line groups go to the rear risers. The smooth side of the grommets in the slider goes toward the harness. Attach the connector links to the corresponding risers temporarily and do a complete continuity check on each link to insure proper sequence. Tighten the "L" links with a flat head screwdriver. Clear each set (left and right) of upper control lines.

Lower control lines should pass through the rear grommets of the slider (clear of the suspension lines) then through the Type I webbing guide loop located on the rear riser just below the "L" link and then through their respective guide rings on the rear risers. Attach the steering toggles to the lower control lines by inserting the looped lower end of the lower control line through the grommet in the toggle from the Velcro side, then pass the bottom end of the toggle through the loop and cinch the loop snug around the toggle. If practical, the rigger should then carefully inflate the reserve as a final continuity and assembly check.

### *5.2.3 Bag, Bridle and Pilot Chute*

Pass the 13-foot long bridle webbing through the reserve deployment bag's loop, then pass the large loop end of the webbing through the smaller loop end and cinch snug. Pass the large loop end of the bridle through the pilot chute's loop, and then pass the entire pilot chute through the large loop of the bridle.

**! WARNING !**
**This reserve deployment bag assembly must not be attached to the reserve canopy.**

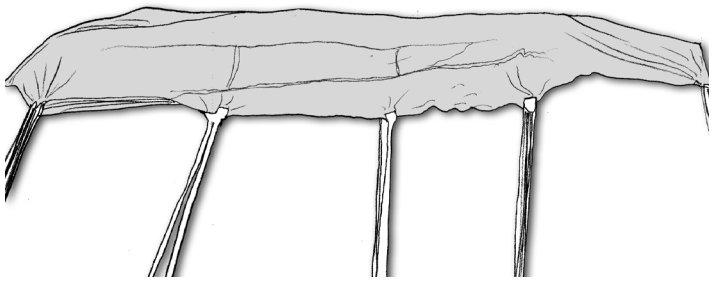
# 5.3 Packing the Master Reserve Canopy

Parts of these packing instructions are similar to those shown in other manuals. This method has worked best under all speeds and conditions as tested by Strong Enterprises. This procedure utilizes a combination of flopping and stacking the canopy.

**! WARNING !**
**PRO packing of the Master Reserve canopy**
**IS NOT APPROVED.**

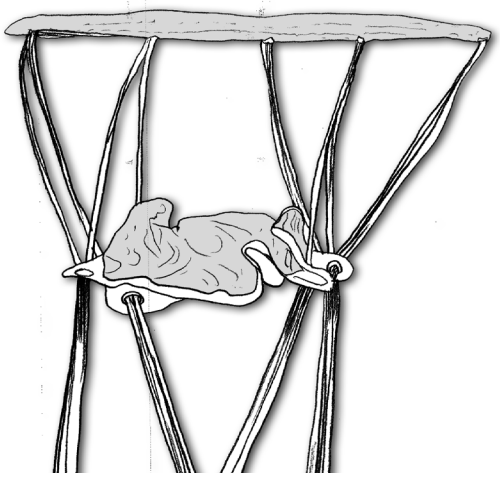
## 5.3.1 Lay out the Canopy

Lay the canopy out with the left or right side up. Orient the harness face down, head toward the canopy. Clear the lines of twists and tangles. Confirm suspension line continuity by tracing the lines from each quadrant of the canopy to their proper sequence on each riser.



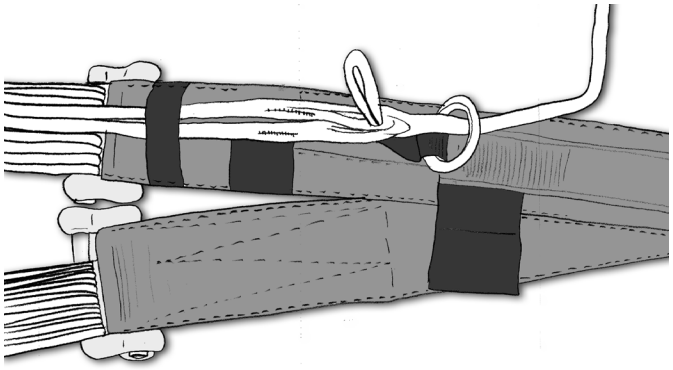
## 5.3.2

Insure that the control lines are clear of other lines and that they pass through the rear grommets of the slider as well as through the type I guide loop and the guide ring on each rear reserve riser. Position slider near connector links. Clear the nose with a combing motion, picking up the center seam of each cell and pleating each cell all the way to the tail.



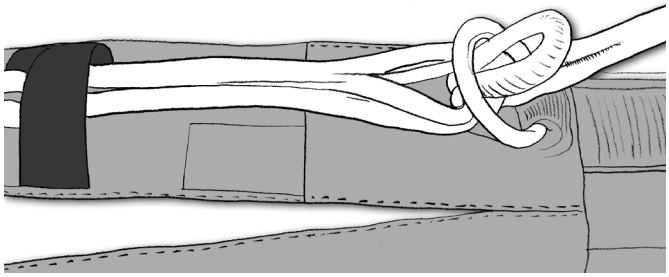
# 5.3.3 Setting the Brakes

Pull the control line through the steel guide ring located on the rear riser until both brake loops (built into lower control lines) are just below the ring. Bring the locking loop (located on the riser behind the steel ring) up through both brake loops and pass it through the guide ring.

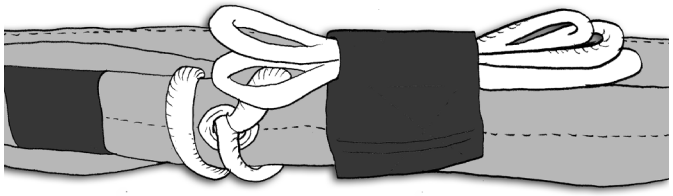


***Note!***

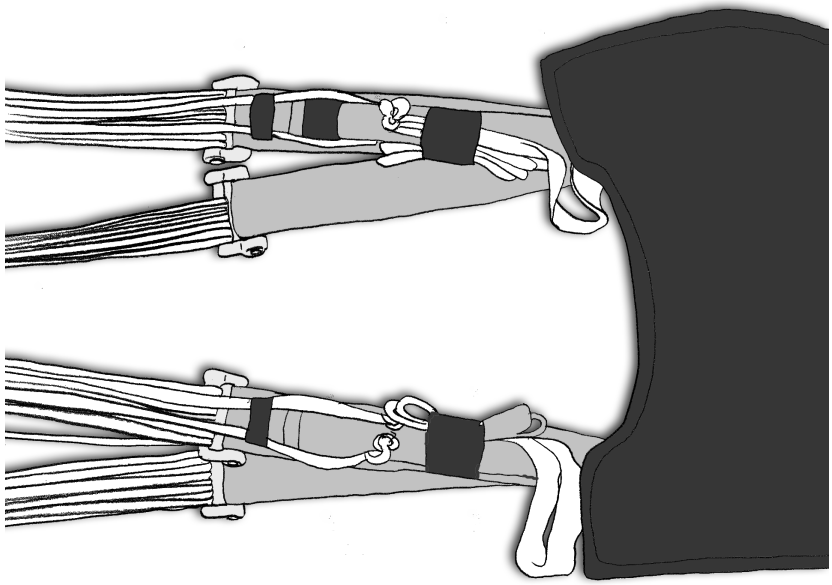
*Pulling both left and right control lines at the same time will help keep the tail neat.*



Insert the tip of the toggle (the portion of the toggle above the grommet) through the locking loop up to the grommet. Place the tip of the toggle in the elastic keeper and mate the toggle to the Velcro on the riser. S-fold the excess line and lay it next to the toggle. Mate the Velcro on the toggle keepers. Lay the bottom of the toggle handle flat against the riser. Repeat procedure on the opposite riser.

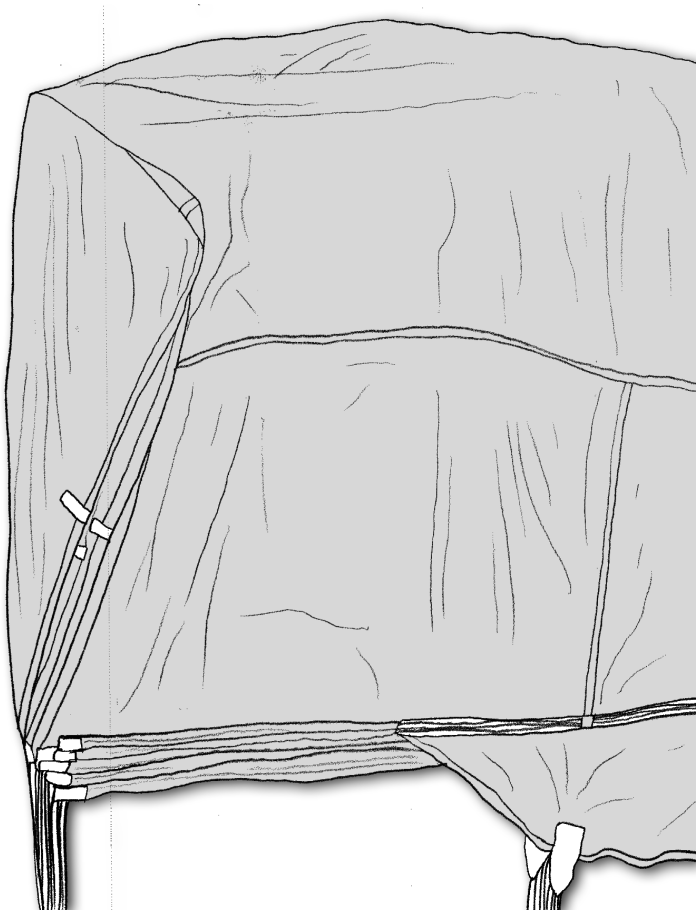


Visually check the lines, they should all be straight, with no slack between the canopy and the harness.



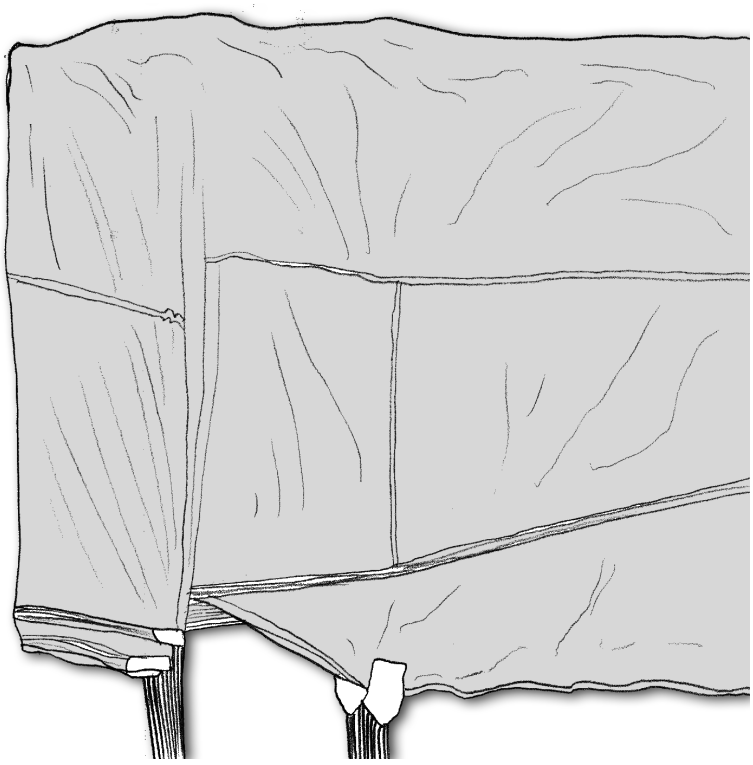
## 5.3.4 Folding the Canopy

Fold (do not stack) the nose over up to the "A" line group.



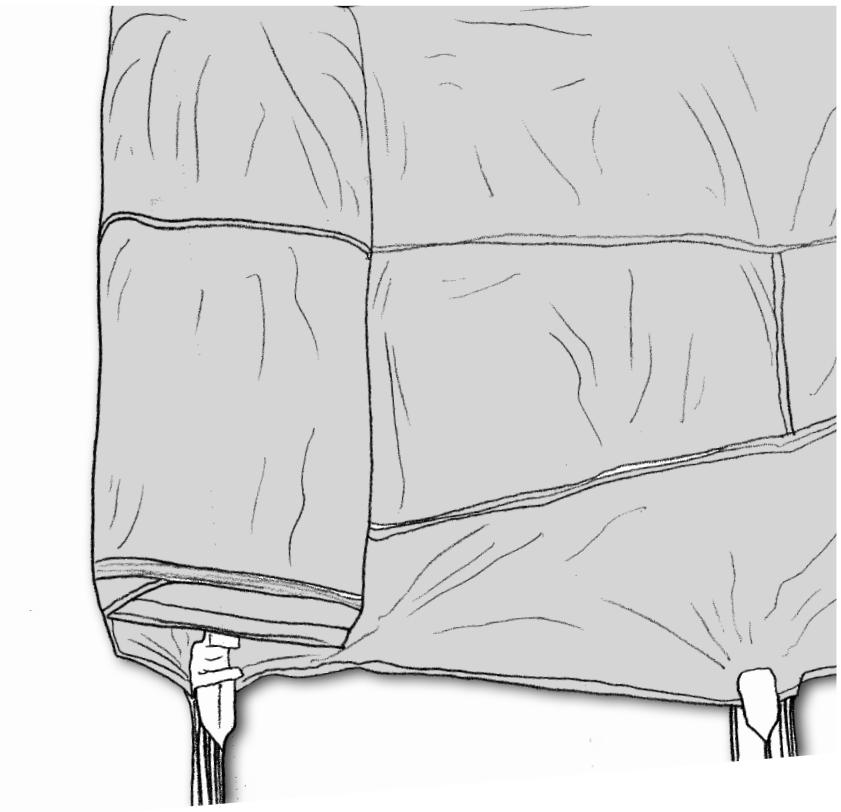
## 5.3.5

Fold the canopy again half way between the "A" line group and the "B" line group.



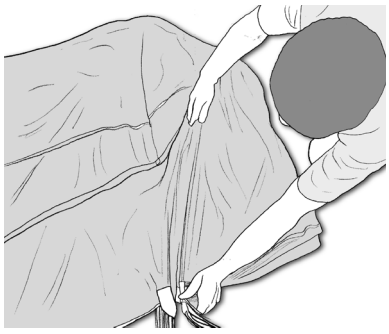
## 5.3.6

Continue with one more fold so that the "A" line group is lying directly on top of the "B" line group. Maintain tension when folding to keep the lines taut.



## 5.3.7

Move to the tail of the canopy and slide the tail section over to the "D" line group, so that the line attachment points are placed along side the "D" line slider stops.



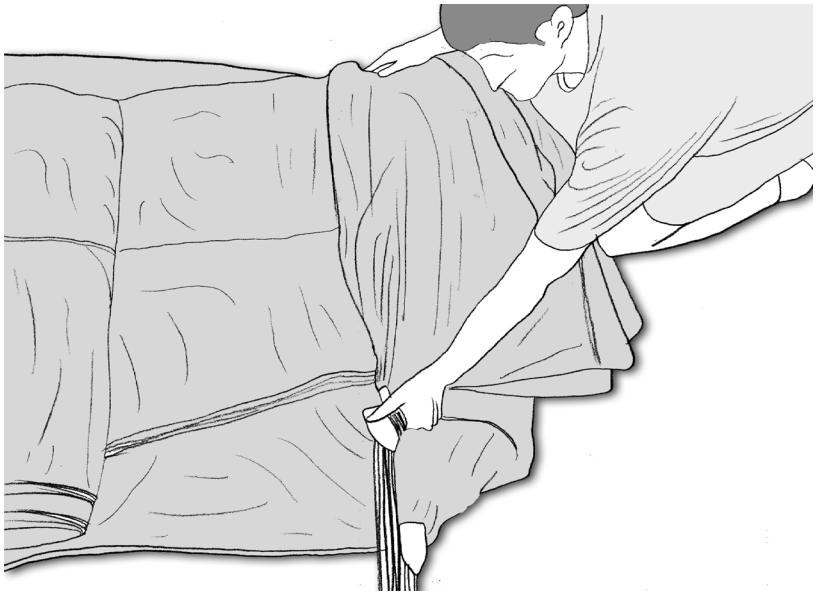
## 5.3.8

Now grab the canopy just above the "D" line attachments with one hand, and the top of the canopy with your other hand, keeping tension on the lines.

Now stack the "D" lines and control lines on top of the "C" lines.

***Note!***

*Maintain line tension during all stacks by pulling on the canopy.*



## 5.3.9

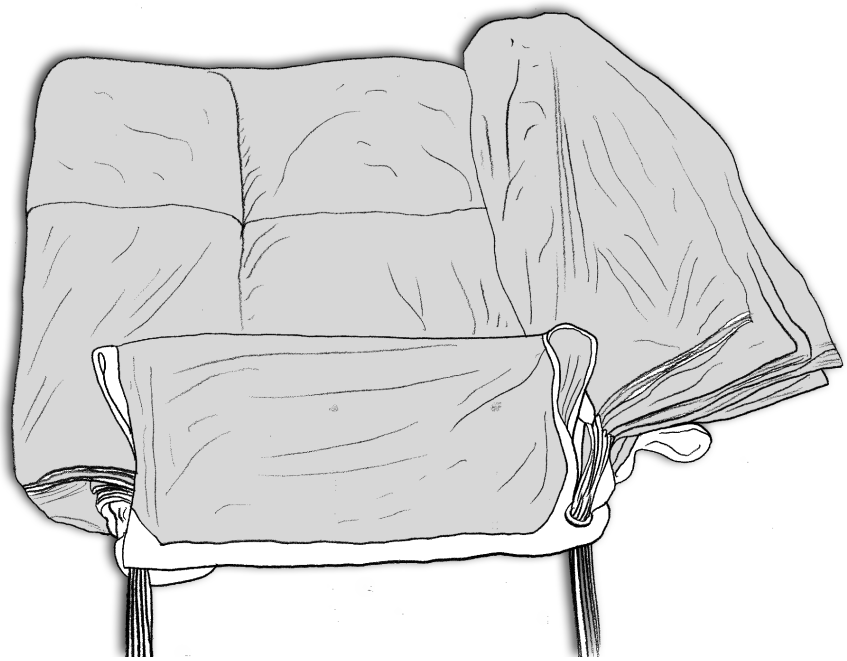
Move the slider up to the base of the stabilizers.

Make certain that any twists in the lines are ABOVE the slider.

***Note!***

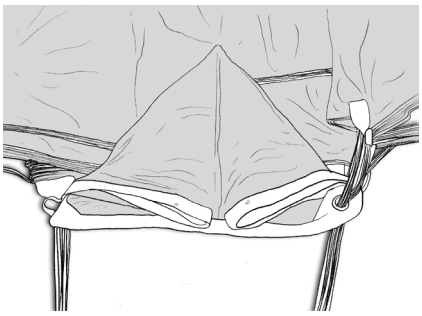
*Twists are likely to occur at this point as a result of folding the nose. This is normal.*

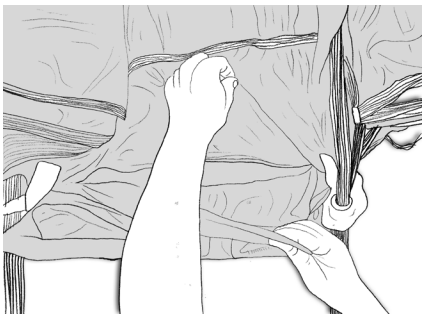
Spread the slider out flat (it will be folded in half span-wise) and stow it between the two stabilizers.

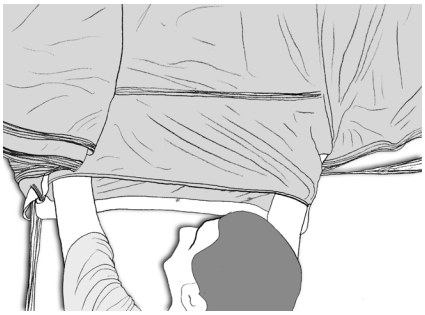


## 5.3.10

Fold slider into a point and insert between stabilizer. Then spread.

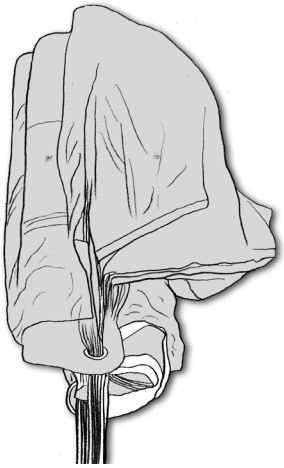






## 5.3.11

Make one more stack with the tail section placing it on top of the nose section so that all lines are stacked on top of one another.

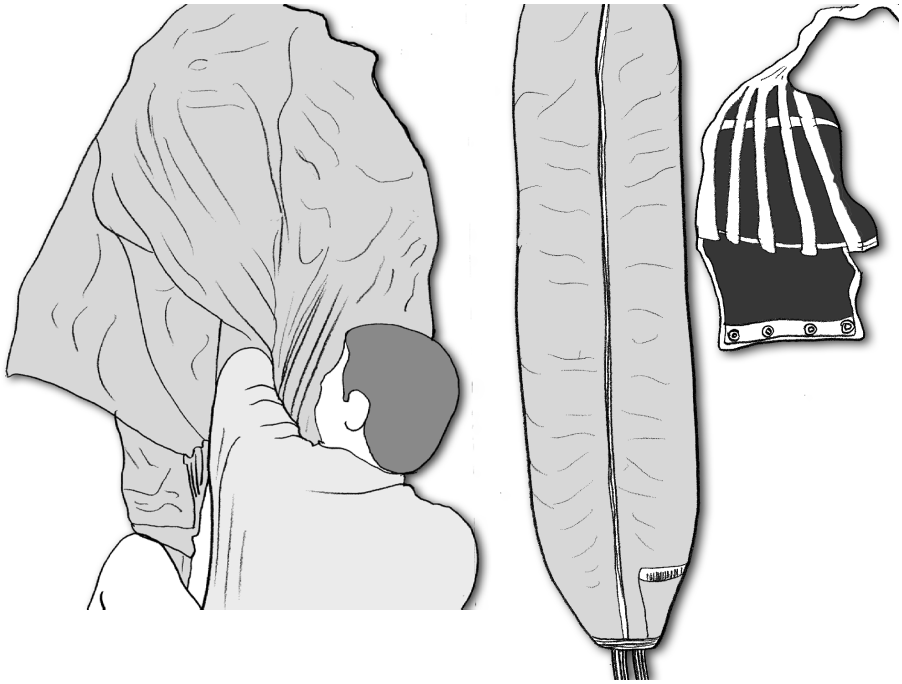


## 5.3.12 Dressing the Tail

Dress the tail, half on one side and half on the other so that the center of the tail is on top. Care should be taken when doing this to insure that the control lines stay neatly stacked on top of the "D" lines and do not fan out over the canopy fabric. The trailing edge (four needle seam) should be placed over the slider.

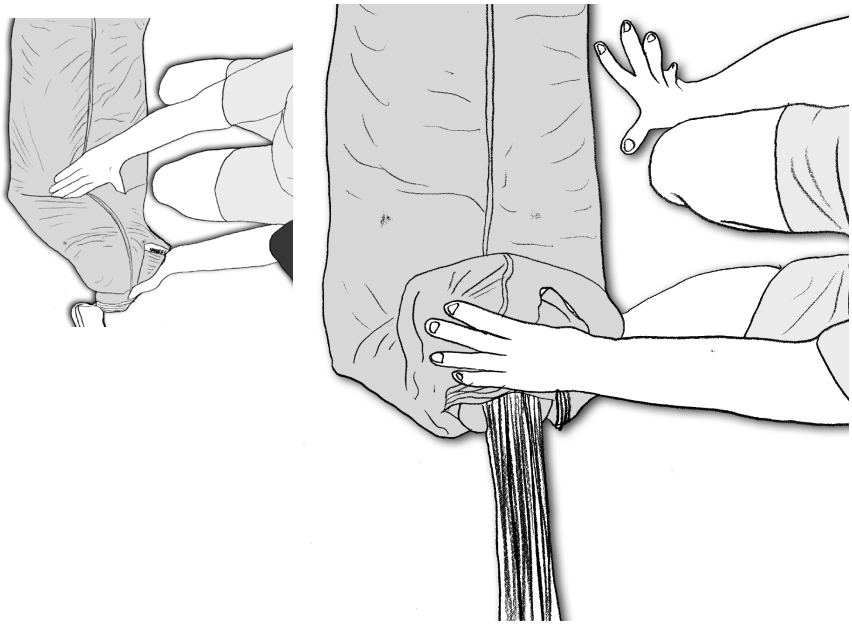
## 5.3.13

Wrap the tail around each side to make a smooth roll. Gauge the width of the canopy before bagging. It should be the same width as the free bag.



## 5.3.14

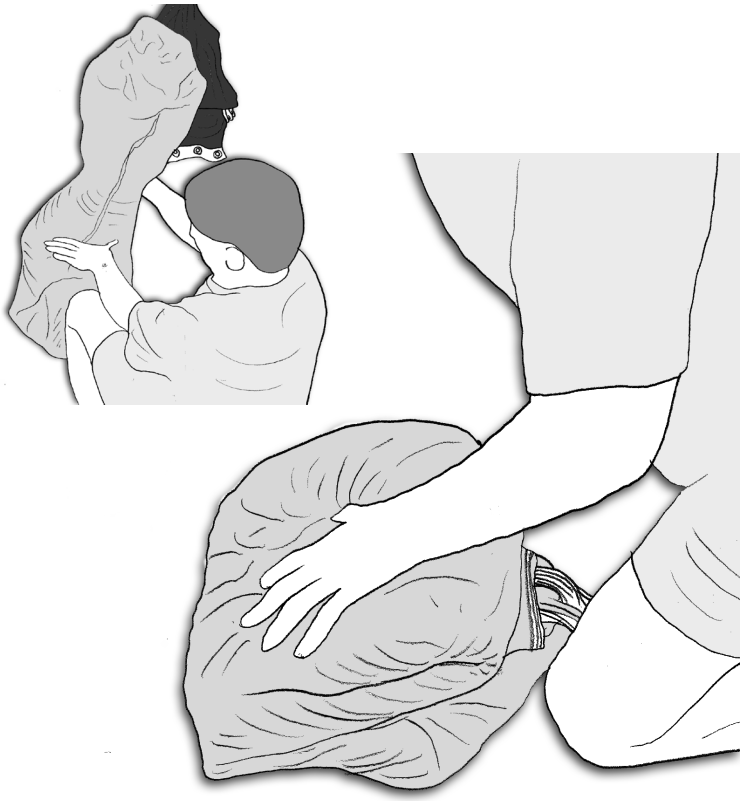
S-folding the Canopy
Make your first S-fold with the lower 14" of canopy.



## 5.3.15

Keeping everything secure, fold the canopy once back on top of itself, and then back again completing the S-fold.

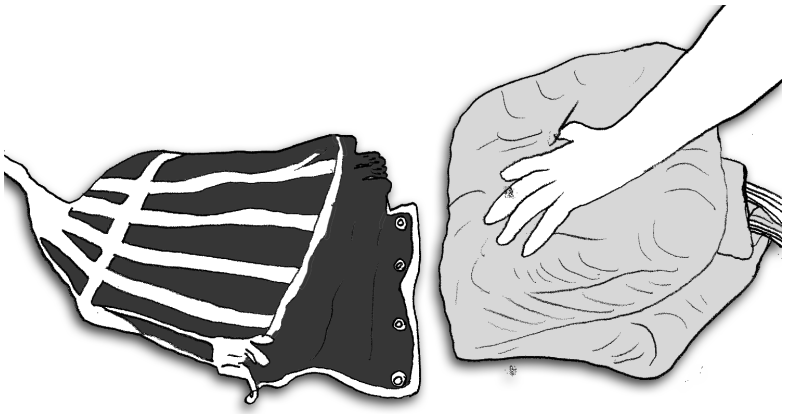
Now tuck the remaining 6 to 8" of canopy under to create a wedge shape.



# 5.4 Folding the Canopy into the Freebag

## 5.4.1

Slide the canopy directly into the freebag, filling both corners completely.



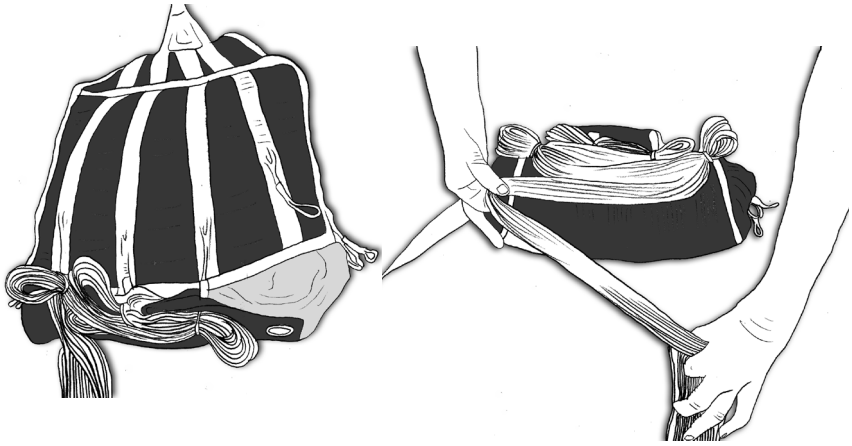
## 5.4.2

Close the mouth of the bag by routing the two center locking bungee stows through their respective grommets and lock with a 1-1/2" bight of suspension line.

Make sure the plastic sleeves are installed properly by stretching the bungee to its fullest capacity then sliding the plastic sleeve up as close to the bight of suspension line as possible.

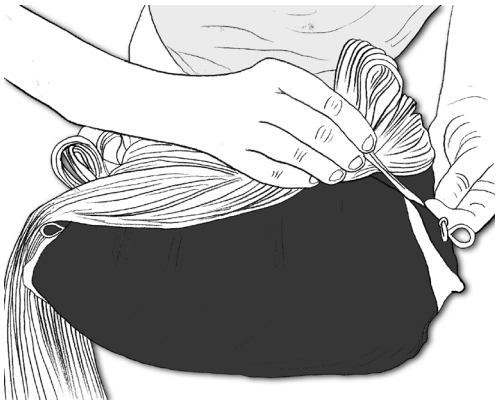
## 5.4.3

In the same manner, stow the outer two locking stows next.
Stow the remainder of the lines to within 12 inches of the connecter links.



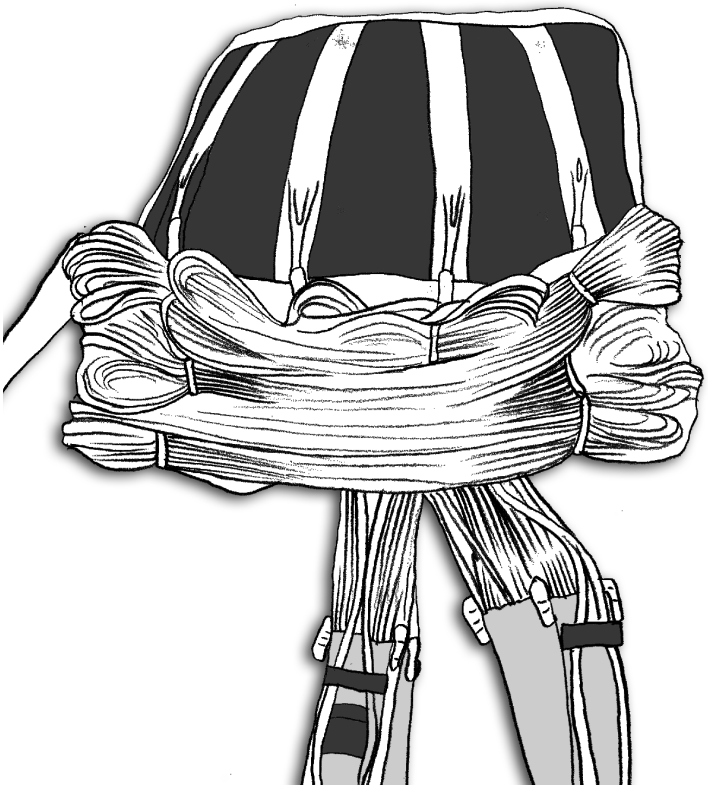
***Note!***

*Forming the bag into a wedge shape using open-handed persuasion will help create the ideal shape.*



***Note!***

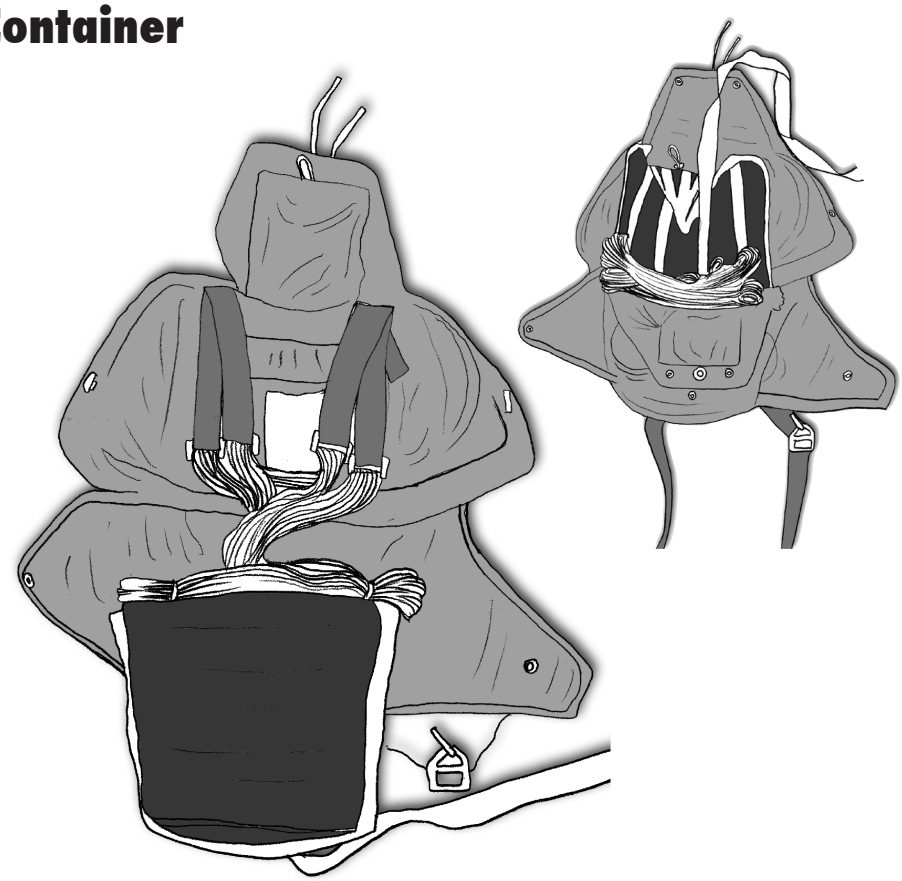
*Stows should be no longer than the bound edge of the freebag.*



# 5.5 Closing the Reserve Container

## 5.5.1

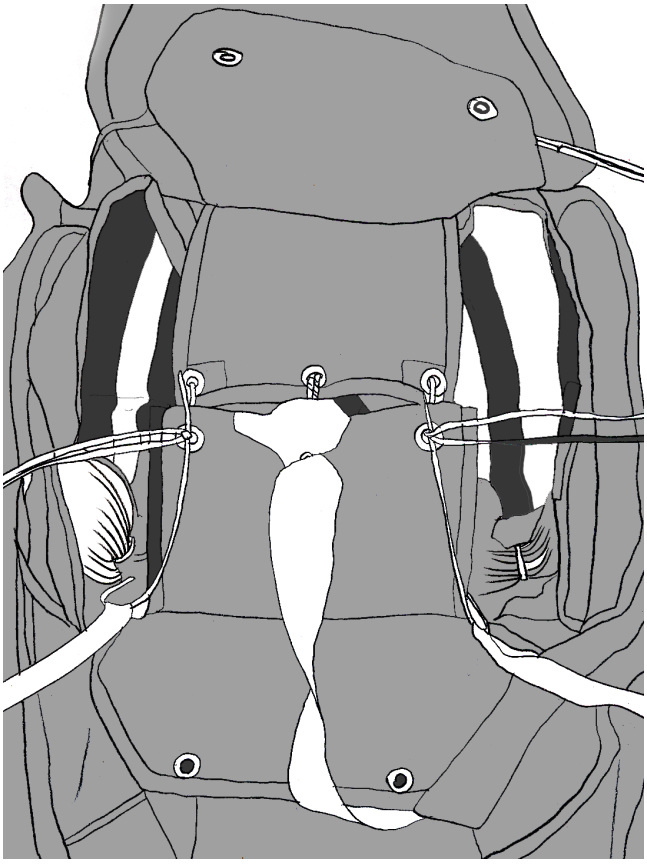
Place the risers and freebag into the container, spreading the risers so that the toggles are outboard. Fold the top part of the freebag back on top of the bag.

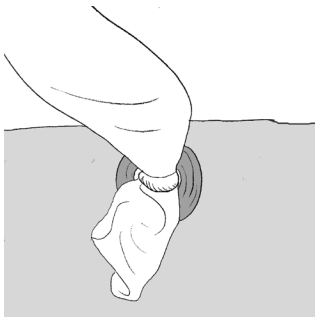


## 5.5.2

Route the elastic hesitator loop through the center grommet of the bottom subflap. Make a bight of the bridle no more than 1-1/2" through the elastic hesitator loop.

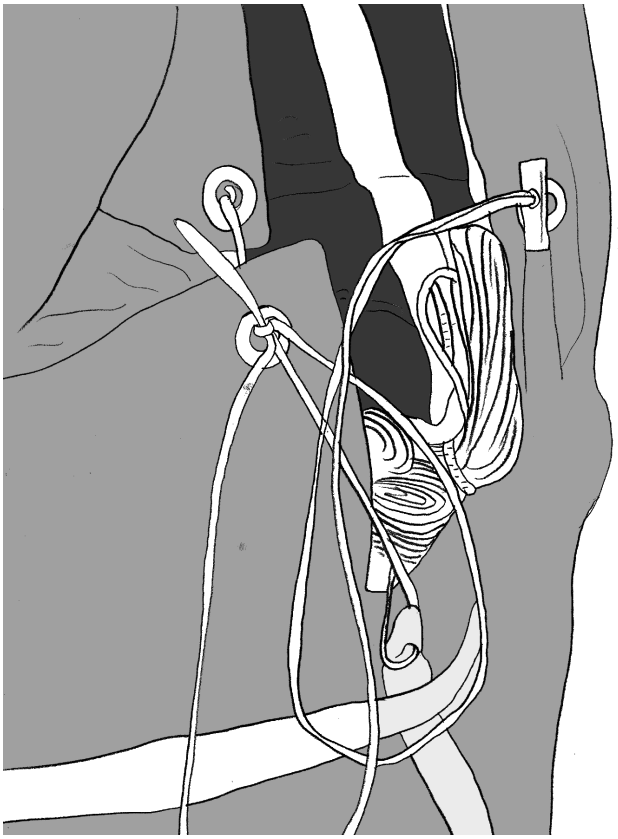
Close the subflaps by inserting 1-1/2" closing loops (using Cypres approved pull-up cords) through the upper subflap, then the lower subflap, routing the bridle out between the grommets. Hold closed with temporary pins.





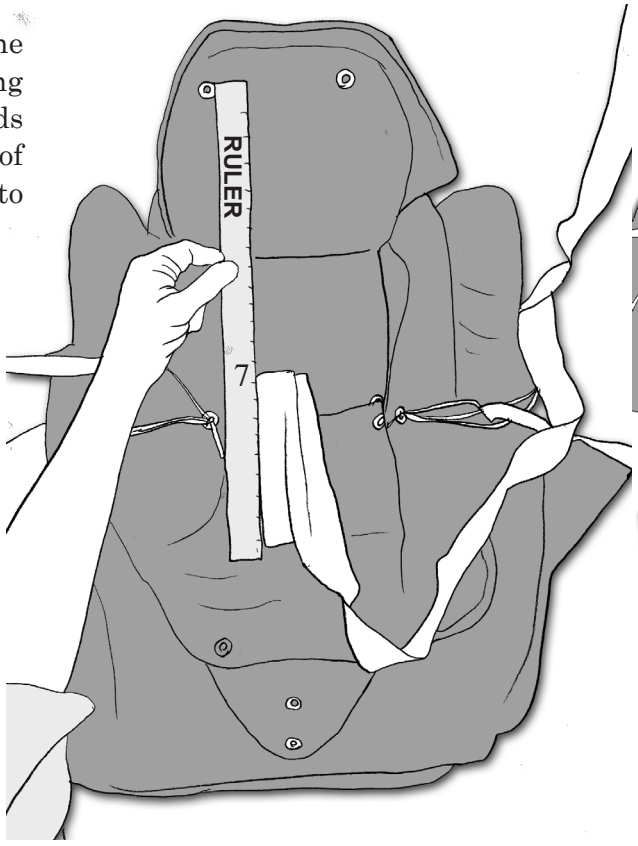
## 5.5.3

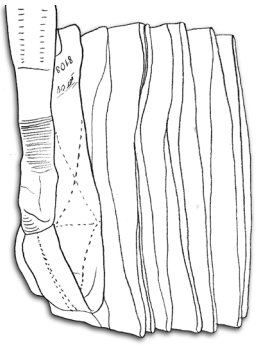
Close the side flaps next, making sure the closing loops are routed through the Cypres cutters and insert the temporary pins. Mate the Velcro at each lower corner of the container.



## 5.5.4

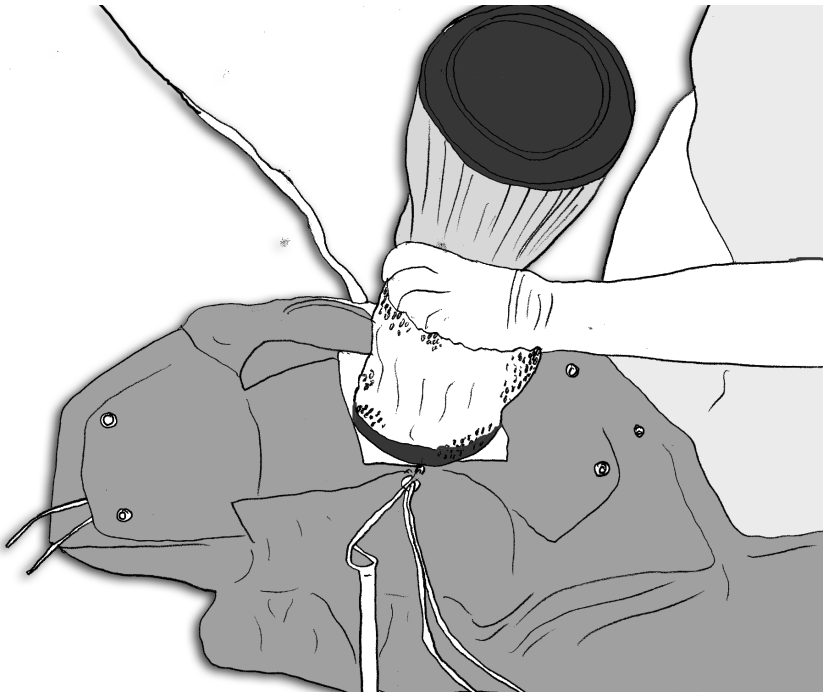
S-fold the bridle on top of the bottom subflap vertically using approximately seven-inch folds fanning out evenly on both sides of the hesitator loop from one side to the other.

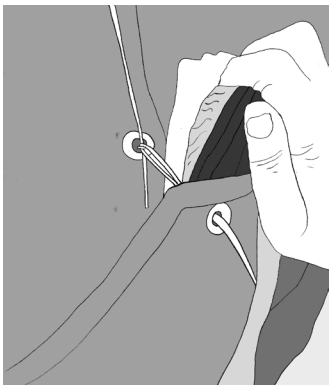


## 5.5.5

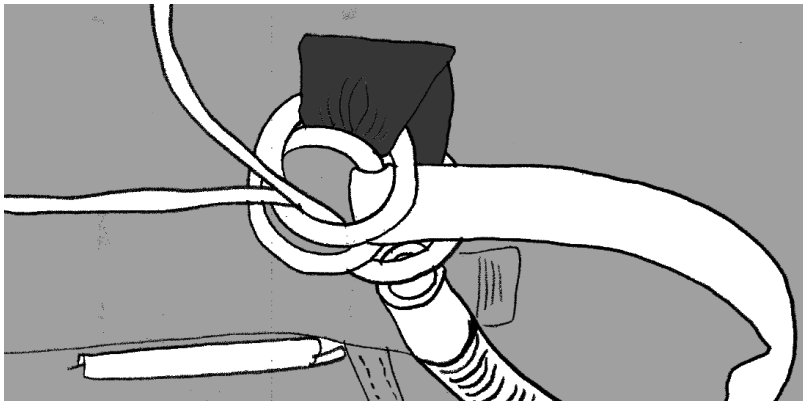
Thread the pull-up cords through the grommets in the bottom flap. Position the pilot chute in the center of the lower subflap, below the grommets, and compress. Close the bottom flap and insert the temporary pins.





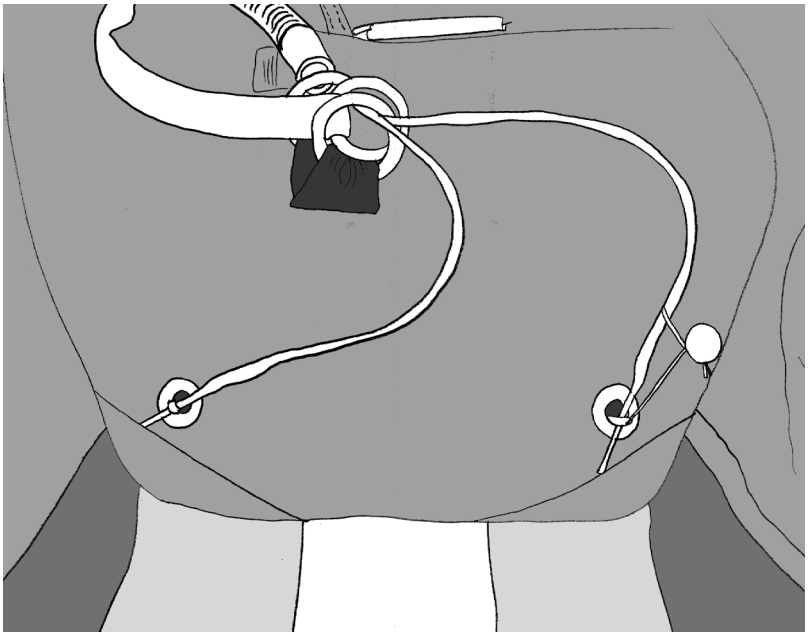
## 5.5.6

Install the reserve static line (RSL) lanyard by routing both ripcord cables through the top guide ring (the one located closer to the ripcord cable housing) then through the ring on the reserve static line lanyard then through the bottom guide ring on the top closing flap.



## 5.5.7

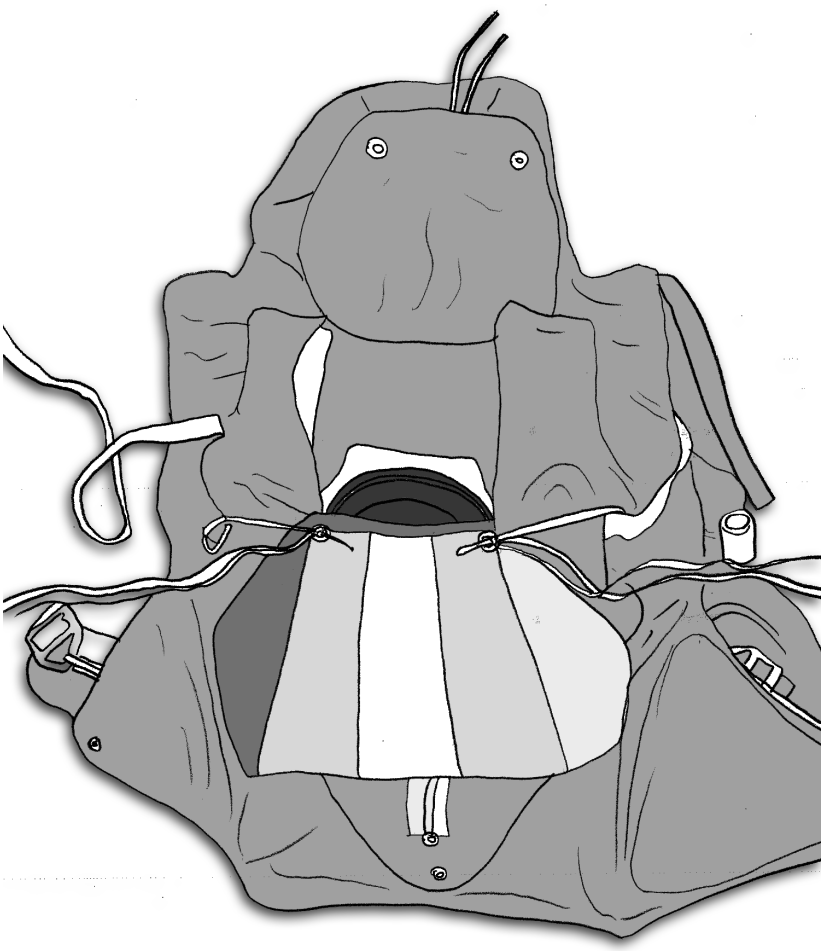
Close the top flap and insert closing pins. The longer cable routes to the right closing loop (furthest from the housing) and the shorter cable to the left closing loop (closest to the housing).



## 5.5.8

Dress the container. Pull cable slack out towards pins. Place pins under pin covers. Seal the furthest pin from the cable housing (right). Fill out the data card and personal log, close the pin protector flap. Inspect the complete container and count your tools.

**CAUTION**
**COUNT YOUR TOOLS!**



# 6.0 Packing the SET 400 and SET 366 Main Canopies

The person packing this parachute must be completely familiar with ram-air type parachutes, preferably checked out as a Strong Enterprises Certified Tandem Instructor. Tandem mains are jumped by two people; therefore, reliability and confidence levels dictate that the parachute be packed according to the manufacturer's instructions by current and competent riggers/packers, thoroughly trained in this procedure.
The following instructions will cover the PRO Pack method Strong Enterprises recommends using the PRO pack procedure.

## 6.1 Assembly

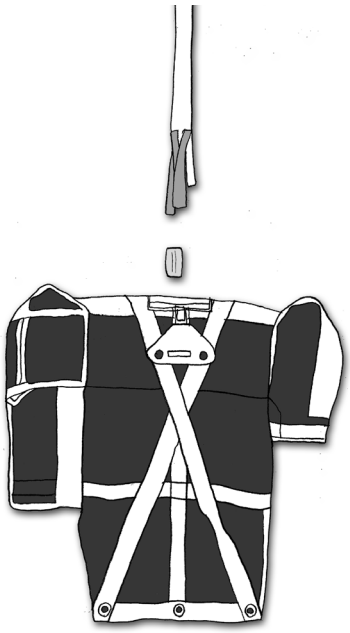
It is not required that a rigger assemble a main parachute. However, if you are unfamiliar with the process, Strong Enterprises strongly recommends that a qualified FAA certificated rigger perform the assembly procedure.

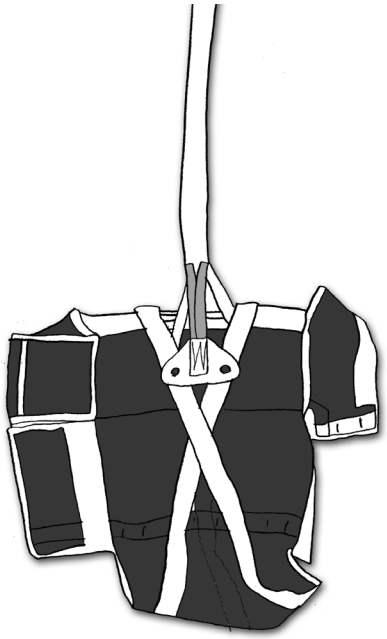
### 6.1.1

Lay the canopy on left or right side. Clear the lines of twists and tangles. Confirm suspension line continuity by tracing the lines from each quadrant of the canopy to their proper sequence on each riser. Insure that the control lines are clear of other lines. Attach the canopy risers to harness and container and connect the reserve static line lanyard to the stainless steel fixed bail snap shackle located on the left riser.

### 6.1.2

Lay ALS bag flat with #3 flap facing toward the canopy and the drogue release ring facing up. Attach Kevlar drogue bridle to #5 Rapide link on top of the ALS bag. Tighten nut, finger tight plus 1/4 turn with a 3/8" wrench. Slide plastic bumper over link and handtack in place with two turns through the link bumper and the bridle. Feed Y-lines through #4 grommet on either side of the Rapide link and attach them to the #5 Rapide link on top of the canopy. Tighten nut, finger tight plus 1/4 turn with a 3/8" wrench.

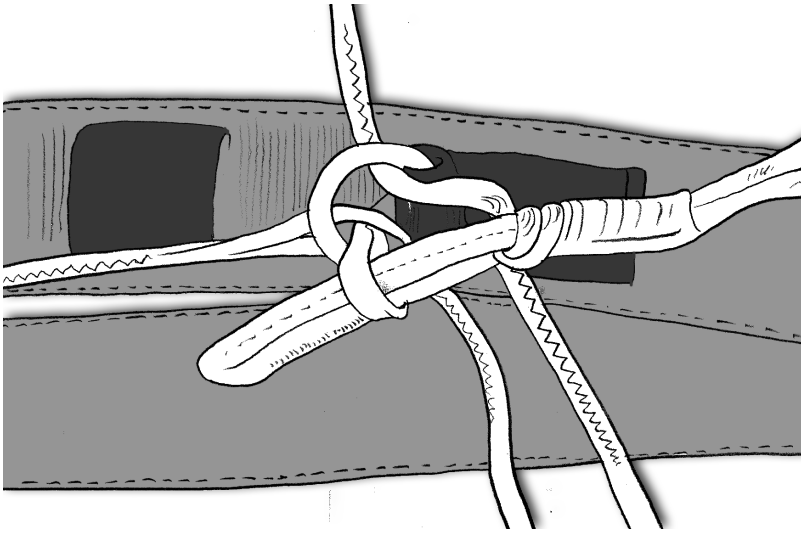




# 6.2 PRO Pack Method

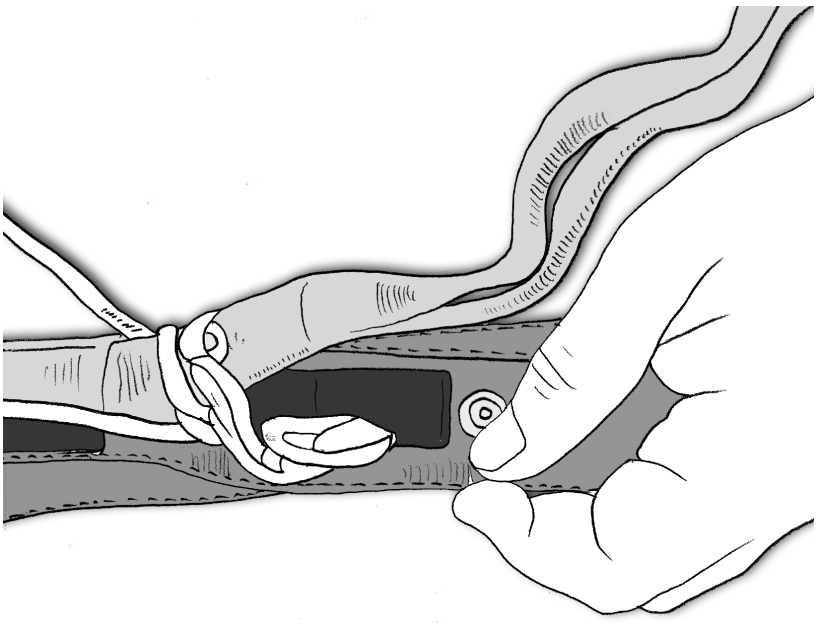
## 6.2.1

Set the brakes and stow the excess control line. Pull only the control line with the brake loop through the guide ring until the brake loop is just below the steel guide ring on the rear riser. Bring the locking loop (located on the riser) up through the guide ring, pass it through the brake loop and insert the tip of the toggle. Leave the other control line slack above riser.



## 6.2.2

Insert the tip of the toggle into the elastic keeper. Snap the toggle to the riser, then fold the toggle between the middle and lower hand grip loops and tuck the lower end of the toggle into the toggle pocket located on the riser. S-fold the excess control line and stow under the toggle. Repeat procedure on the opposite riser.

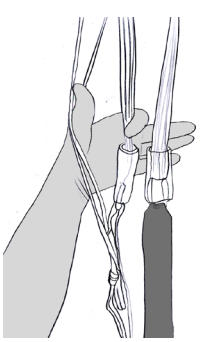


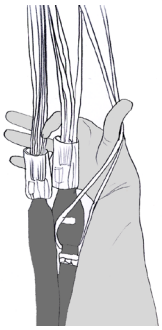
**CAUTION**

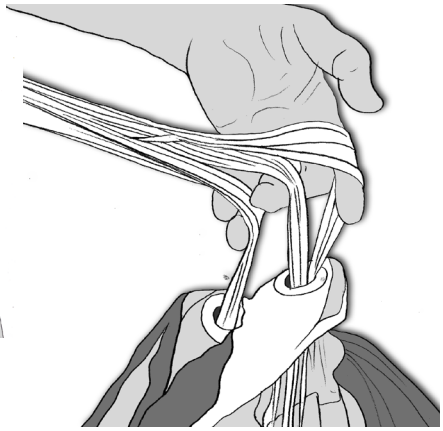
**THE LOOP ON THE RISER MUST BE USED IN ORDER TO KEEP THE BRAKE LINE LOOP FROM DIGGING INTO THE SIDE OF THE TOGGLE, MAKING BRAKE TOGGLE RELEASE ALMOST IMPOSSIBLE DURING A MALFUNCTION. THE INNER CONTROL LINES ARE NOT "BRAKED"!**

## 6.2.3

At the risers, pick up the lines and use your fingers to separate the front lines, rear lines, and control lines.







## 6.2.4

While facing the canopy, and still using your fingers to keep the lines separated, walk forward pushing the slider ahead of you until it is seated against its stops.

## 6.2.5

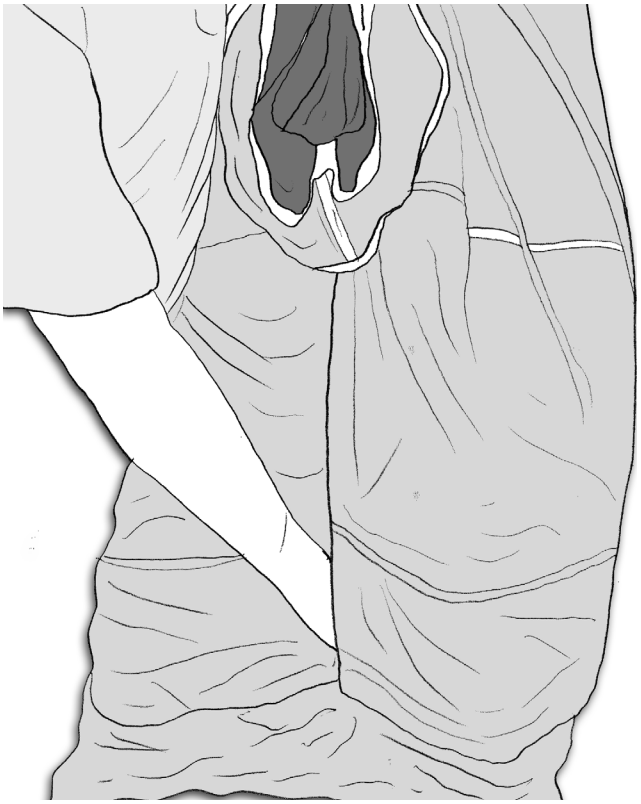
Attach a rubber band to the third control line attachment tab from the outside on each side of the canopy. Stow the two left inner control lines in the left rubber band and the two right inner control lines in the right rubber band, using a double wrap, so their attachment tabs are even with the tabs of the outer "braked" control lines.

## 6.2.6

Reach down into the right side of the canopy between the "A" and "B" lines and pleat all material out from between the line attachment tabs, this should include 5 lower tapes and the stabilizer. Again reach down into the right side of the canopy between the "B" and "C" slider stops and pleat all material out from between those line attachment tabs, this should also include five lower tapes and the stabilizer. Pleat the small section of stabilizer out from between the "C" and "D" slider stops. Ensure that all "D" lines are pulled into the center of the canopy and are clearly visible. Dress the left side of the canopy in the same manner.

## 6.2.7

Cloverleaf the slider so that it is ready to cup air the moment it is deployed. Make sure that the four corners are spread and ensure that the slider pocket is out in front of the nose. Because of the inherent soft, controlled openings of the SET 400 and SET 366 canopies, there is no need to do anything with the nose other than to let it hang down naturally, grasp it and push it into the canopy folds a few inches.

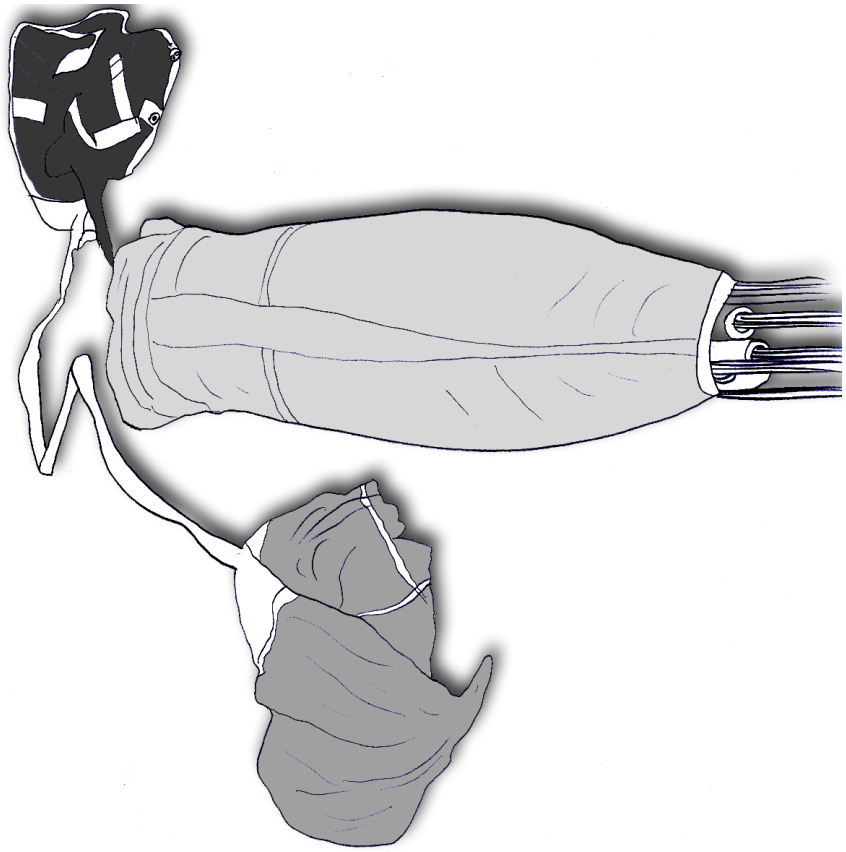


## 6.2.8

Locate the center of the tail near the warning label and pull it up so that it covers the slider grommets. Swing the tail seams around the canopy so that they meet in front of the nose and roll them together several times.

## 6.2.9

While keeping the tail seams held firmly in your hand, carefully lay the canopy down flat on the packing surface with the lines taut. Purge the air from the canopy and dress to the approximate width of the deployment bag.

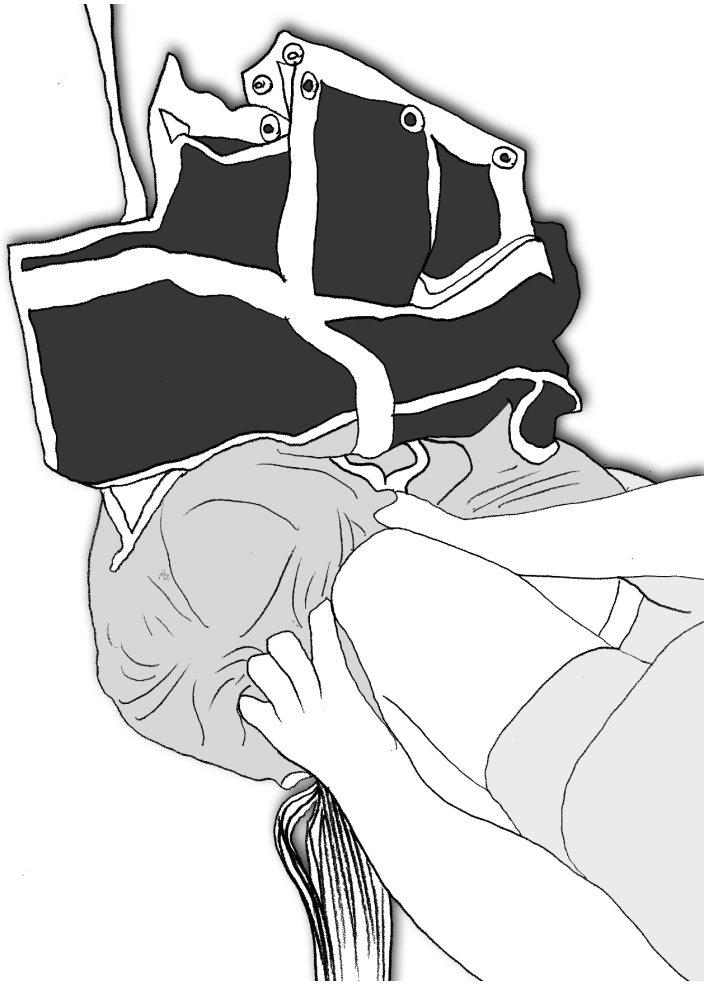


## 6.2.10

S-fold the lower canopy by grasping at the lines and folding up approximately 10-inches.

## 6.2.11

Make your next S-fold by folding the upper canopy back over the first fold keeping everything neat and secure with your other hand. Fold the canopy once back on top of itself and completing the S-fold. Tuck the remaining bit under and to the center.



Made in U.S.A.

# 6.3 Anti-Line Slump Bag (ALS)

## 6.3.1

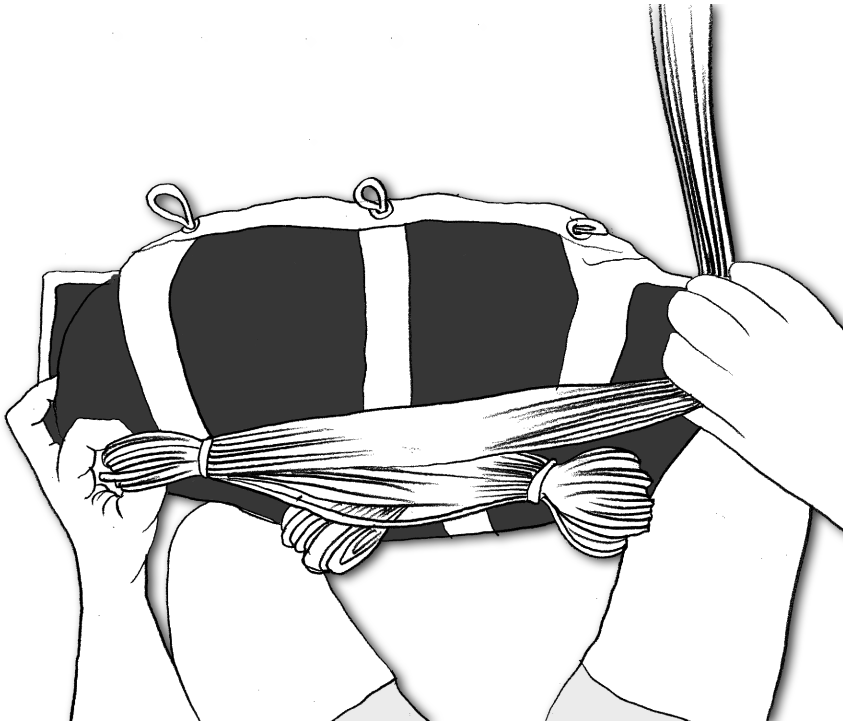
Keep the canopy under control. Hold everything in place while sliding the ALS bag under the folded canopy with the 3 locking bungee stows toward the packing surface.

## 6.3.2

Stow the lines. Make your first stow in the center inner rubber band. Then make the next two stows on each side, and then mate the Velcro sides of the bag.

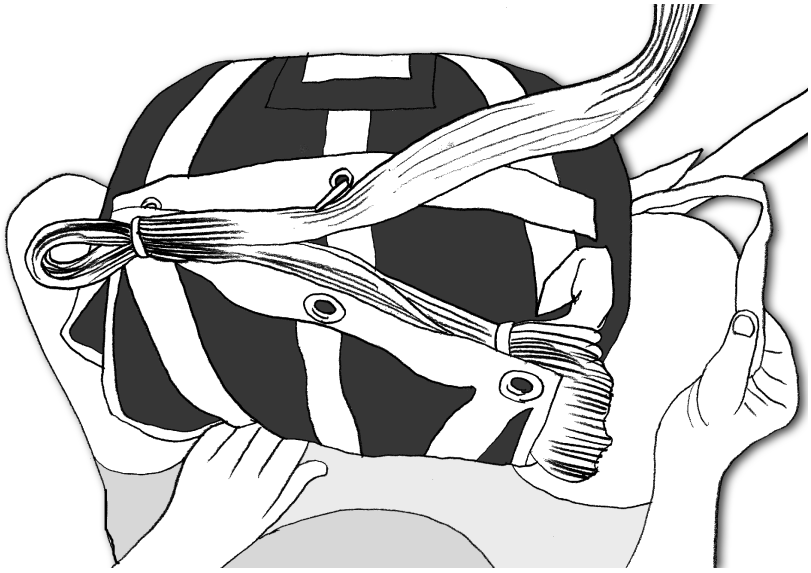
## 6.3.3

Stow the remainder of the lines to within about 4 feet of the links using rubber bands on sides of the bag.



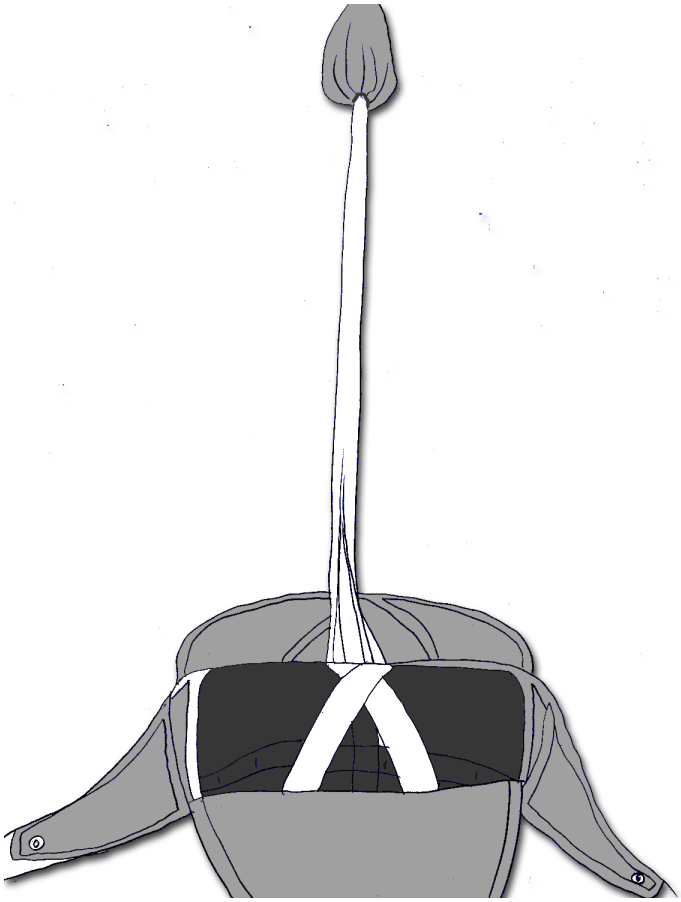
## 6.3.4

Fold the ALS flap down over the suspension lines and lock it in place using the bungee loops and three bites of suspension line. Lock the center stow last.



## 6.4 Arming the Drogue

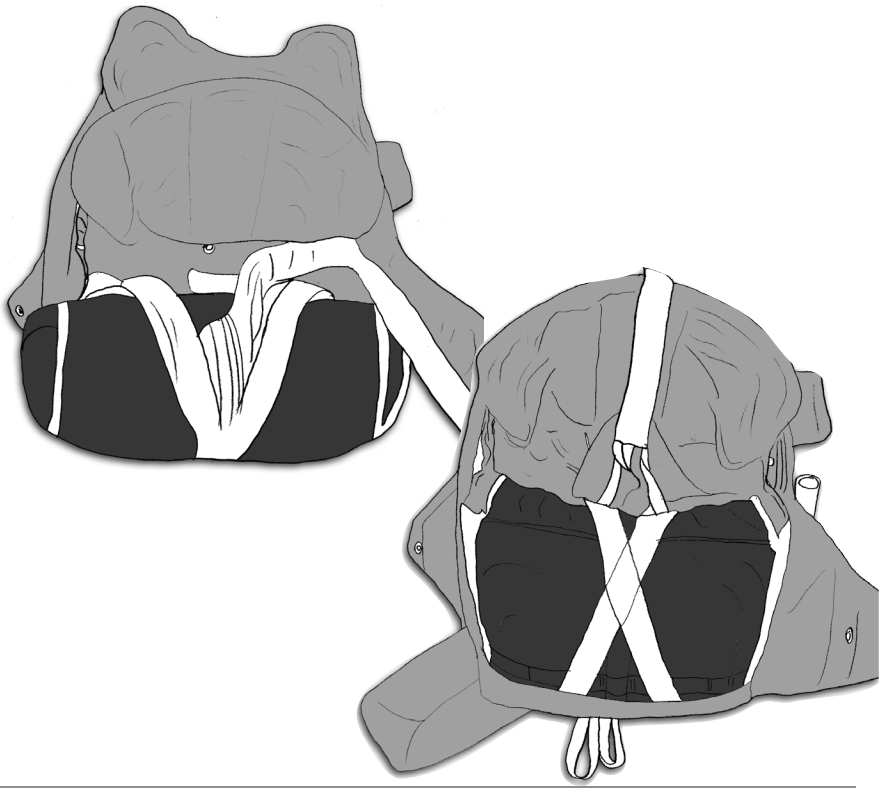
After the canopy has been jumped, several feet of deflation line will be protruding from the bridle of the drogue. Before the bag can be packed into the container, this line must be pulled back inside the bridle. This is done by grasping the drogue deployment pud (located at the apex of the drogue canopy) and extending the drogue bridle to its fullest length. Doing this will pull the deflation lines back inside the bridle.



## 6.5 Closing the Container

### 6.5.1

Place the deployment bag into the container, lines facing the bottom, drogue bridle towards the reserve. Dress the risers neatly along the outside of each side of the reserve container.

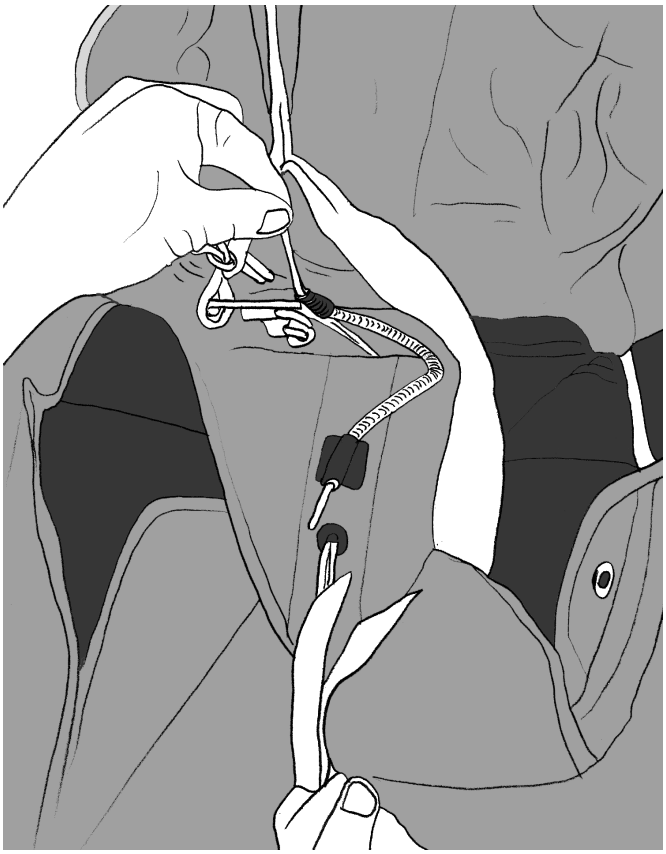


## 6.5.2

Using the 2 closing loops provided (1800-lb Spectra), close the bottom and top flaps of the container with the flex pin or a temporary pin.
Make sure the drogue bridle is routed out the center of the container.

***Note!***

*Loop closest to the housing is loose and is a redundant safety feature on the two-loop system.*



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# 6.6 Assembling the Drogue Riser

## ! WARNING !

**Attach the 3-ring drogue riser assembly so that the Kevlar between the large ring and the ALS Main Deployment Bag is on the reserve side of the drogue riser and away from the 3-ring. Route that portion of the bridle to the jumper's right side and down into the container.**

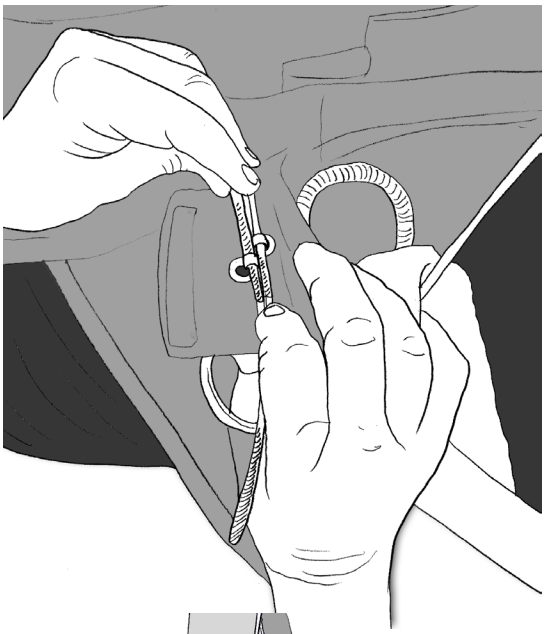
## 6.6.1

Pull the drogue riser up, allowing the container to fold and exposing the riser.

Assemble the 3-ring release by putting one of the ripcord cables through one end of the drogue riser thru-loop. The label should face reserve canopy.

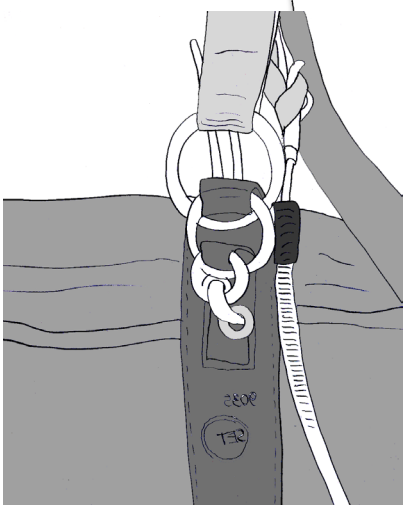
The thru-loop then goes through the grommet over the bottom ring, and back out through the other grommet. Now insert the other ripcord cable through the other end of the thru-loop.

Now slide the cables through the tape channels provided. Finally, insert the main closing flex pin into the flex pin housing.



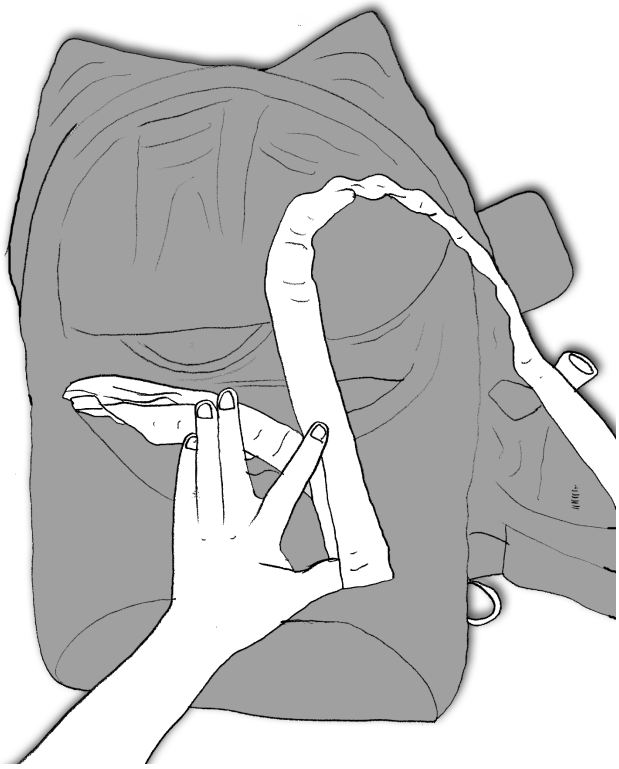
## 6.6.2

Replace your temporary pins with the single flex pin and stow the assembled drogue riser down in the area between the main and reserve containers as shown.



## 6.6.3

Close the right, then left flaps with the flex pin. Stow the excess flex pin in the pocket provided as shown. Close the flex pin protector flap and stow in its pocket.



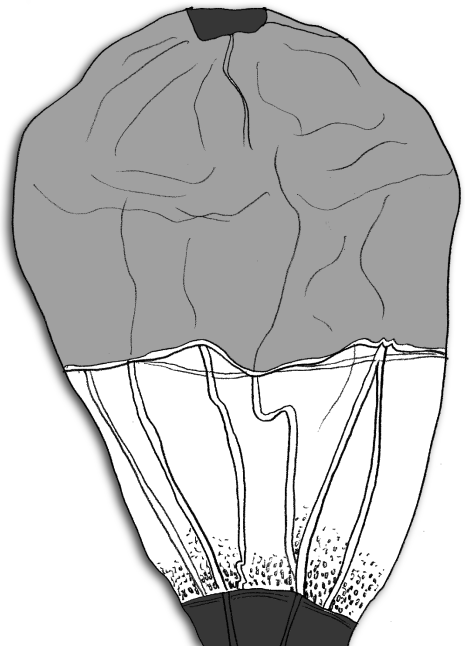
## 6.6.4

Route the bridle down the container on the right cover flap channel and close the bridle cover flap and tuck into space provided.

# 6.7 Packing the Drogue

## 6.7.1

Remove all the twists in the bridle; check to make sure the drogue is armed (section 6.4), and neatly lay the drogue out flat and smooth with the Velcro at the deployment pud facing upwards.

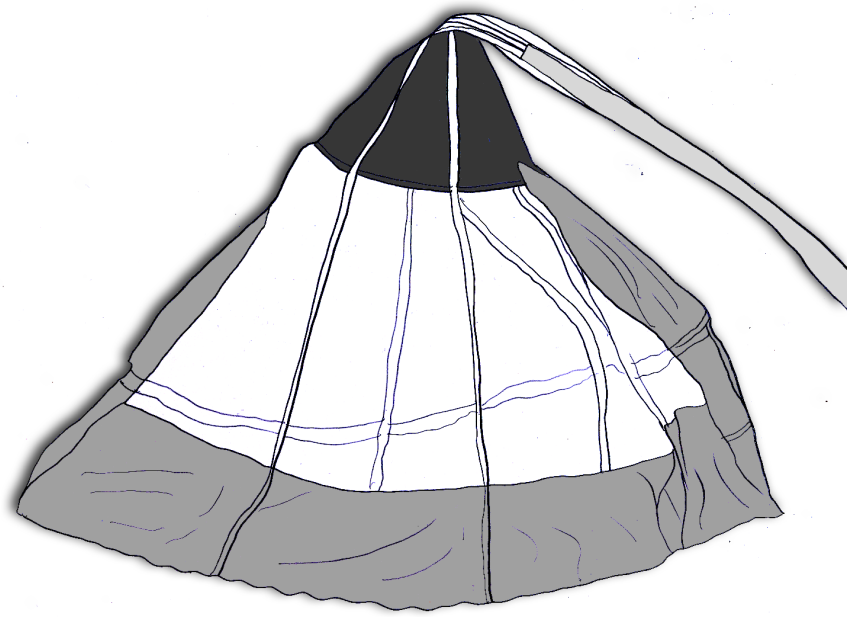


***Note!***

*Fold near the bottom of the container so you can easily gauge the final size of your folded drogue with reference to the drogue pouch.*

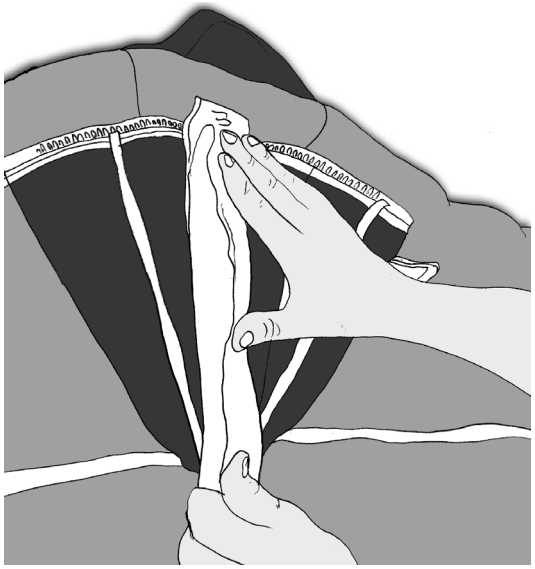
## 6.7.2

Make your first fold in the drogue, folding it approximately in half so the bottom of the base is even with the drogue pud (handle).



## 6.7.3

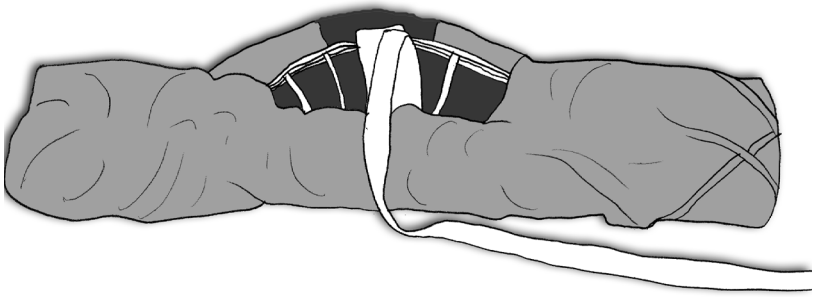
Fold the drogue again, approximately in half, so that the bottom of the drogue body is even with the top of the base.
Fold the base over the folded body exposing the drogue pud.



Make about three S-folds with the bridle, laying them on top of the base, leaving approximately 42" of unfolded bridle.

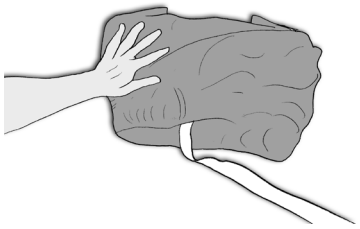
## 6.7.4

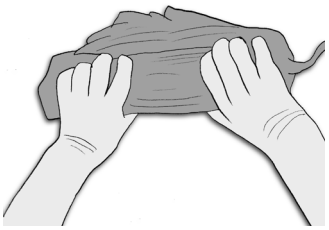
Now fold a small portion of the body over half the S-folded drogue bridle, again using the bottom of the container to gauge the final size of your folded drogue.



## 6.7.5

Fold into thirds leaving the drogue pud in the center of the folded drogue.
Roll it up tightly from one side to the other. Remove any twists from the Kevlar bridle.
Stow the drogue in the pouch, stow the remaining bridle, and dress the main container assembly.
Stand the system up and close the riser covers making sure there is no riser or toggle material exposed.
Inspect the entire assembly.





**CAUTION**
**COUNT YOUR TOOLS!**

# 7.0 Repair Guidelines

When possible, stitching and re-stitching on parachute items constructed from cloth, canvas, and webbing should be accomplished with thread that matches the color of the original stitching.

All straight stitching should be 7-11 stitches per inch, and locked by overstitching the existing stitching by at least 2-inches. Zigzag should extend at least 1/2-inch into undamaged stitching at each end. Re-stitching should be made directly over the original stitching, following the original stitch pattern as closely as possible.

All thread on the canopy should be V-T-295E, Size E, VY, and applied with a light or medium duty machine.

## *7.1 Canopy*

Any holes or tears in the canopy fabric should be patched with a single side patch using a French fell seam.

| **Type of Repair** | **Limitations** |
|---|---|
| Re-stitching: | No limit as to length or number |
| Patch, single side: | Size limit: Maximum 15% of cell surface<br>Limit of 2 per cell |
| Cell replacement: | Factory replacement only |
| Reinforcement tape replacement | Factory replacement only |
| Suspension line replacement | No limit |

## *7.2 Drogue*

Use re-stitching or single side patch. Anything more, replace.

## *7.3 Bridles*

Damaged bridles should be replaced.

## *7.4 Harness*

Any portion of the harness that is structurally damaged should be replaced in a manner to duplicate the original.

## *7.5 Container*

Standard single side patches or replacement of the damaged area is authorized.

## *7.6 Ripcords*

Damaged ripcords should be replaced.

## *7.7 Data Card*

Data cards should not be discarded or replaced. When filled, they should be attached to the new card so that a complete history can be maintained.

***Note!***

*Darning and ripstop tape are not authorized for certified canopies as they may weaken the fabric. Single side patches are recommended for even small, damaged areas.*

# 8.0 Maintenance Checks and Services

The Strong Enterprises Dual Hawk Tandem Parachute System is manufactured under strict quality control standards from the finest materials available. However, your care will determine the useful service life of the system. Always use a drag mat under the container when packing to avoid damage. Keep the rig out of direct sunlight as much as possible to prevent the colors from fading.

In packing and maintaining this system, Strong Enterprises highly recommends you use the 25-jump inspection checklist included in section 1.11 of this owner's manual. While conducting this inspection, keep in mind that an inspection does not make a parachute system airworthy. The inspection itself is useless unless any identified problems are corrected.

## 8.1 Harness (Instructor and Passenger)

**Hardware:** Inspect all hardware for rust that might inhibit the operation of the unit. Snap or "click" the gates open and closed on the B-12, butterfly and quick ejector snaps to verify the spring inside is still operational. Inspect the large RW-0 ring passenger side attachment point on the instructor's harness to insure that the 4-point stitch is not unraveling. Inspect the tackings on the B-12 snaps.

**Drogue Riser:** Tighten the screws on the separable "L" link that attach the drogue riser to the diagonal back straps. Insure that the tacking that attaches the ripcord cable housings to the drogue riser are secure and have not come loose. Inspect the drogue riser for cuts or frays in the webbing.

**Webbing:** Inspect all webbing on both harnesses for cuts or fraying. Inspect all 4 -points and single needle stitching to insure they are not unraveling. Look at the overall appearance of the harness and try to locate any excessive fading in color by its dull dry look. This is an indication of over exposure to ultraviolet rays which can weaken the webbing substantially. This condition should be nonexistent, considering all tandem system owners should protect their equipment from the sun when it is not being used.

## 8.2 Container

**Grommets:** Inspect all the grommets for rough edges, dents or bends in the metal. Rough edges can be smoothed out with very fine emery cloth; large dents or bends in the metal require replacement. Grasp the grommet with two fingers and try to spin the grommet in place to insure that it is still set properly and secured to the container. It should not move at all.

**Fabric:** Look at the overall appearance of the Cordura and binding tape looking for any holes, tears, or broken stitches in the fabric. Oil or grease spots can be removed with a laundry pre-soak detergent.

**Velcro:** Mate all Velcro to insure it stays secured. Clean off any grass or dirt that might have accumulated on it. Worn out Velcro should be replaced.

# 8.3 Ripcords, 3-Ring Release Handle, Housings and Cables

**Ripcords:** Inspect the ripcord hardware for wear. Inspect the ripcord cables for kinks, broken strands or rough areas. Check the tip of the cable to insure that no metal cable strands have become exposed. Inspect the reserve ripcord pins to ensure they are not bent.

**3-Ring Release:** Inspect the release handle for kinks in the cable, or loose ends. Breakaway drogue release handle (PN 862020) must be used on all Dual Hawk Tandem Parachute Systems. Coated cables are obsolete.

**Cable Housings:** Keep cables and housings clean: Pull the release cables out of the housings and make sure there are no kinks or prominent curves in the cable. Pay particular attention where the cable leaves the housing, as a bend or sharp curve may increase pull force as it feeds back through the housing. If the cable shows signs of unraveling it should be replaced. Clean the cables, the inside of the housings, and the braided cord loop on the riser which holds down the small ring, then lubricate using any of the following:

i) We use these two products, Pedros Extra Dry by Pedros USA and White Lightning a similar product described as a self-cleaning lubricant (www.whitelightning.com). About $7.00 a bottle from your local bicycle shop. We found it easiest to just squirt the lubricant into the end of the (cleaned) cable housing since it dries completely. Both parts get lubricated with one simple procedure. Be careful as it may stain your Cordura®.

ii) SuperLube with Teflon - This is a spray that can be found at auto parts stores. Leaves a dry film of Teflon. (Don't lubricate the loop with Teflon Spray.)

iii) Silicon spray - Be sure to wipe off the wet silicon with a clean dry rag as this residue will attract contaminant's. (Don't lubricate the loop with Silicon). All cable housings including the small release cable housings should be inspected for damage. Check all tackings to insure they are secure, replace tackings if loose.

# 8.4 Main Canopy

**Fabric:** Check the seams and line attachment points for stitch integrity. This can be done by turning the canopy face up and standing on a chair, hold the top leading edge (nose) of the canopy at shoulder height, spreading each cell apart to look inside. Inspect each panel for damage. Inspect the canopy for holes, tears and burns and repair as needed. Inspect the slider and bridle attachment point for wear.

**Lines:** Check for stretch or shrinkage. The tolerance for line length deviation is plus or minus 1-inch. Inspect the lines for excessive wear and replace if necessary. Tandem systems are subject to heavier loads. This should be taken into consideration when looking at a frayed line that is questionable. Inspect the bartacks at the links, at the cascades, and at the canopy attachment points.

**Risers:** Check housings installed in rear riser channels. (If you do not have these housings, you may contact Strong Enterprises for options). Inspect the TVII webbing at the 3-ring for signs of wear. Any wear at this location can lead to riser failure. Inspect the stitching on the complete riser for

unraveling. Inspect the stainless steel snap shackle to insure it functions properly. Inspect the #6 Rapide links for cracks and tightness.

**Slider:** Inspect the fabric for holes or burns, repair as necessary. Inspect the grommets for burrs and separation, replace or reset if necessary. If your canopy has Vectran lines, check to be sure your grommets are stainless steel.

## 8.5 Drogue and ALS Bag

Drogue and ALS BagStarting at the top of the drogue and working down, inspect the canopy fabric for holes or tears, moving down to where the drogue canopy is attached to the bridle, inspect the bartacks for any unraveling. Inspect the whole bridle for loose stitching and signs of wear. Inspect the drogue 3-Ring attachment and the main closing pin attachment and Velcro, replace or repair as necessary. Inspect the bartacks on the Y-deflation line for unraveling and the deflation line itself for wear. When replacing the Y-deflation line the new deflation line can be pulled through the bridle, from the top, using the old deflation line by attaching the two together. Inspect the shock cords, rubber bands, Velcro and grommets on the deployment bag, replace if required.

## 8.6 Master Reserve Canopy

| | |
|---|---|
| Fabric | Thoroughly inspect during every 120-day repack cycle. |
| Lines | Thoroughly inspect during every 120-day repack cycle. |
| Freebag | Thoroughly inspect during every 120-day repack cycle. |
| Bridle | Thoroughly inspect during every 120-day repack cycle. |
| Pilot Chute | Thoroughly inspect during every 120-day repack cycle. |

# 9.0 Service Bulletin #22

PRODUCT SERVICE BULLETIN #22
20 February 1997

A) Dual Hawk Tandem, Use of Unapproved Components
B) Dual Hawk Tandem Service Life

STATUS: Mandatory compliance.

COMPLIANCE DATE: 20 May, 1997.

IDENTIFICATION:
Dual Hawk Tandem Systems; PN 103000 through 103005 (Dwg No. 1151 & 68E10001).

BACKGROUND:
A) Strong Enterprises has determined that Dual Hawk Tandem Systems with components not approved by Strong Enterprises present a hazard that is not acceptable for tandem jumping.
B) The rapid improvements of the Dual Hawk Tandem System have shown considerable safety enhancements. It is also evident that most systems older than eight years have considerable wear and deterioration with loss of performance and could pose a threat to the users.

SERVICE BULLETIN:
A) Only components approved by Strong Enterprises may be used on the Dual Hawk Tandem System for tandem jumping.
B) All Dual Hawk Tandem Systems shall have a service life of eight years from date of manufacture or be returned to Strong Enterprises for re-inspection and recertification. It may then be placed back into service for five years.

This service bulletin does not change the requirements for periodic inspections and maintenance as outlined in the FAA Exemption or manufacturers instructions.

DISTRIBUTION:
All Dual Hawk Tandem System owners, national aero clubs, PIA, USPA, Skydiving, Parachutist.

EXPLANATION OF SERVICE BULLETIN #22
20 February 1997

A) Dual Hawk Tandem, Use of Unapproved Components
B) Dual Hawk Tandem Service Life

Strong Enterprises has taken a proactive step to ensure public safety and the safety of our certified Tandem Instructors by issuing Service Bulletin 22 on 20 February 1997 (attached).

The purpose of Bulletin 22 is to assure that Dual Hawk Systems more than 8 years old are still safe to use, and components that Strong Enterprises has not tested or approved as being compatible are not being used in these systems.

Dual Hawk Tandem Systems that are not in compliance with Bulletin 22 are considered by Strong Enterprises to be un-airworthy. Therefore, the TSO on that system is void and any tandem jumps made on these systems are made in violation of FAR 105.45 (a).

Any Strong Enterprises certified tandem instructor who enters into an aircraft with the intention of making a tandem jump, and the Dual Hawk System he intends using on that jump is not in compliance with Strong Enterprises Bulletin 22, has automatically voided his Strong Enterprises tandem instructor certification and that jump will be made in violation of FAR 105.43 (a) and Strong Enterprises' tandem exemption.

The appropriate FAA FSDO offices will be notified of the serial number, location, and owner of all Dual Hawk Tandem Systems that are not in compliance with Bulletin 22. In consideration of the liability exposure of USPA, a copy of notices related to Bulletin 22 will be forwarded to USPA.

Compliance with Bulletin 22 is quite simple:
1. Use only manufacturer-approved components in your Dual Hawk system.
2. If a Dual Hawk system is more than 8 years old, return it to Strong Enterprises for inspection, refurbishing if needed, and recertification as airworthy.

Recertified components are marked:
1. Harness/container: Labels sewn on the horizontal back strap of the passenger harness, inside the main container, and on the front left reserve riser.
2. The main and reserve canopies: A label sewn onto the tail seam.

# 10.0 Service Bulletin #23

TANDEM SERVICE BULLETIN #23

9 September 1997
Revised January 2005

STATUS: Compliance optional.

IDENTIFICATION: Dual Hawk Tandem Systems: PN 103000 through 103005 (Dwg. No. 1151). All serial numbers.

BACKGROUND: Through the development of tandem jumping equipment, the integration of a Reserve Static Line (RSL) has been both required and beneficial. In recent years the addition of a Cypress AAD and since 1 November 1994, the requirement of the Cypres has made the requirement of an RSL less critical. A recent tandem accident is in part attributed to the RSL.

SERVICE BULLETIN: Disconnecting the Dual Hawk Tandem RSL is now authorized by Strong Enterprises. Complete removal of the RSL is not necessary. Disconnect the RSL by opening the shackle, removing the yellow RSL webbing and folding it back up 3 to 4 inches under the Velcro® reserve riser cover flap.
It is important for Tandem Instructors that will be using a Dual Hawk Tandem System with the RSL disconnected to review emergency reserve procedures. Procedures should incorporate touching all handles in sequence (drogue release handles, cut-away handle, reserve ripcord) as soon as the drogue is deployed. This should be performed on each and every tandem jump. It is also equally important that verification is performed before each jump that the Cypres AAD unit is turned on.

QUALIFIED PERSONNEL: Equipment owner, Strong Enterprises Tandem Instructor, Senior or Master Rigger or foreign equivalent.

COMPLIANCE DATE: Not applicable.

DISTRIBUTION: All Dual Hawk Tandem System owners on record, national aero clubs, PIA, USPA, Parachutist, Skydiving, www.strongparachutes.com

# 11.0 Service Bulletin #24

TANDEM SERVICE BULLETIN #24

STATUS: Mandatory.

COMPLIANCE DATE: June 2, 2006.

IDENTIFICATION: (TICC) Training Syllabus, Appendix M, PN 590011 Rev L
Dual Hawk Passenger Harness, PN 240075-4.

BACKGROUND: Strong Enterprises started tandem parachuting in 1983, developed, TSO'd and has marketed the Dual Hawk Tandem system since 1985. Tandem jumping is the most popular method of providing a skydive to people interested in experiencing the sport. Presently there have been over 2,000 Dual Hawk Tandem Systems manufactured and sold thought the world. There are over 4,300 registered Tandem Instructors certified to use the Dual Hawk Tandem System. It is estimated that there have been over 2 million tandem jumps made on the Dual Hawk Tandem System. Although there have been parachute malfunctions and canopy damage, there has been no incidents or reports of harness (student/passenger or instructor harness) failure. A recent (May 27, 2006) tandem passenger fatality, in which the student/passenger slipped out of the harness backwards between the back diagonal straps and the horizontal back strap during main canopy deployment has led to this Service Bulletin.

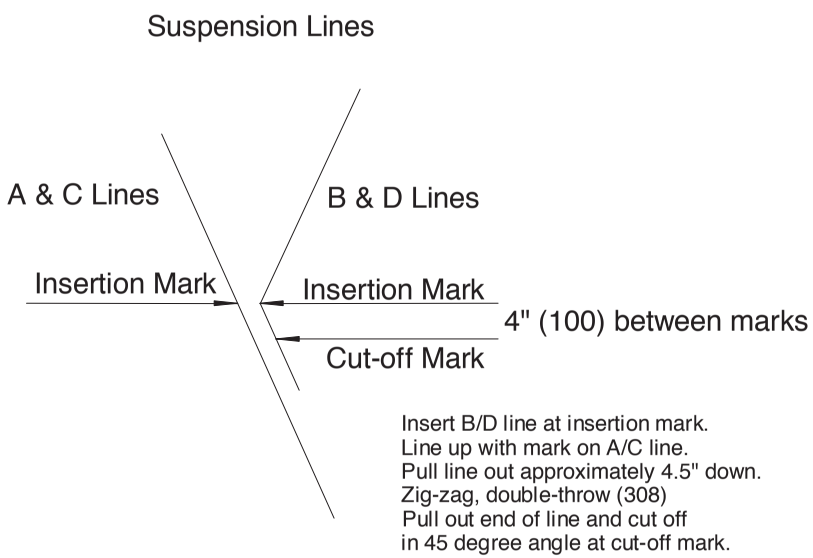
FACTORS: This specific accident involves a 5'4" female student/passenger that weighed 230 lbs. The Tandem Instructor was 5'11" and 145 lbs. Ground video footage verifies that the harness was not properly adjusted and extremely loose on the student/passenger before boarding the aircraft. Video footage of the drogue fall shows the student/passenger's horizontal back strap was located under at least one leg strap (between the leg strap and the passenger's leg), not around the lower back as intended. Also, the main lift webs, diagonal back straps and lower attachment points from the tandem instructor to the student/passenger harness are all out to the maximum length.

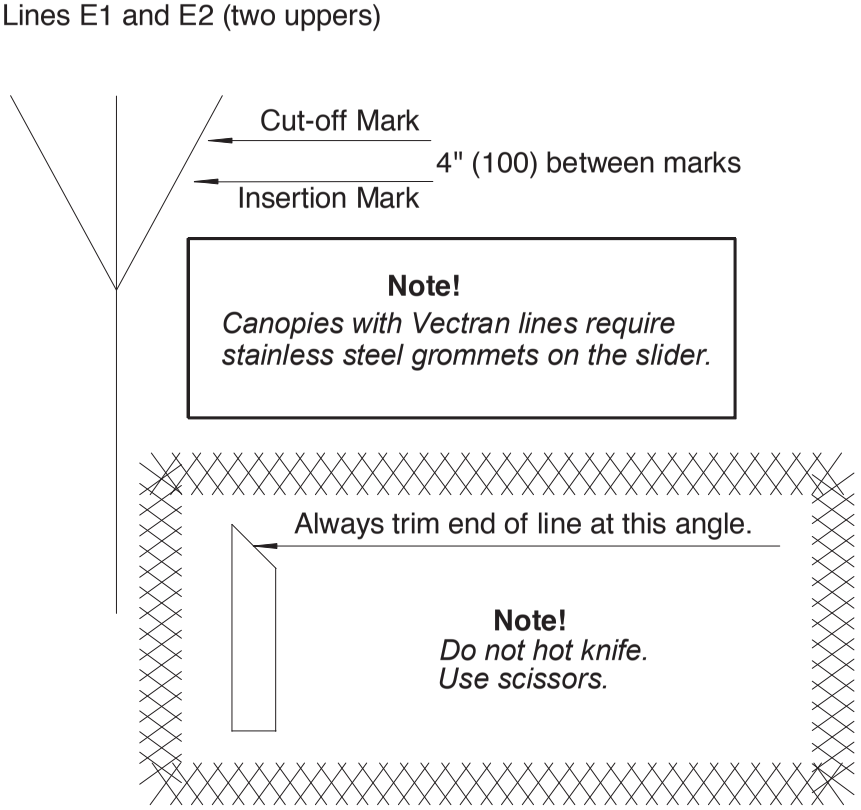
SERVICE BULLETIN: It is important for Tandem Instructors to know that they are ultimately the responsible person for all aspects of the tandem jump. They are responsible to assure a proper fit of the harness, it's comfort and safety as well as the entire performance of the tandem jump for themselves and the student/passenger. The procedure of fitting the harness must be accomplished on the ground, where adjustments in proper harness fit can comfortably be made, thoroughly checked and verified, before boarding the aircraft.
Each and every current Strong Tandem Instructor should review the Dual Hawk Tandem Service Manual (DHT) Rev. L, Appendix M, to re-familiarize themselves with instructions for fitting the Passenger Harness PN 240075-4 to the student/passenger. These instructions are attached to this Bulletin. (Listed in section 1.6.1.3 pg 8)

It is also important for Drop Zone management to establish guidelines of any physical or mental limitations for evaluating potential tandem student/passengers to as certain that they are capable of being able to provide a safe and comfortable tandem parachute jump within these parameters.

# 12.0 Line Installation SET 400 Main Canopy

**SET 400 (PN 411540):**
Line set PN 865053 (1500 Spectra® lines)
Color Codes on suspension lines:
A - Green
B - Blue
C - Black
D - Red

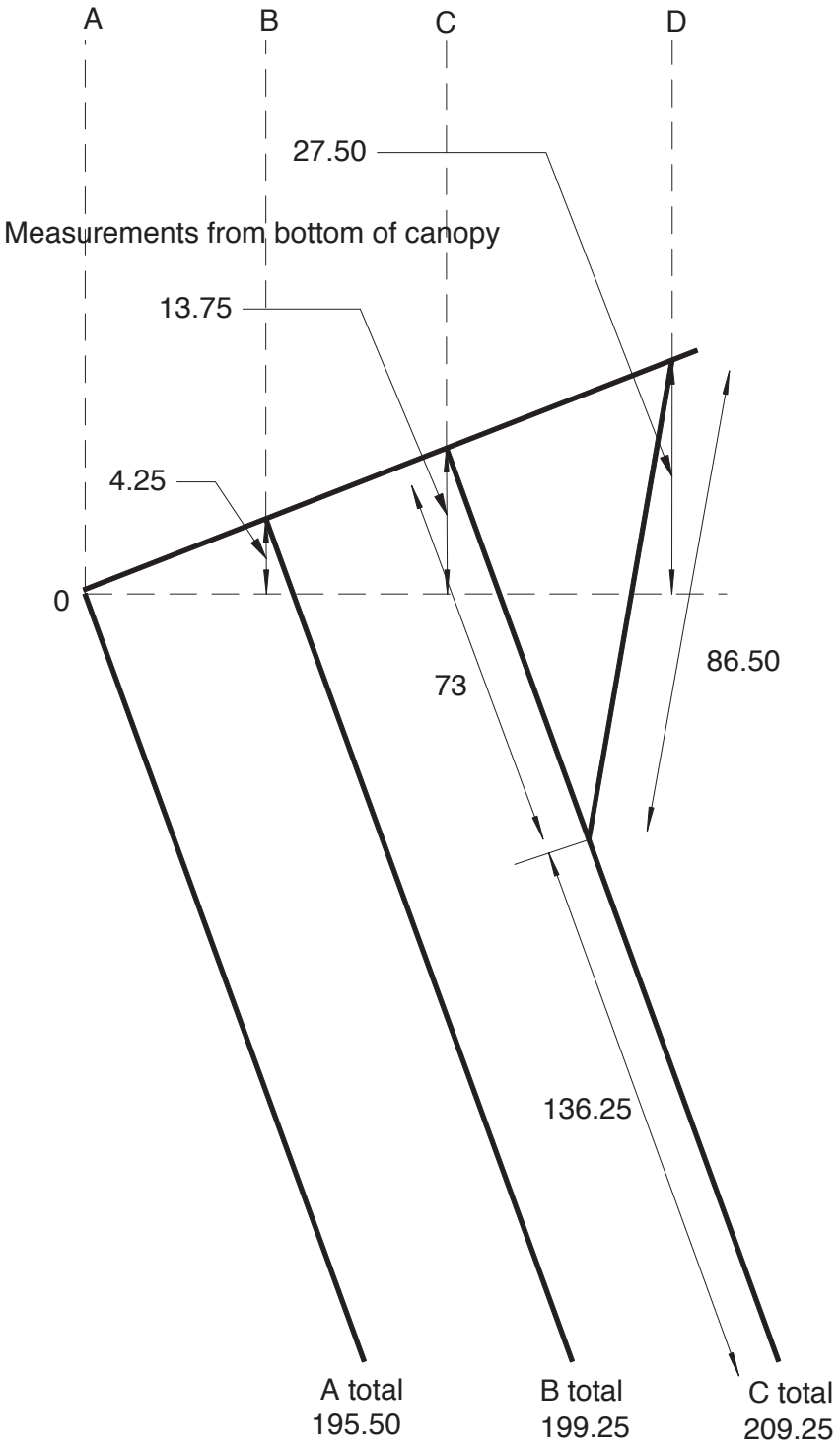


# 12.1 SET 400 Main Canopy

## Trim and Line Length, Inner Lines, Ribs 4,5,6,7

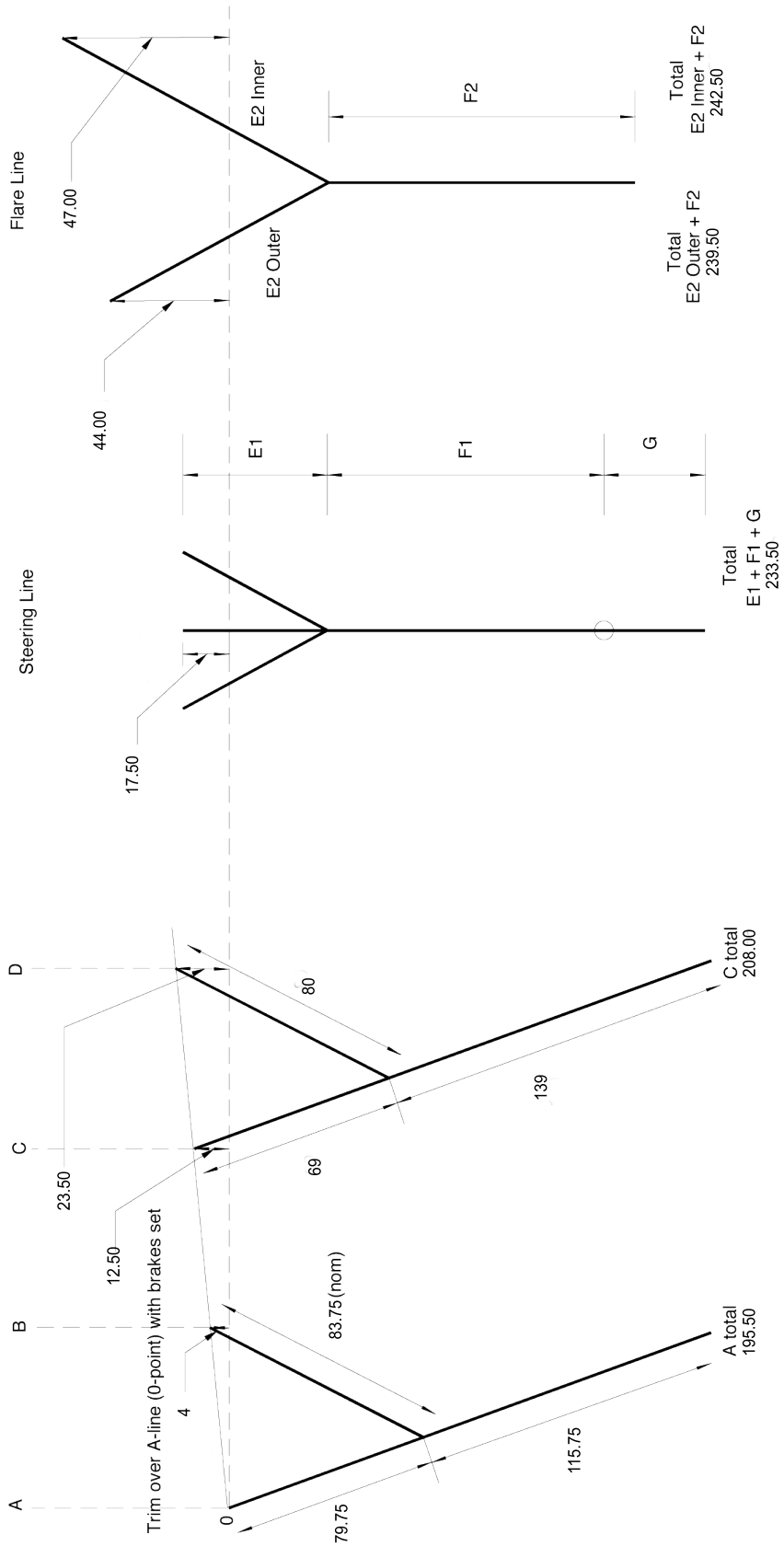
**Measurements are installed on canopy.**
**Trim over A-line (0 point) with brakes set.**
**(Trim measurements underlined with dotted line - - -)**



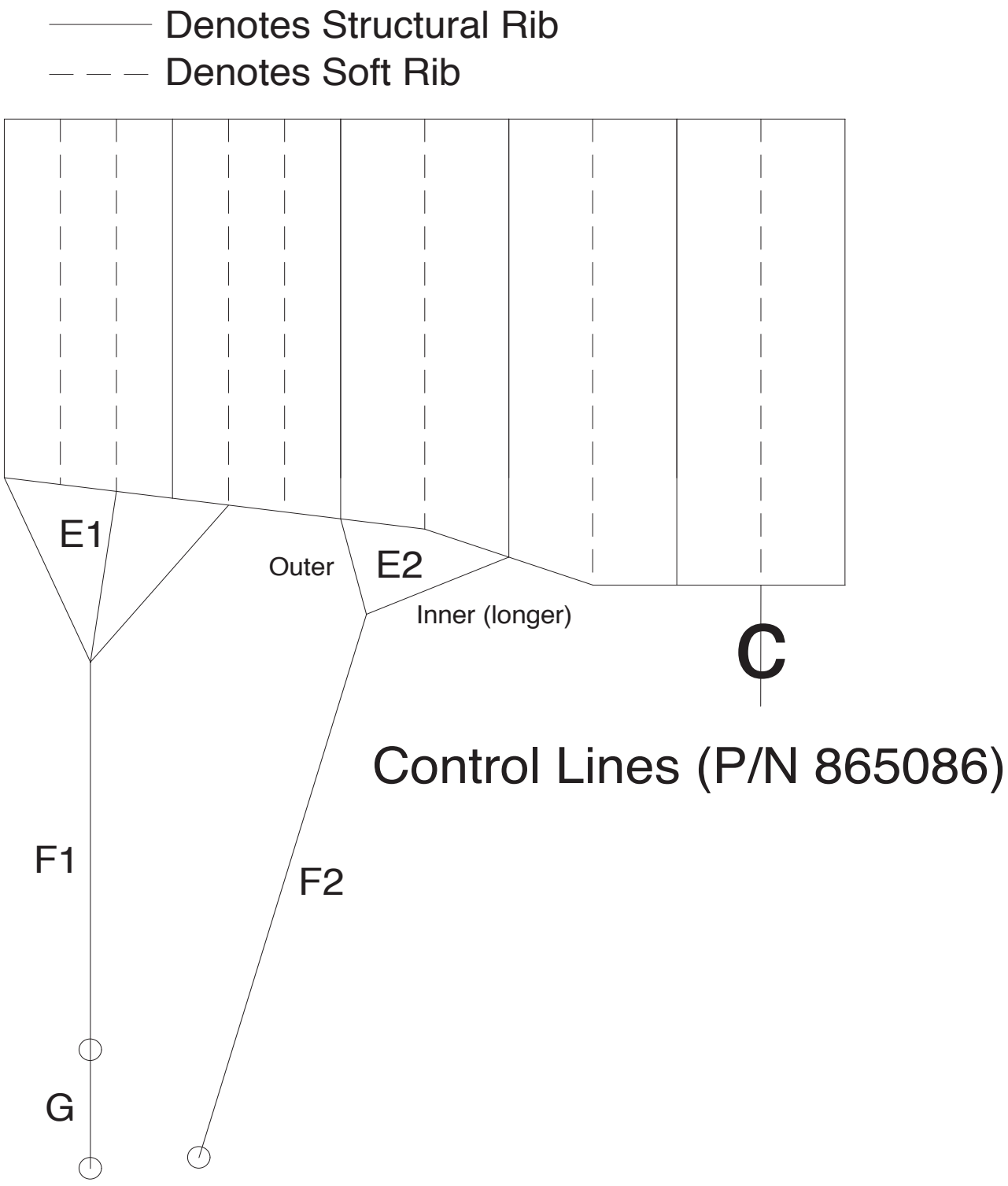
# 12.2 SET 400 Main Canopy

## Trim and Line Length, Outer Lines, Ribs 1,2,3,8,9,10

**Measurements are installed on canopy.**
**Trim over A-line (0 point) with brakes set.**



# 12.3 Control Line Attachment SET 400



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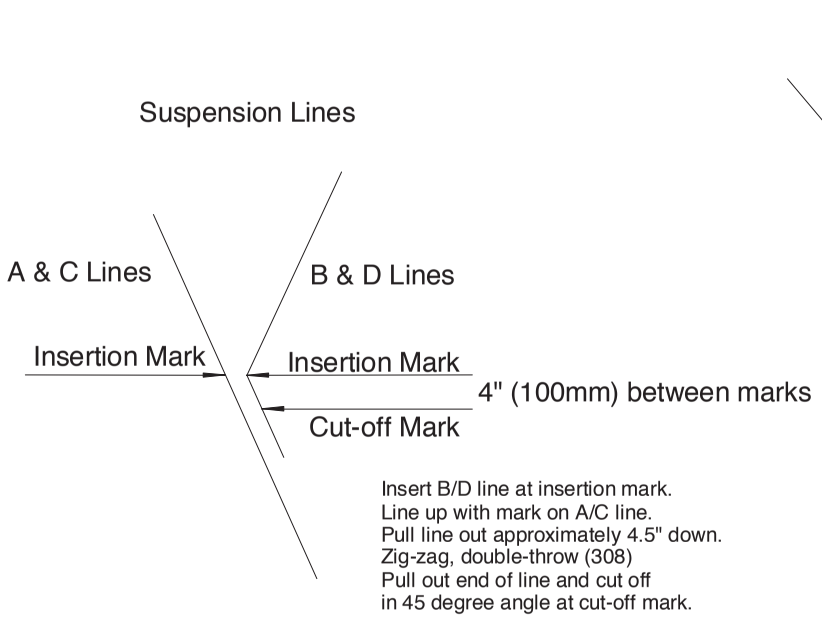
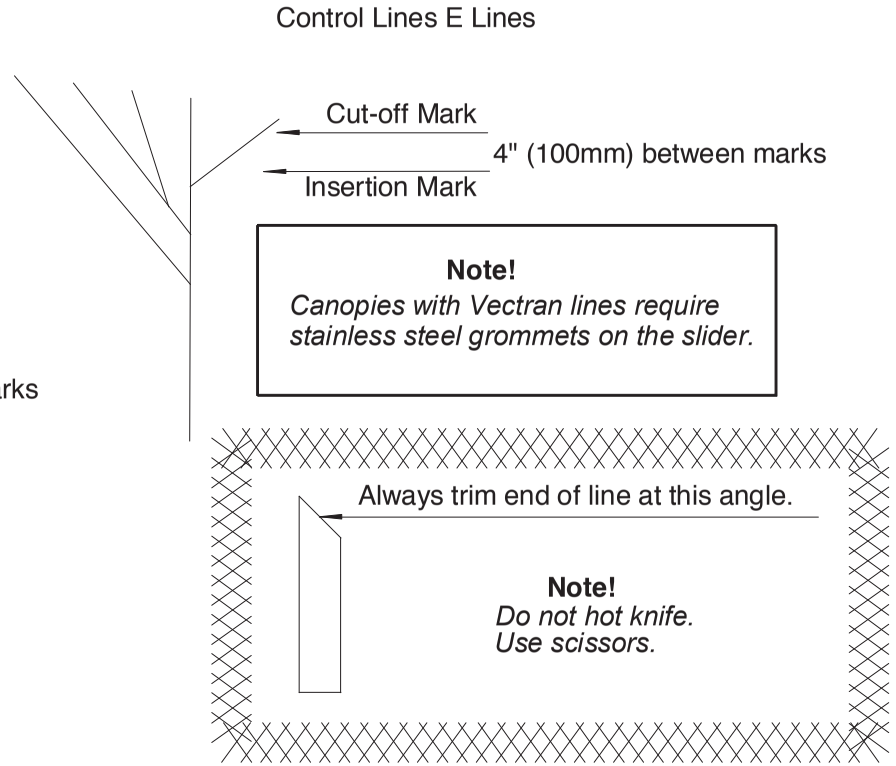
# 13.0 Line Installation SET 366 Main Canopy

**SET 366 (PN 411366):**
Line set PN 865357 (1500 Spectra® lines)
Color Codes on suspension lines:
A - Green
B - Blue
C - Black
D - Red

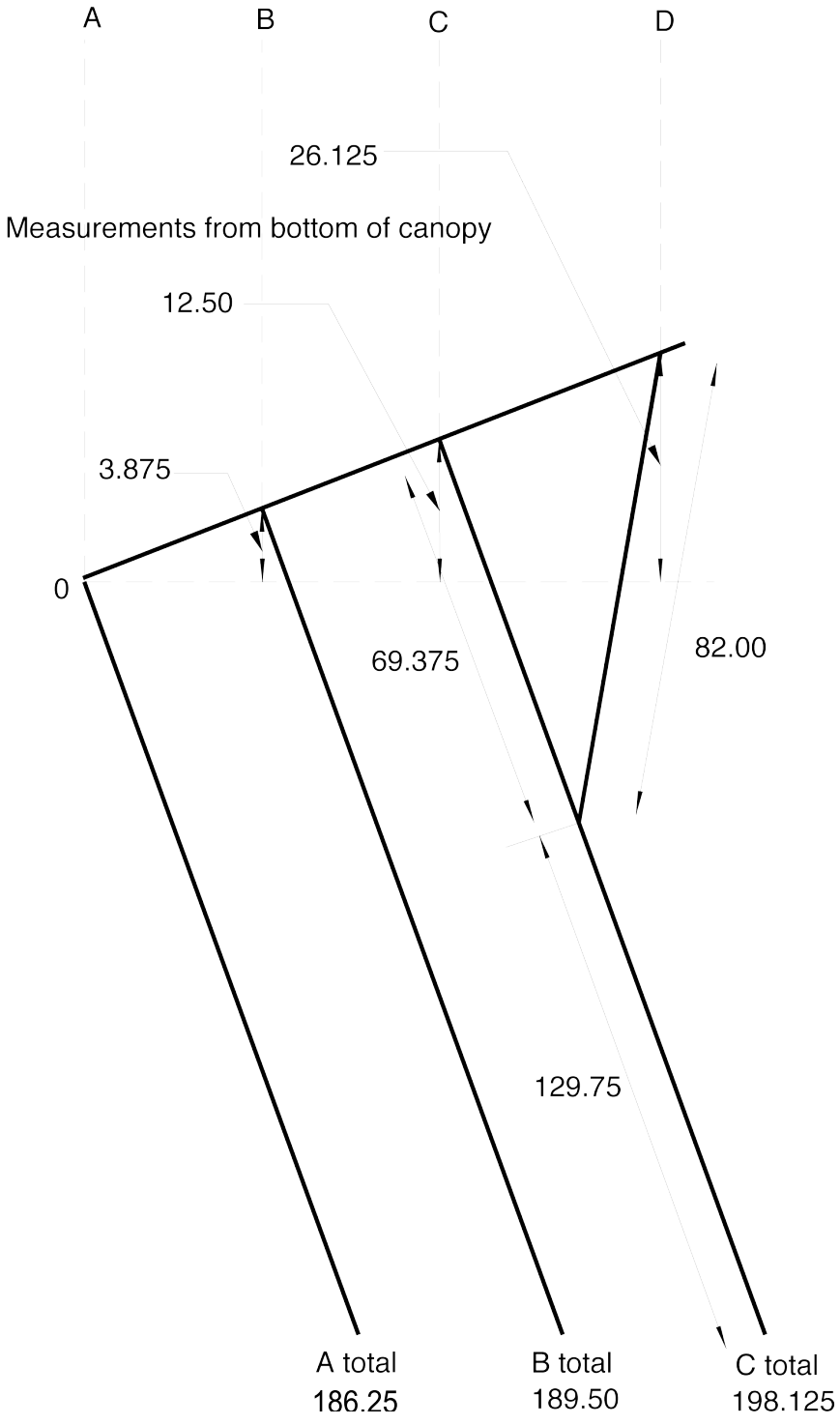


# 13.1 SET 366 Main Canopy

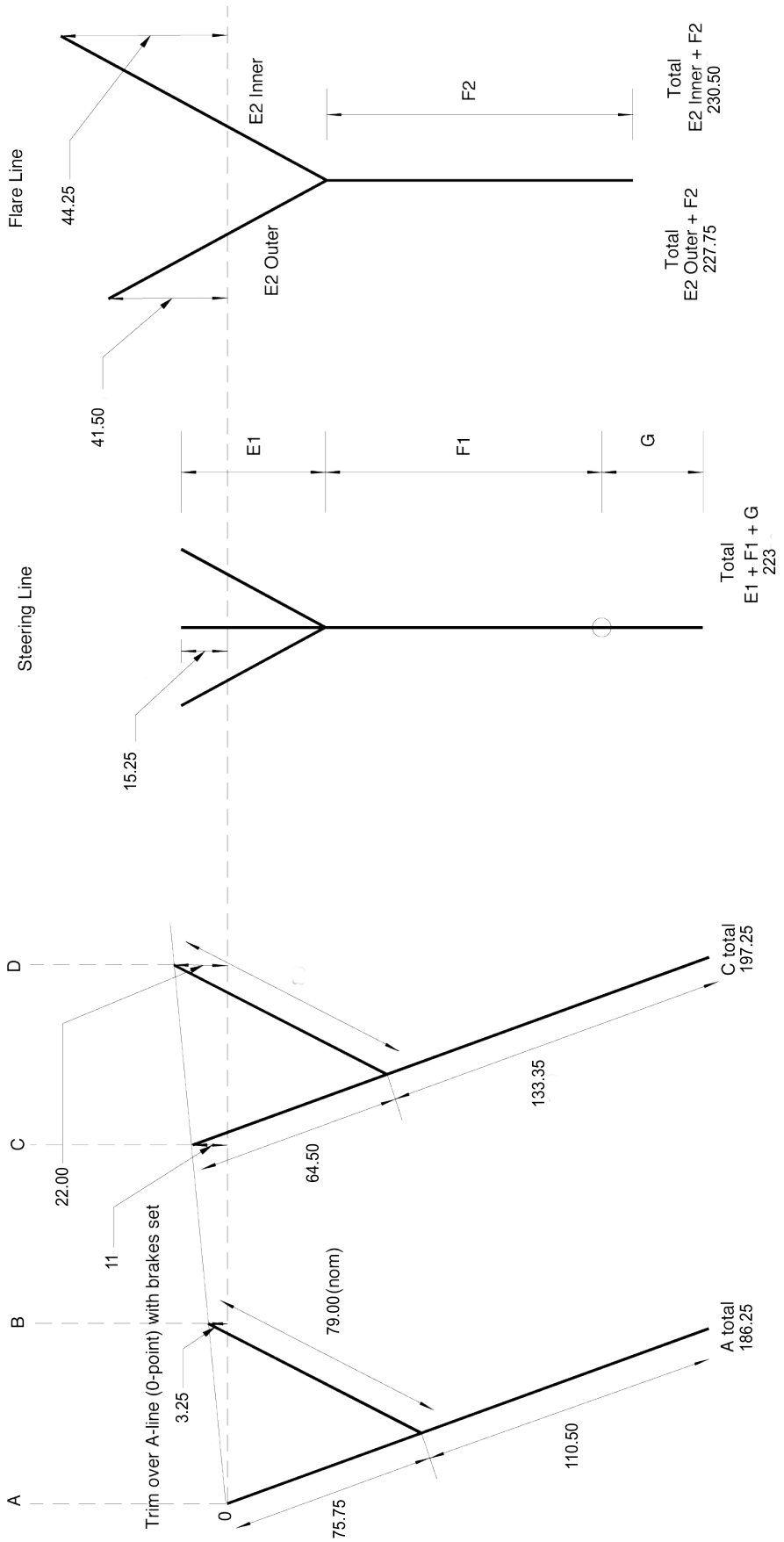
## Trim and Line Length, Inner Lines, Ribs 4,5,6,7

**Measurements are installed on canopy.**
**Trim over A-line (0 point) with brakes set.**
**(Trim measurements underlined with dotted line - - -)**

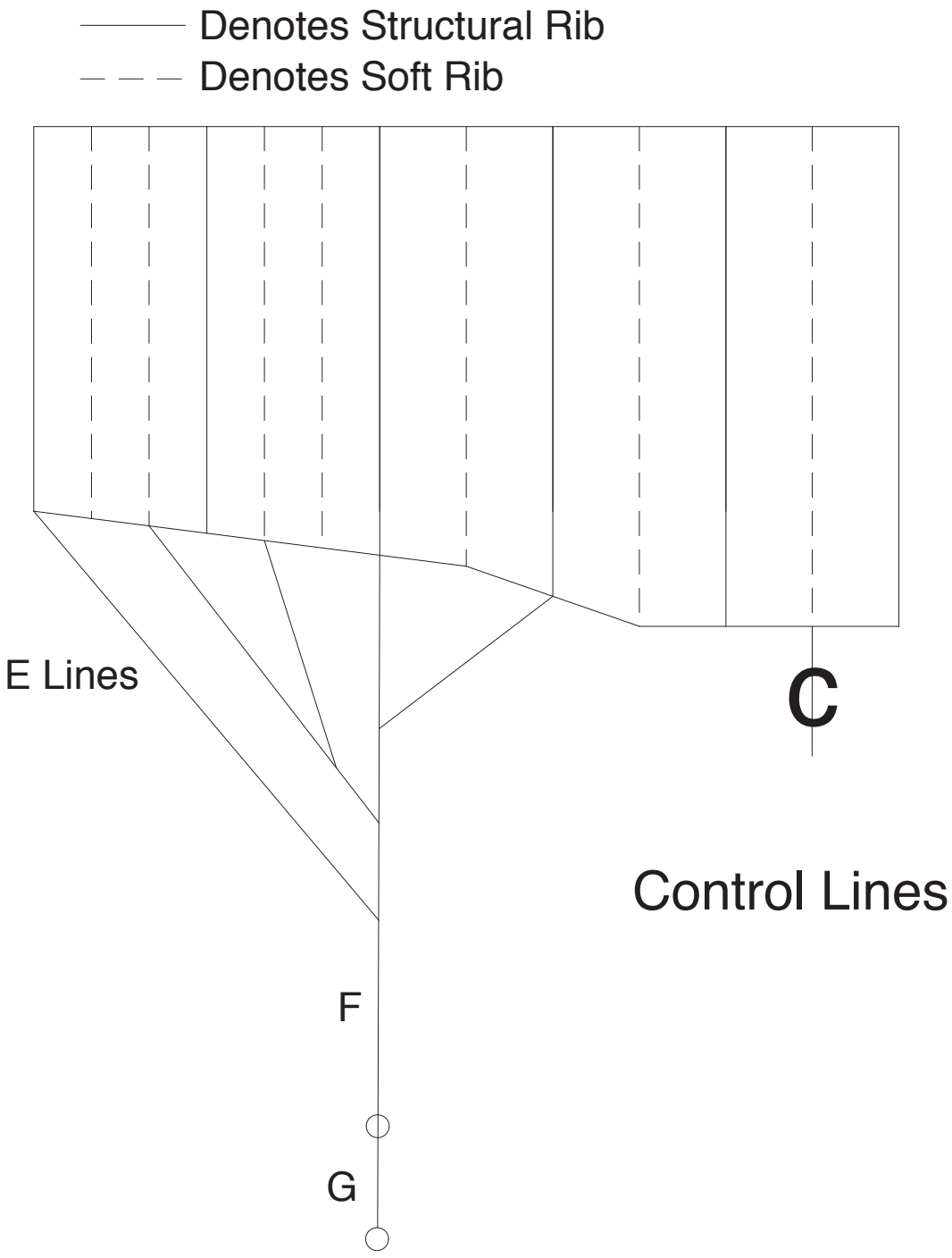


# 13.2 SET 366 Main Canopy
## Trim and Line Length, Outer Lines, Ribs 1,2,3,8,9,10

**Measurements are installed on canopy.**
**Trim over A-line (0 point) with brakes set.**



# 13.3 Control Line Attachment SET 366



# 14.0 – FAA FAR 105.45
# § 105.45 Use of Tandem Parachute Systems.

(a) No person may conduct a parachute operation using a tandem parachute system, and no pilot in command of an aircraft may allow any person to conduct a parachute operation from that aircraft using a tandem parachute system, unless—

(1) One of the parachutists using the tandem parachute system is the parachutist in command, and meets the following requirements:

(i) Has a minimum of 3 years of experience in parachuting, and must provide documentation that the parachutist—

(ii) Has completed a minimum of 500 freefall parachute jumps using a ram-air parachute, and

(iii) Holds a master parachute license issued by an organization recognized by the FAA, and

(iv) Has successfully completed a tandem instructor course given by the manufacturer of the tandem parachute system used in the parachute operation or a course acceptable to the Administrator.

(v) Has been certified by the appropriate parachute manufacturer or tandem course provider as being properly trained on the use of the specific tandem parachute system to be used.

(2) The person acting as parachutist in command:

(i) Has briefed the passenger parachutist before boarding the aircraft. The briefing must include the procedures to be used in case of an emergency with the aircraft or after exiting the aircraft, while preparing to exit and exiting the aircraft, freefall, operating the parachute after freefall, landing approach, and landing.

(ii) Uses the harness position prescribed by the manufacturer of the tandem parachute equipment.

(b) No person may make a parachute jump with a tandem parachute system unless:

(1) The main parachute has been packed by a certificated parachute rigger, the parachutist in command making the next jump with that parachute, or a person under the direct supervision of a certificated parachute rigger.

(2) The reserve parachute has been packed by a certificated parachute rigger in accordance with §105.43(b) of this part.

(3) The tandem parachute system contains an operational automatic activation device for the reserve parachute, approved by the manufacturer of that tandem parachute system. The device must—

(i) Have been maintained in accordance with manufacturer instructions, and

(ii) Be armed during each tandem parachute operation.

(4) The passenger parachutist is provided with a manual main parachute activation device and instructed on the use of that device, if required by the owner/operator.

(5) The main parachute is equipped with a single-point release system.

(6) The reserve parachute meets Technical Standard Order C23 specifications.

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**Division of S.E. Inc.**

**11236 Satellite Blvd. Orlando, FL 32837**

**Tel. (407) 859-9317 Fax: (407) 850-6978**

**www.strongparachutes.com sales@strongparachutes.com**