

# Apex BASE Owner's Manual

Sixth Edition

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The information contained in this manual is time sensitive. Because the sport of fixed object parachuting is advancing at a high rate some of the information will become outdated. When? Time will tell. Contact Apex BASE for details on current manuals.

## **!!! WARNING !!!**

**You will die. You were born. You will live and you will die. You may die while BASE jumping (parachuting) as others have. It is your responsibility to prepare yourself and your heirs for any eventuality that may arise from your participation in such activities as parachute jumping. 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.**

**If you are unwilling to accept full and complete responsibility for your activity you may return unused equipment to Apex BASE for a complete refund. By keeping or using any equipment you are accepting full responsibility and agree not to sue or make claims against The Uninsured Basic Research Inc., DBA Apex BASE, or its directors, owners, shareholders, officers, employees, designers, suppliers.**

## **Disclaimer – No Warranty**

**Because of the unavoidable danger associated with the use of parachute equipment, the manufacturer makes no warranty, either express or implied. The equipment 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 malfunction or from defect in design, material, workmanship, or manufacturing whether caused by negligence on part of the manufacturer or otherwise. By using this equipment, or allowing it to be used by others, the buyer waives any liability for personal injuries or other damages arising from such use. If the buyer declines to waive liability on the part of the manufacturer, the buyer may obtain a full refund of the purchase price by returning the equipment and all parts, before it is used, to the manufacturer within 30 days from date of delivery with a letter stating why the equipment was returned.**

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# **Welcome to Apex BASE**

## **Please read the following information**

### **Training Required**

It is recommended to have a minimum of 150 parachute jumps before attempting any BASE, fixed object jump. It is recommended you receive direct and qualified instruction on the use, maintenance and packing of this equipment. It is also recommended you receive direct and qualified instruction on the techniques and procedures of BASE jumping before using this equipment.

Training is necessary to reduce the possibility of injury or death. This manual is to help familiarize its users with the equipment - IT IS NOT a training manual on fixed object, BASE jumping, and must not be used as such. It must not be used as a sole source of information but should be a supplement to direct and qualified instruction. Canopy experience can be obtained (and is recommended) from skydiving it as a main. The Apex DP container is NOT approved for use (in most countries) from airplanes, however, the canopy can be used as a main in a two parachute system. Skydiving our parachutes, as a main parachute, is a great way to familiarize yourself with the flight characteristics of our BASE parachute. When skydiving our parachutes configure (Drawing 14.6-5) them for slider-up (mesh or sail) jumps, NEVER skydive them in a no-slider configuration.

### **How to use this manual**

This manual was set up to allow the user to find detailed information about the specific piece of equipment he/she is looking for. They should be able to turn to the specific pages and find all the information about the item. It is important to understand that these items do not function alone. They interact with other pieces to create a system. It is important that the user understands the important relationship between components. To understand this relationship we recommend reading the entire manual then come back and refer to the specific points of interest.

Each section has a number with a sub-section number, example 1.6.

Sub-section numbers relate as follows: .1 – description, .2 – assembly, .3 – packing, .4 – use,

.5 – maintenance, .6 – drawings. This manual is unique to other manuals. For two reasons – First, this manual covers 7 major components and 9 sub components, each with their own unique factors. Second, BASE jumping requires a much greater knowledge of equipment than does skydiving. For instance, with skydiving, equipment set up rarely changes from one type of jump to the next. With BASE - different pilot chutes are used at different altitudes, sometimes a slider, the line mod, Tail Gate, ..... Once again BASE equipment knowledge is a must. If you have any question or comments about the information in this manual or the equipment itself please contact Apex BASE directly at either of the two locations. Apex BASE Perris, 236-C East Third Street, Perris CA 92570 USA. Phone 951-940-1324, email- [perris@apexbase.com](mailto:perris@apexbase.com). Apex BASE Perris is in the Pacific Time Zone.

Or Apex BASE Moab, Phone 435-259-1085, email- [moab@apexbase.com](mailto:moab@apexbase.com). Apex BASE Moab is in the Mountain Time Zone.

### **Tail Gate**

Basic Research invented the Tail Gate a reefing device aimed at reducing line-overs. The Line Mod is an equipment set up as well as an emergency procedure in the event of a line over. Apex BASE continues to use and recommends using both the Tail Gate and the Line Mod. The Tail Gate has gained world wide acceptance since its introduction in early 1995. Since that time several other equipment manufactures have made it standard equipment on their canopies. And it is, of course, standard on all Apex BASE parachutes manufactured since its introduction. Because a canopy that is deployed without a slider (no slider) has a higher incident rate of line over malfunctions the Tail Gate is highly recommended on all no slider deployments. The Tail Gate has also gained popularity on slider up jumps, to reduce the line over malfunctions. However, the Line Mod MUST NOT be used with slider up deployments.

### **Single Container**

Single container, Velcro closed systems were introduced and gained popularity in the mid to late 1980's. It was the belief that the Velcro closed, hand held pilot chute, no slider, ram air\* with the line mod was the safest parachute system available. This set up was very reliable and consistent with regards to opening times and malfunction ratio. One reason the malfunction ratio was so low was due to how the equipment was configured. It was set up in a manner that eliminated several common malfunctions of skydiving equipment. A pilot chute in tow malfunction is easily detected on a Velcro closed container. Pin closed systems (including BASE) are not as easily detected. Total malfunctions are virtually eliminated by use of hand held pilot chutes. A ram air\* (square) parachute de-

ployed without a slider has an excellent opening reliability. However, it has definite limitations, deployment air-speed (approx. 55 mph or 85 km - 3 seconds of free fall) being its most notable. So, with these simplified systems the single container gained considerable popularity in fixed object jumping.

As the sport matured and more sites became available the equipment went through its own growth. On taller objects, sliders (mainly mesh) became commonplace. Stowed pilot chutes also became common on slider up and no slider jumps. Pin closed containers were needed for the higher airspeeds (from tall objects and long delays) and for aerial maneuvers – the introduction of a new age of fixed object jumps.

However, because of the mental and physical comforts, the single container remained and reserve parachutes were not used. It is important to understand the critical nature of single parachute jumps. Do not enter this type of activity without serious thought, training, mental and physical preparation.

We are frequently asked, “How can you jump without a reserve?” We reply, “We don’t, we jump without a main.”\* This statement expresses our frame of mind. Make sure any parachute system you may jump is 100% ready for the task at hand. It must be inspected, maintained, packed, deployed, flown, and landed with a great deal of care. And even with all that - you can still die, because there is a multitude of other influences.

*\*Notes to above- The mention of “ram-air” parachute is a very broad term. All ram-air parachutes are not the same. We are referring to the type contained in this manual, i.e. low aspect ratio, non elliptical. The parachutes featured in this manual ARE NOT RESERVES. They have not been tested as such and are not sold as such.*

### **Velcro vs. Pin Closed**

Pin closed parachute containers have been used in skydiving for decades. The Velcro closed container was introduced to fixed object jumping in the mid 80’s. A Velcro closed container has a very small variable of required force needed to open the container. It is about 8 to 12 pounds of force needed to remove the flap thus opening the container. This force does not change significantly with regards to packing technique, humidity, fullness or emptiness of the container. With a pin closed container, however, there is a substantial variable in pull force needed to remove the pin(s) thus opening the container. Factors that can change the required forces are packing technique, humidity, fullness or emptiness of the container, material type and length of the closing loop(s). Velcro closed system where the primary container for BASE jumping for over 10 years. Today, however, the dual pins systems are the primary container for BASE.

### **Pilot Chutes**

Using a hand held pilot chute is more technical than one may think, but a wise decision for most low free falls. There are several different methods of folding and deploying a pilot chute as it relates to free fall delays. For instance, a "go and throw" delay would usually keep all of the rip stop out of the hand and fold only the bridle and the mesh. While a 2 second and beyond delay would fold the entire pilot chute in the hand. Placement/ deployment of the pilot chute can also greatly affect inflation time. It is very important to learn these and other vital techniques before attempting any jumps.

A stowed pilot chute is an accident waiting to happen. You will die if you can not get a stowed pilot chute out of the pouch in a timely manner. There is no fix for this problem/malfunction. Do not be in a hurry to go stowed just because of peer pressure or because “going stowed” looks cool.

General ideas for hand held pilot chutes. Free fall delays of 3 seconds and shorter. Novice jumpers are wise to explore the hand held possibilities before deciding on a deployment method.

General ideas for stowed pilot chutes. Free fall delays over 3 seconds. The harness and container must fit very well or the handle may shift out of reach during the jump. Clothing must be tucked away so it will not interfere or cover the pilot chute.

BASE pilot chutes also come in a wide range of sizes and a several construction styles. Over-sized pilot chutes are commonplace in fixed object jumping. However, a pilot chute that is too large for a specific airspeed may create its own set of problems – center cell strip and a list of malfunctions. A pilot chute that is too small may not open the container and/or allow the parachute to deploy in a timely manner. Once again learn and understand the potential benefits and detriments of different sized pilot chutes.

### **Sliders**

In skydiving the slider is rarely given a second thought, unless it is the cause of a malfunction. In BASE it is a valuable tool in a deployment. If used incorrectly it can be dangerous or deadly.

There are several different types of sliders: sail, mesh, split, spider, bikini, and more. It is important to understand all sliders are not the same. Every canopy has a slider the manufacture deems to work for the particular canopy. Its type, fabric, overall size, grommet style, grommet size, and construction are all factors used to determine which slider is most appropriate for the canopy. Borrowing a slider should not be undertaken without careful consideration to guarantee the proper slider is being used. Opening performance will change when using a slider of different

styles or sizes.

Mesh sliders have become the norm for a wide range of BASE jumping. However, depending on the topography of the area, a no slider jump is the most common type of jump in many locations. There are two basic types of deployments used in BASE jumping – ones that use a slider and ones that do not use a slider during deployment. When a slider is used it will typically be referred to as “slider up“. When a slider is not used for its primary purpose of reefing the opening it will commonly be referred to as no slider, slider removed or slider down. The term slider down refers to the technique in which the slider is left on the parachute assembly but is not used during the deployment. Apex BASE does not recommend this method because of the entanglement possibilities associated with the slider during deployment. We recommend removing the slider from the parachute assembly when not needed. This will also give the canopy better flight performance due to the spread of the risers not being restricted by the slider dimensions. Removal also helps reduce problems associated with poor body position during deployment such as line twists and entanglement. If the slider is going to be left on (and not in the slider up position) it should be secured to the front risers only. This will prevent it from sliding up the lines during deployment but still provides full range of motion for the rear risers. The Tail Gate and Line Mod must be utilized any time the slider is down, or removed. The Line Mod must never be used when the slider is up.

### **Vtec**

FLiK and FOX canopies are available with an option known as Vtec (vent technology). Vtec was designed to assist the normal ram air pressurization. This assistance is most noticeable on no slider jumps. The vents are located on the bottom surface of the canopy and allow air to enter, through these vents, into the air-foil while the canopy is in the vertical element of the opening. Once the canopy begins moving forward pressurization is maintained traditionally (ram-air). During ram-air pressurization Vtec will be closed by a cover, thus maintaining a high internal pressure. If the canopy enters into vertical flight then pressurization will come from Vtec. Some users say “Vtec opens faster,” and use this statement as rational for making jumps from much lower heights. This is a foolish and deadly game. Vtec does allow for quicker pressurization. However, pressurization is but one of several elements needed in a parachute deployment. There is pilot chute deployment, bridle stretch, pilot chute inflation, container opening, canopy lift, line stretch, reefing release, canopy inflation, heading, pressurization and flight control all influencing opening speeds.

### **Micro Reefing**

There are several devices (sliders, Tail Gates) that are used to reef (slow, control or sequence the opening of) a parachute. There are even more techniques (controlling the slider directly or indirectly, masking tape, rubber banding this-that-or-the-other) to reef a parachute. Individuals have used and invented reefing device and techniques to adjust openings to a comfortable point or to solve a problem that is real or imagined. Regardless there are a multitude of reefing options. Here is a list of some (but not all) reefing that may be used alone or in some combination with each other. It is important to understand that some may not work the way they are intended. Each item must be used with caution and the individual must understand how the technique or device may effect the opening speed, comfort and functionality of the parachute system.

- Slider- (mesh, sail, spider, bikini...)
- Tail Gate- with out slider
- Tail Gate- with slider
- Single Direct Control- of the slider (a single rubber band stow of the slider typically to a center C line attachment)
- Double Direct Control- of the slider (two rubber band stows of the slider typically to both left and right center C line attachment)
- Rolling the nose- (usually on slider up jumps when hard openings are common) so that the three outside cells are rolled toward the center cell on each side.
- Stabilizers folds or rolling– using folds or rolls of the stabilizers to reduce the air blast to the bottom surface.
- Single Stow– a single bite of the suspension lines stowed under the Tail Pocket.
- Slider Stow- is a single stow mounted on the slider typically the stow will use only the upper control lines.
- Masking Tape– Not recommended because of the inconsistency with type and size of tape
- POD or Sleeve– Great for controlling the sequence of a deploying parachute but heading performance will suffer.

Each of these have there own pros and cons. Each parachute will have its own opening characteristics due to design, age, reefing and temperament. Consult your instructor or contact us for more details.

### **Upper Control Lines 4 or 5**

An option on Apex BASE canopies is the number of Upper Control (UC) Lines. Standard is with 4 UC on each side, therefore the option is 5 UC. This option has created a great deal of controversy. Those who like it (5 UC) want it on all their canopies. Those who dislike it, think it should be banned. It's basically depends on the type of jumping, the particulars of the individual sites, and the jumpers experience with the canopy.

4 UC characteristics:

- Better deep brake, accuracy approaches
- Good stall warning
- Less flare performance
- Slower flatter turns
- Longer toggle stroke
- Slower slider speed during openings, comfortable at terminal velocity, but sub terminal slider may be slow

5 UC characteristics:

- Fair deep brake, accuracy approaches
- Reduced stall warning
- Better flare performance
- Faster diving turns
- Shorter toggle stroke
- Faster slider speed during opening, requires more (micro) reefing to obtain comfortable openings at terminal, but at sub terminal slider comes down quicker.

### **Warning**

#### **Release System**

Apex BASE offers several releasable components-3-Ring risers and WLO Toggles to mention a couple. Any component has the possibility of creating injury or death if not properly packed, used, maintained, designed, and constructed, however a component that IS designed to release will always have the possibility of release when it is not intended. An accidental release of any component could cause serious injury or death. Non-releasable versions of the components do exist. The releasable 3-Ring riser can be substituted with L-bar risers for a more secure attachment or the risers can be built into the harness. By the same token standard (EZ Grab) toggles can be used avoiding the releasable WLO toggle type. The reason both the 3-Ring and WLO toggles have become popular is because they work, BUT THEY ARE NOT 100%. Releasable components may release when they should not, and as a result injury or death may occur.

**Read all warning labels and all instruction before using or packing any parachute equipment.**

# Part A

## Canopies

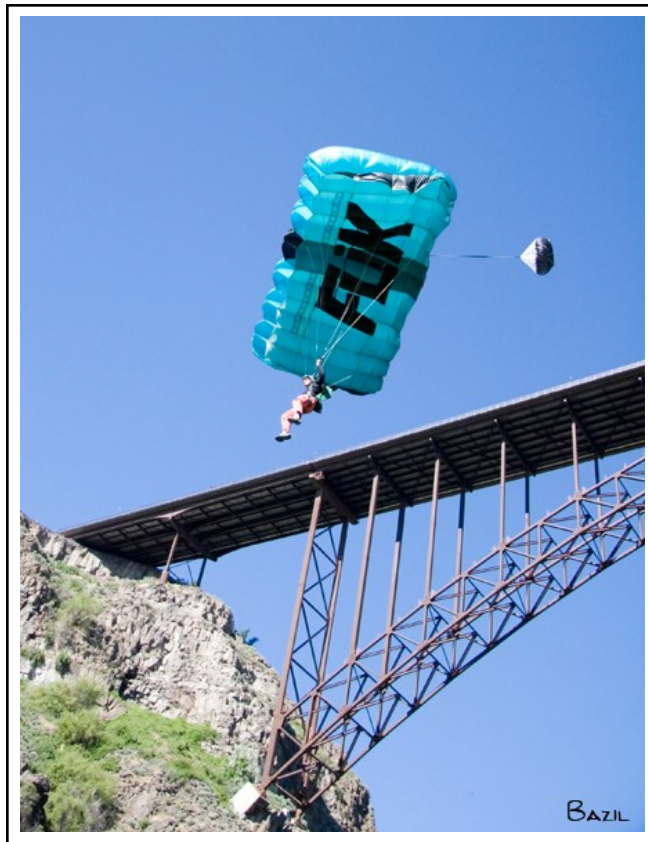
FLiK

FOX

Slider

Multi

H<sub>2</sub>O



## **2-Canopies**

### **FLiK, FOX, Rock Dragon**

#### **2.1 Description**

The FLiK and FOX are seven cell ram-air parachutes utilizing I-beam construction with spanwise reinforcement. The FLiK is available in 11 sizes– 182, 200, 220, 242, 254, 266, 280, 293, 308, 322 and 354 square feet. The FOX has 7 sizes 185, 205, 225, 245, 265, 285 and 315 square feet. All canopies use ripstop fabric that has a permeability of 0-3 cfm when new. Apex BASE also offers HTS- Hybrid Top Surface which includes ZP (zero permeability fabric) fabric on a portion of the top surface starting at the leading edge. Another top surface option is Full ZP top surface which would provide zero permeability fabric on the entire top surface and end cell ribs. The FLiK and FOX are available with Vtec, vent technology, which is mesh covered vents on the bottom surface. All Vtec canopies will have Vtec Covers. Both models come standard with 8 Upper Control lines (UC), 4 right and 4 left, however, they have 10 UC lines, 5 right and 5 left as an option. The UC Inboard (UCI) line is longer than the other UC lines.

The parachute components include:

- Tail Pocket– installed
- Tail Gate insert– installed, center left C line
- Tail Gate– removable
- Mesh Slider– removable, for sizing see Part D Specifications.
- Lower Control lines with 1 or 2 brake settings. Counting from the toggle #1 and #2.
- 4 - #5 stainless steel connector links, with link covers
- Dacron lines (Spectra optional)
- Vtec - Vent Technology - optional
- Multi – Multiple Bridle Attachment – optional, see Section 4
- Sail Slider – optional

#### **2.2 Assembly**

The canopy has three areas of assembly- the connector links to the risers, toggles to the control lines and the bridle attachment to the bridle .

Connecting the links to the risers

Each connector link will have its own continuity concerns. Be sure to treat each connector link separately for proper assembly. The 2 front links will have four lines all cascading. The 2 rear links will have four lines all cascading. The 2 control lines each cascade, into four (or five) lines.

Refer to “Line/Riser Continuity” in Part D, for proper continuity .

Tighten all 4 connector links by hand as tight as possible. Then with a 9 mm wrench apply another quarter turn to all 4 links. No other tool, only a 9 mm wrench, should be required to tighten or loosen any link. Do not over tighten any link. Over tightening can crack the barrel of the link. A cracked link may fail during use.

Slide the link covers over the tightened links. These covers are not only slider bumpers, link covers help maintain proper orientation of the link during deployment.

Assembly with a toggles refer to Section 12.2 with WLO LRT toggles or 14.2 with EZ Grab LRT toggles.

Assembly with a slider refer to Section 3.2.

Assembly with Multi refer to Section 4.2.

Assembly onto Apex DP bridle refer to Section 6.2.

#### **2.3 Packing**

Apex BASE Owners Manual uses a form of a PRO (Proper Ram-air Orientation) Pack. It is done on the ground (not standing - over the shoulder) with 4 spring loaded clamps. The “center” is used as a reference to the area between left and right.

2.3-1 Secure the container so it will not slide toward the canopy when pulled against and so the risers are even and will remain even throughout the packing. Lay out container so the jumper would be face down, per normal packing. Confirm proper continuity, four line check.

- 1a Facing the canopy, grasp both rear risers in the left hand and both front risers in the right. Walk toward the canopy keeping all the lines in the respected hands. If the slider is on leave it at the links. Lift the canopy off the ground, give it a shake, and lay it on its left side.
- 1b Collect all 3 sets of packing tabs- 7 tabs at the B, 7 at the C, and 7 at the D.  
Place a clamp on the canopy at each of these groups.
- 1c Dress the top of the canopy from the B clamp toward the nose. Place the fourth clamp on the top surface directly above the A lines. Drawing 2.6-1
- 1d Place the A clamp directly above of the container and pull tension so the container, the lines, and the A clamp are all in a straight line. With the A clamp on the ground flip the nose over and flake the top 3 cells out leaving the center cell nose in the middle. Drawing 2.6-2 Make additional folds to left and right nose. No slider – single fold facing in toward center cell. Slider – double fold facing away from center cell. Keep center cell nose exposed.
- 1e Place one hand under the entire nose fold, the other on top and grasp the canopy between the two hands. Flip the canopy over so the nose is against the floor.
- 1f Take the B clamp and stack it above the A clamp, while maintaining tension on the lines . Clear the 3 cells to the left and the 3 to the right of the center. This should be done at the top (Drawing 2.6-3) and bottom surface.
- 1g Take the C clamp and stack it above the A and B clamps, while maintaining tension on the lines . Clear the 3 cells to the left and the 3 to the right of the center. This should be done at the top and bottom surface.
- 1h Take the D clamp and stack it above the A, B, and C clamps, while maintaining tension on the lines . Clear the 3 cells to the left and the 3 to the right of the center. This should be done at the top and bottom surface.
- 1i The canopy should now be laid out with the lines and line attachments in the center, and the center cell in the center. All of the left cells should be to the left of the center and the right cells should be to the right of the center. Drawing 2.6-4
- 1j Grasp all upper control lines bringing them to the right side, exposing the left side of the canopy folds. Dress the left side of the 3 stacks of folds.
- 1k Place the left side upper control lines back over to the left and check continuity of left and right brake lines.
- 1l Grasp all upper control lines and place them so they are and near the C line attachment tabs.

## 2.3-2 Set toggles according to Section 12.3 (WLO) or 14.3 (EZ Grab)

- 2a Confirm proper left and right continuity between toggles and trailing edge of the canopy.

For slider up deployments refer to Section 3.3 then continue with Section 2.3-4.

## 2.3-3 Tail Gate – 12 lines, or 14 lines of control

If a Tail Gate is not already installed do so now. The Tail Gate insert location is on the center left C line approximately 4 inches from the line attachment tab. Find this insert and place a Tail Gate into the insert. The Tail Gate should also have a rubber band larks headed to the Tail Gate approximately 1 inch from the end. Rubber band size is 1-1/4 inches by 3/16 inch (3.2 cm x 0.5 cm).

- 3a Ensure there are no twists in the risers. Locate the rear risers, grasp the inner most line on both rear riser links (Tail Gate Friendly lines – colored). Grasp the 2 lower control lines.
- 3b While holding these 4 lines walk toward the canopy. These four line will cascade out to 12 or 14 lines. These will be the 12 or 14 lines placed into the Tail Gate. Work any other line(s) out of this group so that only the 12 or 14 lines remain, one of which should be the line with the Tail Gate. Other methods of obtaining the 12 or 14 lines may indirectly trap other lines.
- 3c Check Tail Gate position. The C line that the Tail Gate is attached to must be inside the Tail Gate, so as not to load the insert piece.
- 3d Place all 12 or 14 lines into the Tail Gate. Close the Tail Gate with 2– 3 wraps of the rubber band. Check that there are 12 or 14 lines in the Tail Gate and that the Tail Gate C line is inside the Tail Gate. Drawing 2.6-5

## 2.3-4 Long Folds to fit container.

- 4a Fold half of the tail over the center, be sure to pivot around the center, exposing the 3 stacks of canopy. Fold the outside edge of the 3 stacks of canopy toward the center. This is accomplished in one long fold with all 3 stacks.
- 4b Remove any of the clamps except the top (D clamp), and place it on this new fold approximately 10 inches from the top of the canopy.
- 4c Pivot the tail back into position on top of this long fold.

-4d Repeat steps 2.3-5a through 2.3-5c for the other side. Drawing 2.6-6

#### 2.3-5 Flaking Tail

-5a With the tail and control lines on the left side remove any slack between the D lines and the control lines. This is accomplished by placing your hand between the D lines and control lines and pulling away from the container removing slack in the curvature of fabric between these two points.

-5b Grasp the small portion of stabilizer (between the D and tail) pulling the fabric out to the right and keeping the seam in the center. This should place the right outer upper control line in the center.

-5c Continue to stack all tail seams in the center, pulling the fabric between these seams out to the right. These will be half cell folds. Continue all the way across, including the center cell Tail Pocket. Keep tension on all the upper control lines.

-5d Now with all the tail stacked on the right and all the seams in the center, stack all the bottom surface tail seams on top of each other. Finish with all seams in the center.

-5e Locate the center cell Tail Pocket and grasp all the tail above it. Pivot this stack of tail around the center. The canopy should be completely symmetrical at this time with the left side of the canopy to the left of the center and the right side to the right of the center. Drawing 2.6-7

#### 2.3-6 Lift Tail Pocket out of the way to expose D line attachments.

-6a Group all D line attachments in center. Dress fabric so the center is exposed at the D line attachments.

-6b Remove the center cell from the D clamp.

-6c Place the Tail Pocket at the edge of the stabilizers. Flatten the canopy working the air out of the fabric as much as possible. Drawing 2.6-8

-6e Kneel on the canopy with both feet on Tail Pocket and knees towards the top.

-6f Wrap/tuck a small portion (2-3 inches) of the tail around the entire canopy. Do not pull any of the lines out from the center. Make the finished width of this fold even with the edges of the Tail Pocket. Do not cover the nose. Work the air out.

-6g Position all 4 clamps on the sides of the canopy at this time. Two clamps should be just above the Tail Pocket, one on each side. The other two should be even with or slightly above the D packing tab, one on each side. Drawing 2.6-9

#### 2.3-7 Stowing the lines in the Tail Pocket.

-7a Release tension from container. Sit on canopy facing container. Open Velcro closures on Tail Pocket.

-7b Optional with slider "indirect control"- Using the single stow (located between the Tail Pocket and the canopy). Grasp lines 6 inches (10 cm) below Tail Pocket. Pull the lines toward the Tail Pocket creating a bite. Locate the single stow between Tail Pocket and canopy, place line bite in rubber band creating a single stow.

Drawing 2.6-10 Then tuck the stow between the canopy and Tail Pocket.

-7c Free stow Tail Pocket (no single stow). Grasp lines 8-12 inches below Tail Pocket and pull the lines towards the Tail Pocket creating a bite, lay this bite in either upper corner of the Tail Pocket.

-7d Continue stowing lines in S-folds back and forth across Tail Pocket. Each S-fold will slightly over-lap the previous S-fold in a "shingle" fashion. Stow to within 5 inches (13 cm) of links. Drawing 2.6-11

-7e Lines MUST enter and exit between the 2 Velcro tabs at the bottom of the Tail Pocket. Moreover, the Velcro must not be required to open to facilitate line deployment.

-7f Close the Tail Pocket by mating the Velcro to its respected piece. Start by mating the corners and work the Velcro up the sides and across the bottom.

-7g Ensure no lines are trapped in the Velcro. Ensure the Velcro is aligned with its counter part completely.

Drawing 6.6-1 or 7.6-1 or 8.6-1 or 9.6-1

-7h Multi canopies only- Follow section 4.3.

#### 2.3-8 Placing the canopy into the container., Section 6.3 Apex DP

### **2.4 Use**

The FLiK and FOX Parachutes have numerous possible configurations. For instance, without a slider, free fall delays between 0 and 3 seconds are common but must never exceed 4 seconds. On a no slider free fall delay beyond 4 seconds there is a very high risk of damaging the equipment and/or injuring the jumper and this may be

fatal. Any time the slider is not used during deployment is considered a no slider jump. Some people will use the terminology of "slider down," or "slider removed" but they are all the same in this respect, the slider offers no reefing to the opening parachute. Apex BASE will refer to this configuration as "no slider". We recommend removing the slider when not being used on slider up jumps. The act of tying the slider to the connector links is not advised due to the entanglement possibilities during deployment. If this method is used never tie the slider to the rear risers. On any no slider jumps the Tail Gate and the Line Mod should be utilized. If you are unfamiliar with either method STOP and receive training on both items before continuing.

With a slider, the canopy will open slower. Most slider up jumps are made using the mesh slider. The mesh slider allows for quicker inflation than a sail slider. Refer to Section 3.4 and Reference Chart for more information on mesh vs. sail. Consult an instructor or knowledgeable persons for more information regarding specifics.

It is typical to use large pilot chutes for BASE jumps. The larger the pilot chute the greater the effect it will have on the flight performance of the parachute. This flight performance is most notable on the landing flare. Therefore, do not expect the same type of performance when jumping a 36 inch pilot chute as with a 48 inch pilot chute. There is a great deal of knowledge and experience necessary to reduce the risk of injury and death. Gain such knowledge before making any jumps.

Water exposure can greatly affect the parachute fabric. Water damage may come in several forms, obviously water landings, but also from flights in rain or heavy mist, packing on wet or damp surfaces. Water damage will reduce the fabric's ability to stop air from flowing through it. Thus creating a more porous canopy. A canopy with a high porosity will generally open slower (pressurize slower), and will have a higher descent rate even with a flare. Packing, handling and jumping also effect the canopy's porosity. Therefore, the more jumps a canopy has the higher the porosity.

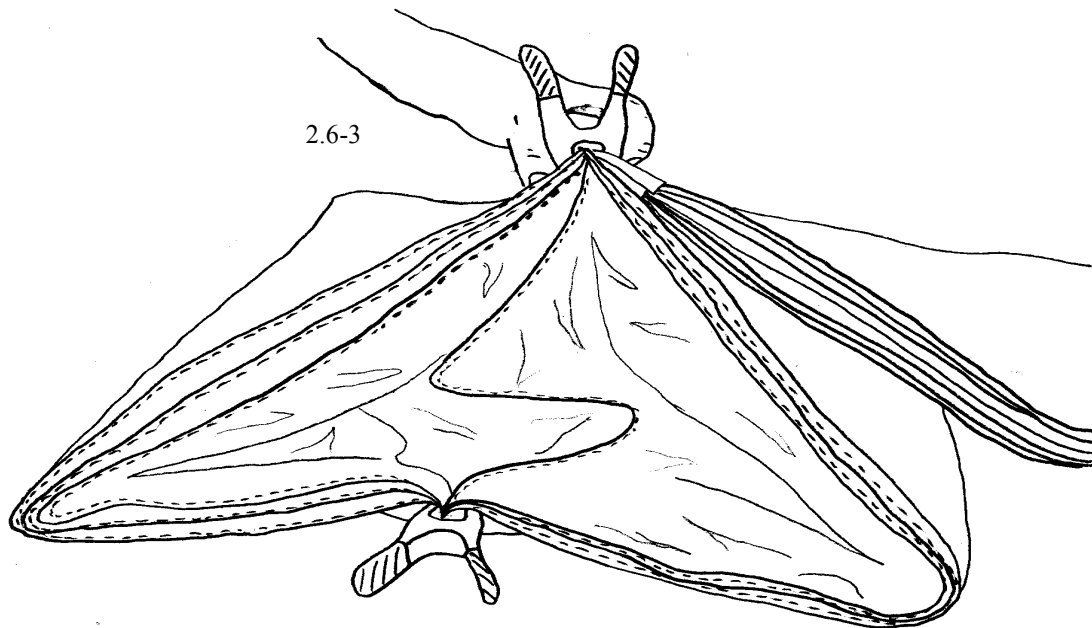
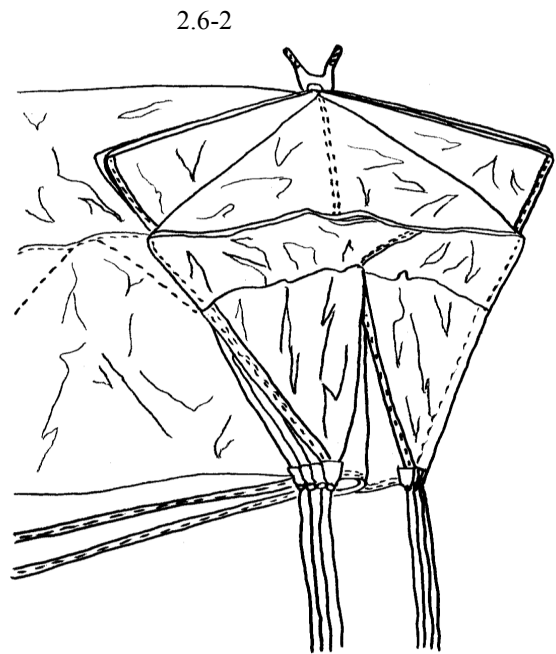
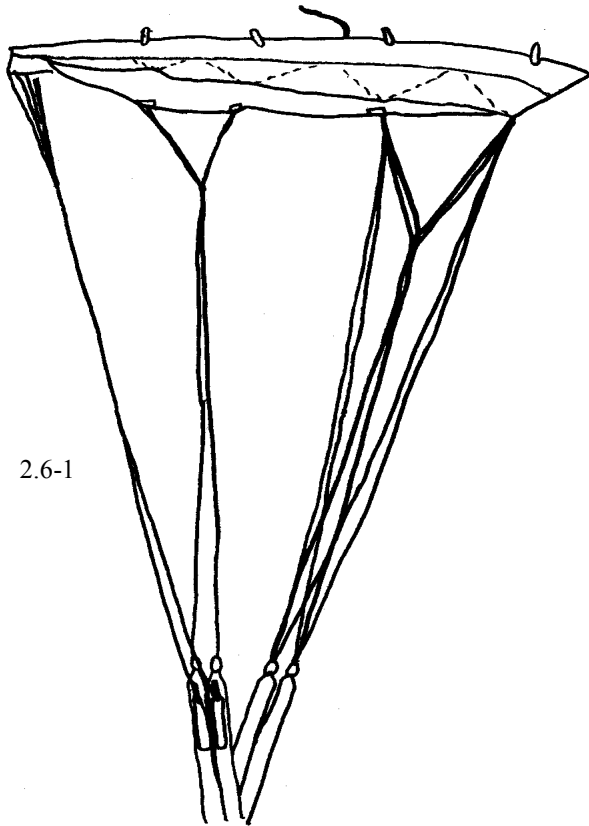
## **2.5 Maintenance**

Canopy fabric is durable but not indestructible. Holes larger than 1/4 inch or within 10 inches of a line attachment or the bridle attachment should be repaired before jumping. The canopy may be repaired by qualified persons. Patches should be done according to common parachute industry standards. Major repairs should be returned to Apex BASE for quality assurance. A major repair is one that has to get into any seam, reinforcement tape, line attachment or if repaired incorrectly can effect the flight characteristics of the canopy. Do not wash any canopy. After salt water landings the entire system should be rinsed with fresh water. Never pack or use a wet parachute. Contact Apex BASE if you have questions concerning cleaning or contaminants.

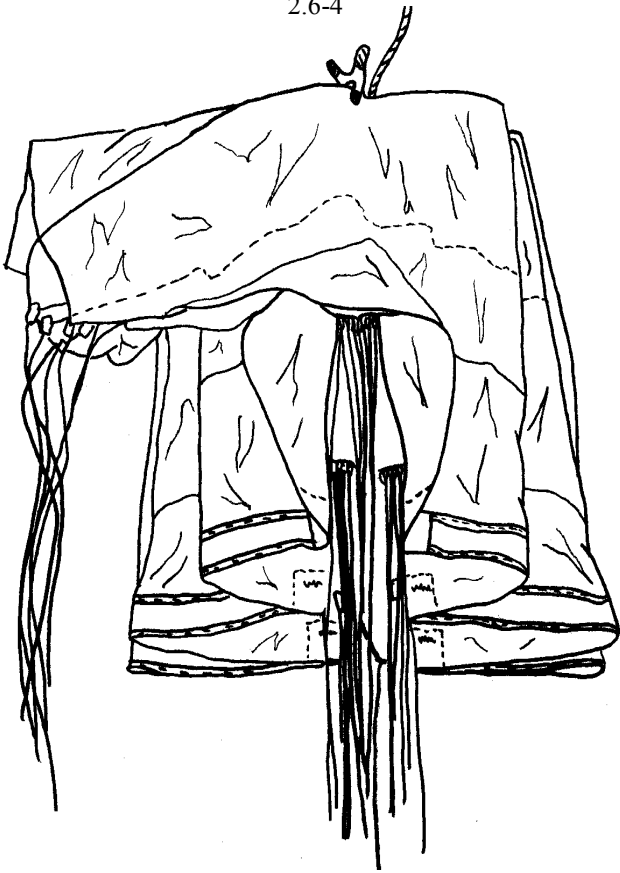
The slider is a contributor to line damage, keep the grommets free of burrs, sharp or rough spots, and keep link covers in place. This is noticeable by general wear on most of the lines, control lines specifically. However, landing and handling problems damage more lines than sliders do. The lower control lines do wear out due to slider wear as do the brake settings. Brake setting wear is highest with no slider deployments. Inspect them regularly and replace when damage is present.

Inspection of the canopy is very important. It should be inspected regularly. An inspection should take place when any flight goes unusual, i.e. poor landing, tree landings and such, and any unusual openings. Inspection must take place on the external portions of the canopy, but you must not forget there is an internal part as well. Crawl into each cell to inspect internal structure and connections. Refer to Part D – Inspection for more information.

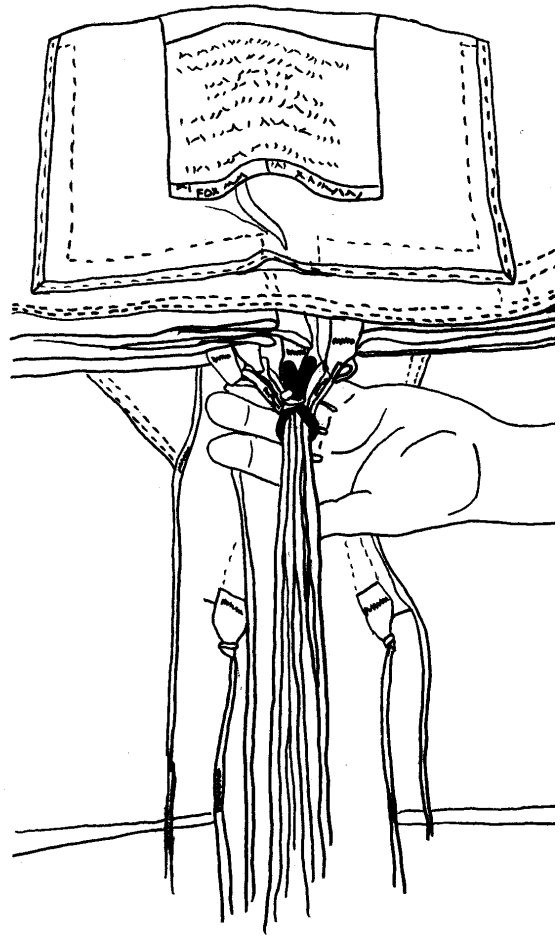
## 2.6 Drawings



2.6-4



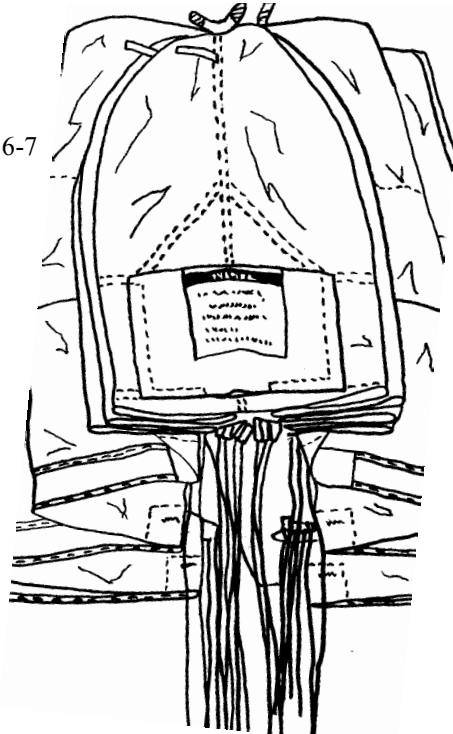
2.6-5



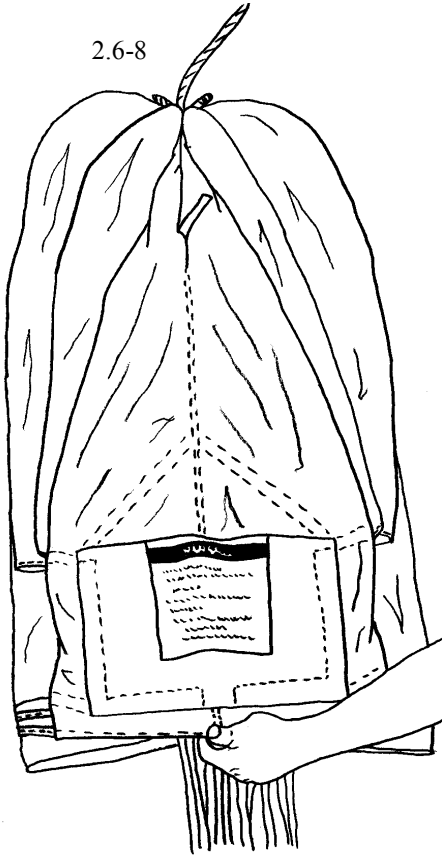
2.6-6



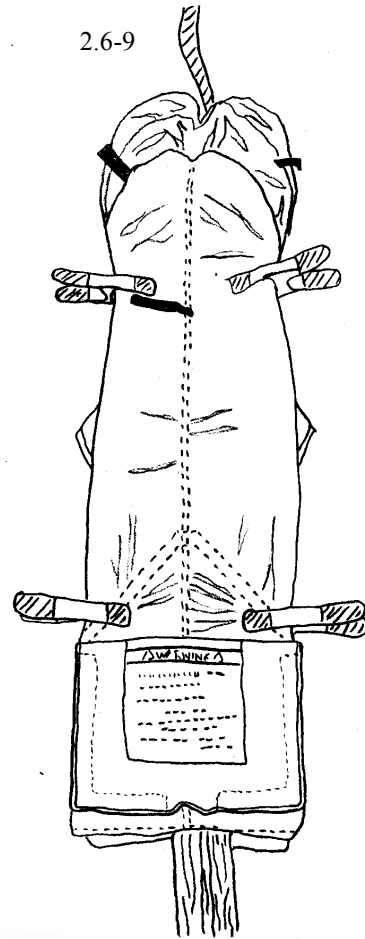
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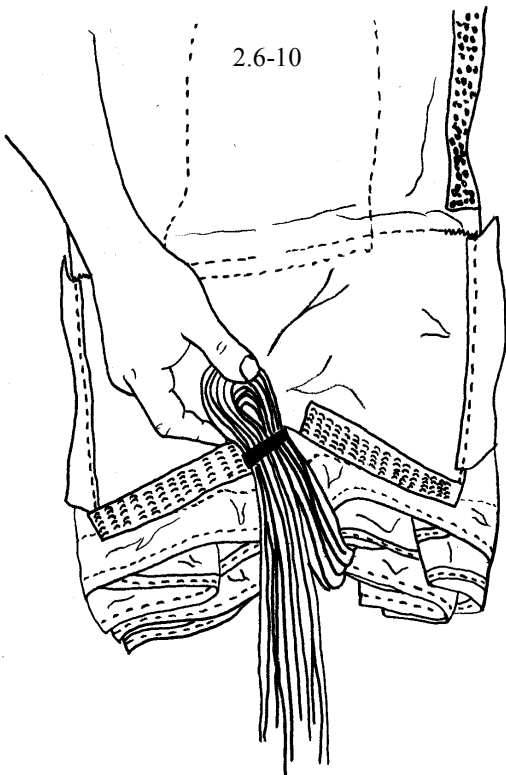
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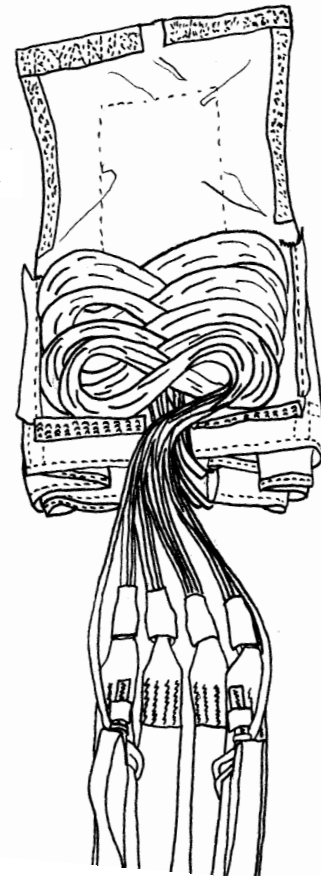
2.6-9



2.6-10



2.6-11



## **3- Sliders**

### **3.1 Description**

A slider of any type is a reefing device, designed to slow the parachute inflation to a speed that is acceptable for the user and the equipment. There are several different types of sliders: sail, mesh (large hole and small hole), split, spider, bikini, and more. We will be working primarily with the mesh, with an occasional look at the sail. A mesh slider is a slider made of mesh rather than a solid piece of ripstop fabric as in the sail slider. FLiK and FOX parachutes have three different sizes of sliders for 13 sizes of canopies. They should not be interchanged among sizes.

FLiK 182, 200 and FOX 185, 205 use the PN 1724 slider measuring 17 x 24 inches.

FLiK 220, 242 and FOX 225, 245 use the PN 2024 slider measuring 20 x 24 inches.

FLiK 266, 293, 322, 354 and FOX 265, 285, 315 use the PN 2328 slider measuring 23 x 28 inches.

The sliders will be marked with a PN number as well as a "RF" and "LF" indicating right front and left front. The lines that pass through the respected grommet must come from the Right Front riser and from the Left Front riser. Maintaining this relationship between slider and risers will insure the slider is installed properly with regard to aspect ratio of the slider matching the A/R of the canopy, and will keep the grommet and canopy relation proper.

### **3.2 Assembly**

Installing and removing the slider must be done with order and attention to continuity. By developing a consistent and repeatable routine - slider installation or removal can be accomplished with efficiency and accuracy.

3.2-1 Removing the slider. Starting with control lines, to rear risers, to front risers.

-1a Place slider to within 12 inches of connector links. Confirm proper continuity from the container and risers to just above the slider. Place harness with container up and rear riser on top of front risers. Fan riser out slightly so the front risers are inside and rear to the outside.

-1b Slide link covers up off link toward the line. Loosen links with wrench (9 mm with #5 Rapide links). Note barrel location of each link. They should be facing inward.

-1c Remove control lines from toggle. Remove the control line from the guide ring on the riser and the slider grommets. Re-attach toggle to control line Section 14.2, and lay to the outside.

-1d Open either rear connector link and remove it from the riser maintaining control of the link. Be careful not to damage the riser during this step, the inside of the connector link, threaded area, can be very sharp. Pass the connector link through the slider grommet and re attach to the respected riser and finger tighten.

-1e Repeat for other side of rear riser.

-1f Work the same routine for both front risers.

-1g Tighten links with fingers until snug, then add a quarter of a turn with a wrench. Do not over tighten, over tightening may cause link barrel to crack.

-1h Slide link covers in place. Check continuity, all four links and control lines.

3.2-2 Installing the slider. Starting with front riser, to rear risers, to control lines. Opposite of removal.

-2a Get good continuity from the container and risers to just above the connector links. Place harness with container up and rear riser on top of front risers. Fan riser out slightly so that front riser are inside and rear to the outside.

-2b Slide link covers up off link toward line. Loosen link with wrench (9 mm with #5 Rapide links). Note barrel location of each link. They should be facing inward.

-2c Position slider so the tape is towards the canopy. Open right front connector link, remove link from riser, pass link through the "RF" grommet in slider. Place link back on riser without losing proper continuity. Finger tighten link.

-2d Open left front connector link, remove link from riser. Remove any twist in the slider tape between the two front grommets. Pass link through the "LF" grommet in slider. Place link back on riser without losing good continuity. Finger tighten link.

-2e Repeat similar procedure with respected rear links passing through the rear slider grommets. Slider tape should be facing canopy.

-2f Disconnect the control lines from the toggle. Pass the right control line through the right rear slider grommet then the right riser guide ring. Assemble toggle to control line, Section 14.2.

-2g Repeat for left control line.

-2h Tighten links with fingers until snug, then add a quarter of a turn with a wrench. Do not over tighten, over

tightening may cause link barrel to crack. Slide link covers in place.

-2i Check continuity, all four links, both control lines, and slider orientation.

The line continuity must be checked separately from slider continuity. Check all four line groups and control lines separately. Anytime the slider is used during deployment, i.e. "slider up" the control lines must pass through the respected slider grommet and the guide ring on the riser. See Drawing 14.6-5. In the event of a premature brake release a control line that does not pass through the riser guide ring is dangerous and may prevent the slider from coming down.

For direct slider control install a rubber band on the right center C line attachment tab. Remove the Tail Gate.

### **3.3 Packing**

The packing method described in this manual is accomplished by keeping the slider at the links until the slider is ready for placement.

Pack the parachute as described in Section 2.3-1 through 2.3-3e.

3.3-1 Slider placement.

-1a Acquire proper continuity with the slider, keeping a left and right separation with the front slider grommets closest to the canopy. If assembly of the slider is correct the slider tape will be up.

-1b Pull slider so the front grommets come in contact with the bottom of the stabilizers (B line slider stops) on both left and right.

-1c While slightly lifting the tape between the two rear grommets, pull them up to the bottom of the stabilizers (C line slider stops) on both the left and right.

-1d The tape and fabric between the front and rear grommets should be placed between the B-C fold of the canopy. This will take place on both sides, left and right.

-1e When packing with a bag type deployment device such as a POD or sleeve, see Section 2.3-5 to continue.

When packing with a tail pocket deployed free packed canopy, see Section 2.3-5 or continue in this section with 3.3-2 "Stowing the slider." Read 3.4 for information on direct control and indirect control of slider.

3.3-2 Stowing the slider, direct control.

-2a Lift the center of the slider so that it puts equal force on all four grommets against the stabilizer stops. Fold the top of the slider, so the slider is now only 1-2 inches (2.5-5 cm) beyond the rubber band located in the C line attachment tab.

-2b Place a stow(s) of slider in the rubber band. The resistance placed on the slider by this rubber band will vary due to type and size of rubber band, number of wraps on rubber band, individual methods and deployment speed. Drawing 3.6-1

-2c Continue with Section 2.3-5.

### **3.4 Use**

The slider is used to slow the opening of a parachute. How much it will slow down is dependant on several factors including but not limited to some of the following: canopy age and individual characteristics; type of suspension line; canopy fabric type and condition; deployment airspeed; packing method; deployment method; slider control method; type, shape and size of the slider; pilot chute size; and more. It is important to understand the desired deployment sequence of a ram-air (square) parachute. A square parachute's lines need to be deployed from the risers to the canopy. If a slider is being used during deployment – the lines should be completely deployed before the slider is allowed to move down the lines. To help achieve this sequencing, controlling the slider is necessary either directly (3.3-2) or indirectly (2.3-7b).

During a "direct control" deployment the release force exerted on the rubber band will vary due to several factors some of which are listed above.

When using a deployment device such as a bag, the need to control the slider directly or indirectly is not necessary. The bag device is maintaining control during a normal deployment in which the bag remains closed until line stretch is complete.

The use of a mesh or sail slider is an individual's choice. Some factors to evaluate may be canopy performance, opening altitude MSL and AGL, deployment airspeeds. Refer to Part D – Reference Chart for more information.

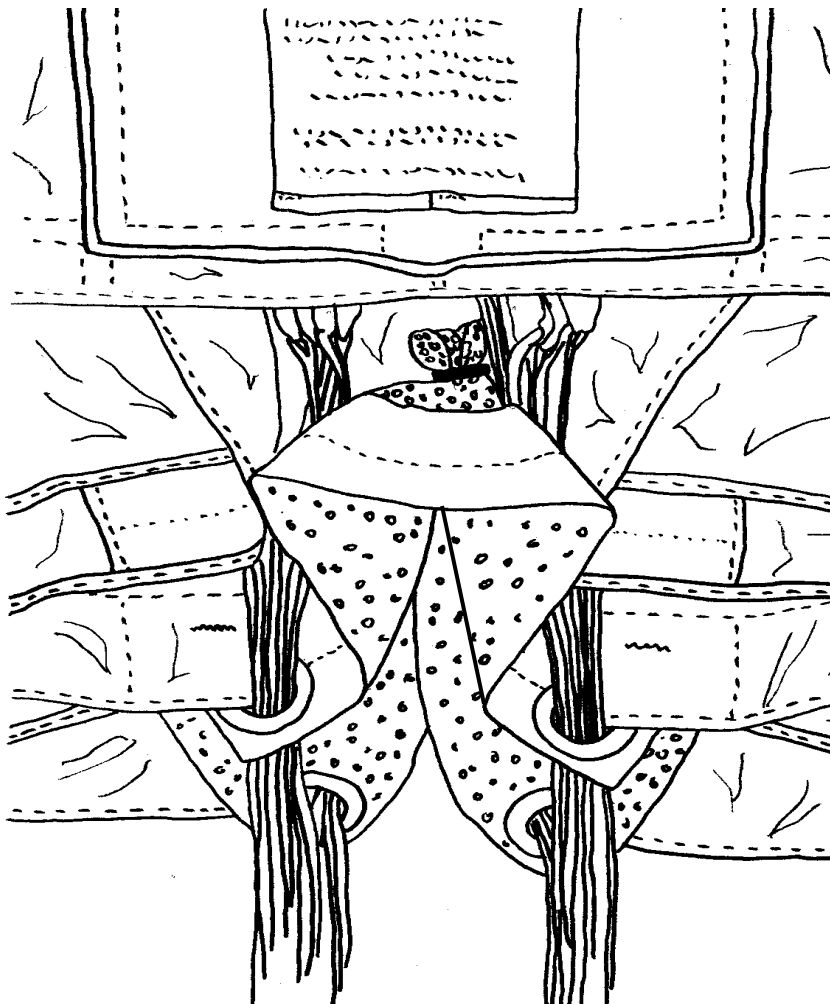
### **3.5 Maintenance**

The slider is exposed to high speeds during deployments. Burns on the tapes and fabric may appear and are indications of friction during deployment. This friction may be problematic and packing should be reviewed and ad-

justed to remedy such problems. Slider grommets must be kept clean and free from burrs and sharp edges that may damage the canopy, stabilizers, lines or may prevent the slider from coming down. Insure proper seating of grommets to fabric. Replace damaged sliders with the proper sized slider from Apex BASE.

### **3.6 Drawings**

3.6-1



## **4- Multi**

### **4.1 Description**

The Multi is short for multiple bridle attachment. The Multi increases the number of bridle lifting points from the typical 1 point to a total of 4 points. The single attachment on the center cell is used as well as two more at the identical location, on each cell adjacent to the center cell, for a subtotal of 3. The fourth point is near the rear of the center cell. The 3 forward points are responsible for lifting the canopy in a normal fashion, similar to the single point. The rear point is to support the Tail Pocket which, during deployment, is heavy with suspension lines.

The Multi consists of the following items:

A canopy with four bridle attachment points on the top surface. One bridle attachment point will have a metal ring to be used as the single attachment point.

Four (4) Dacron lines:

- Three white (or black) lines of equal lengths and equal loop size on each end.

- One red line (may be a different length than the other lines) with a Velcro closed sheath attached. Red line loop size is different on each end.

- 1 - #5 stainless steel connector link and link cover

The Multi may need:

Two container stow loops with 2 small rubber bands (1-1/4 inches by 3/16 inch or 3.2 cm x 0.5 cm) on each. DO NOT USE BLACK BANDS. All Apex BASE containers come with these stow loops directly above the Warning label.

### **4.2 Assembly**

4.2-1 Locate the bridle attachment on the center cell closest to the Tail Pocket. Take the red line with sheath and larks head knot it to the attachment, use the larger loop. Drawing 4.6-1a

-1a Locate the three remaining forward bridle attachments. Lark head knot one line onto the center cell (with metal ring) Drawing 4.6-1b. Take the remaining two lines and larks head knot them onto each of the remaining two attachments (cells 3 and 5). Drawing 4.6-1a.

-1b Configure the Multi lines to the link in the following order, remove any twists from the Multi lines before installing on link. White outside line (#3 or 5), then white center cell line (#4), then red center cell line, finally the last outside line (#5 or 3). Drawing 4.6-2. Install the link cover over the link.

-1c Confirm proper continuity. Drawing 4.6-3 Tighten link. Slide cover over link.

-1d Optional- Install four rubber bands on the Type 3 loops at the top of the container, 2 rubber bands on each of the two loops.

-1e Ready to install bridle Section 6.2

### **4.3 Packing**

4.3-1 Pack the canopy in the normal manner, Section 2-3-1 through 2.3-7h.

-1a At this time check the Multi lines for continuity. Upon proper continuity (Drawing 4.6-2 and 4.6-3) open the Velcro on the sheath and place all four Multi lines inside the sheath. The 4 rings of the Multi will not stack on top of each other. Drawing 4.6-4 Mate Velcro.

-1b Continue with Section 2.3-8, placing canopy into container.

4.3-2 The Multi lines with sheath can be stowed in the container before the container is closed.

-2a Grasp lines and sheath closest to canopy and make a stow on either side.

-2b Continue stowing away from the canopy toward the top flap. The stows should be 4 inches in width with 1/4 to 1/2 inch bites. Drawing 4.6-5

-2c These stows are for staging during deployment. They **must not** be restrictive, therefore double stowing or tight stows are not advisable. DO NOT USE BLACK BANDS.

Or the Multi can be free stowed by S-folding the Sheathed Multi on top of the canopy and closing the container. Drawing 4.6-6

### **4.4 Use**

In a normal deployment the Multi will deploy immediately after the container is opened (shrivel flap removed or pin clearing its loop) and will remain taut throughout deployment. Once the canopy is in normal flight the bridle

and the Multi lay on the top surface. The pilot chute will "fly" between 18 and 36 inches (depending on size of canopy) further behind – when compared to a single attachment. The Velcro closed sheath is designed to stay closed during the earliest portions of canopy lift and will open typically during inflation. On occasion one Velcro section may stay closed. The sheath is designed to reduce the possibility of entanglement between Multi lines and other items such as, but not limited to, jumpers body, extra equipment (cameras, etc.) and container flaps. Even with the Velcro closed sheath entanglement is possible. So the user must be aware of body position before and during deployment, extra equipment (cameras, sky boards.....) and container systems that may interfere with deployment. Each set of Multi lines is unique to its size of canopy. **Multi lines are NOT interchangeable between sizes or models.** See Part D Specifications for Multi sizes.

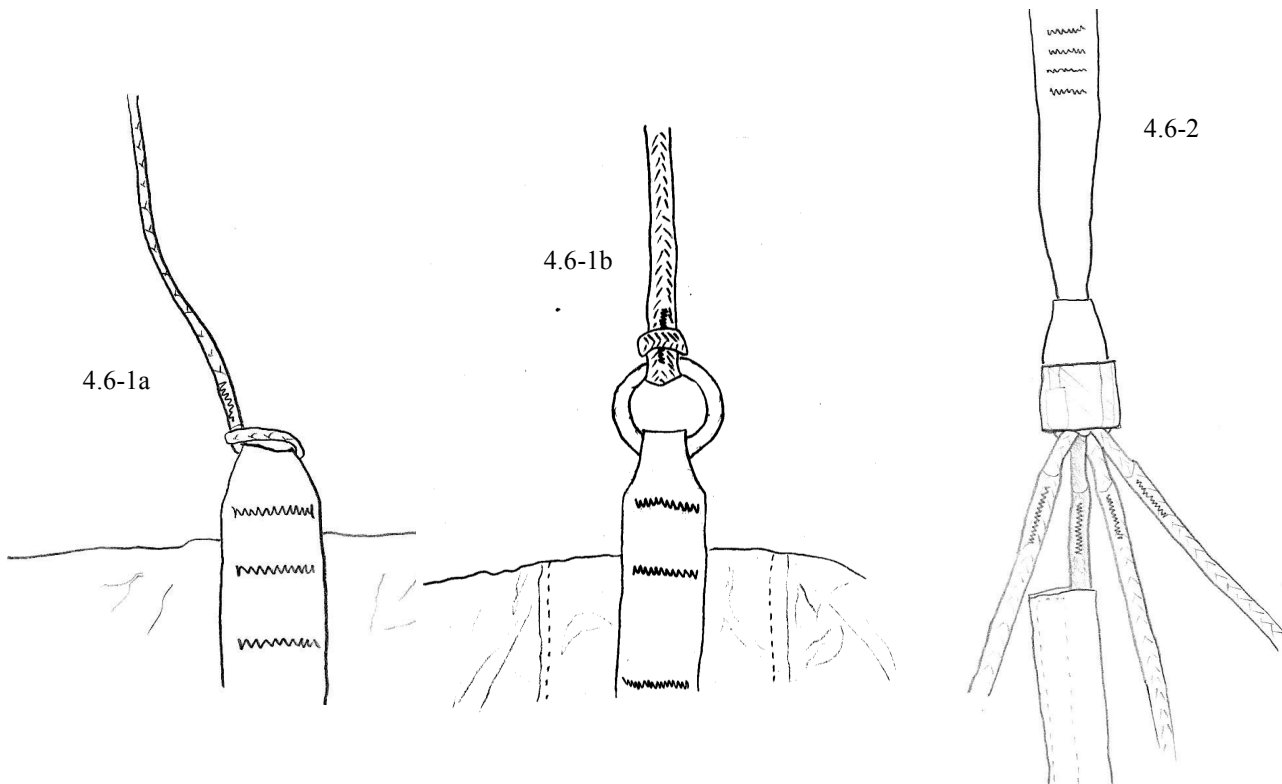
It is not recommended to use the Multi when a bag type device is used (sleeve, pod, bag, etc.). When assembling with these bag type devices use the center forward ring only. With assisted jumps (i.e., static line or pilot chute assist) the air speed and opening forces from this type of jump may not be sufficient to open the Velcro sheath. The opening canopy will be slightly restricted as the Multi lines attempt to open the sheath. Instead of the sheath opening during deployment the sheath tends to compress. Therefore, on assisted jumps it is advisable to close the sheath around the red line only, leaving the 3 white lines unrestricted.

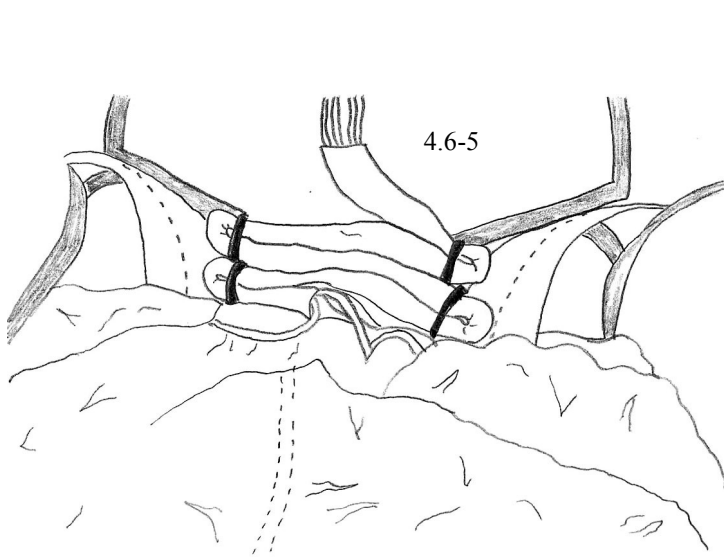
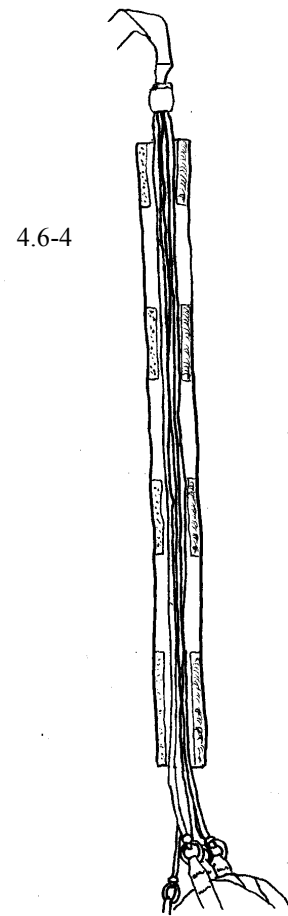
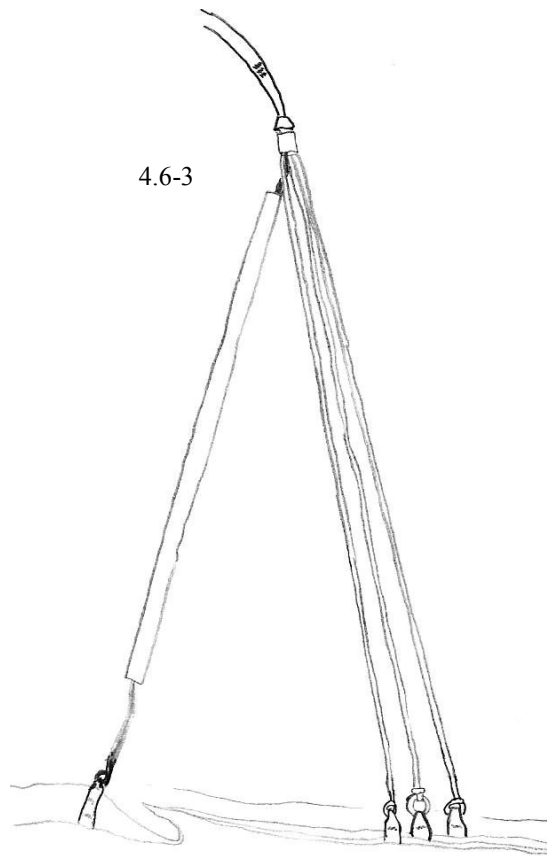
A Multi equipped canopy may also be used with the single attachment only. In this configuration attach the bridle (or shrivel flap bridle) to the forward most ring on center cell. Do not use any other configuration with the Multi other than the ones described within this manual.

#### **4.5 Maintenance**

The Multi is a low maintenance item, however it must be inspected regularly. Inspection should include the Multi ring and all associated tapes, webbing and stitching both internal and external, the four Multi lines and the Velcro closed sheath. Replace any worn or damaged parts with Apex BASE replacement parts only. The Velcro on the sheath will need replacing per normal Velcro wear out times. Approximately 75-100 uses for pile Velcro, and 100-150 uses for hook Velcro.

#### **4.6 Drawings**





## **5 – H20**

### **5.1 Description**

The H20 is a conical shaped round parachute with 3 mesh covered vents. It is available in a 19 foot diameter. The H20 uses ripstop fabric that has a permeability of 0-3 cfm when new.

The H20 parachute components include:

Diaper – optional

4 - #5 stainless steel connector links on the suspension lines

1 - #5 stainless steel connector link at the apex

### **5.2 Assembly**

The H20 has two areas of assembly- the connector links to the risers, and the bridle attachment to the bridle.

Connecting the links to the risers

Each connector link will have its own continuity concerns. Be sure to treat each connector link separately for proper assembly. Refer to Drawing 5.6-1 for proper continuity.

Tighten all 4 connector links by hand as tight as possible. Then with a 9 mm wrench apply a quarter turn or until all 4 links are snug. No other tool, only a 9 mm wrench, should be required to tighten or loosen any link. Do not over tighten any link. Over tightening can crack the barrel of the link. A cracked link may fail during use.

Slide the link covers over the tightened links. These covers are not slider bumpers – H20 does not use a slider.

Link covers help maintain proper orientation of the link during deployment.

Use the apex link as the bridle attachment ring and larks head the bridle onto the link. Make sure all apex lines are in the connector link. See Section 6.2 for more details on bridle assembly.

The diaper will need several rubber bands installed on both sides. This will include two locking stows that will attach to the small “0” grommet.

The container will need to have rubber bands installed (in the pack tray) for packing without the diaper.

### **5.3 Packing**

Apex BASE uses a conventional method of packing the H20. To complete packing, the system (between the apex lines and the risers) will need to be placed under tension. There are two styles of packing dependant on deployment airspeed. For higher airspeed (delays of 4 seconds and longer) use the optional diaper reefing and line stowage. For delays shorter than 4 seconds the lines will stow in the pack tray. This pack job is done on the ground or a long table (30 feet plus).

5.3-1 Secure the risers and the apex then apply tension. Ensure the risers are even and will remain even throughout the packing. Lay out container so the jumper would be face down, per normal packing.

-1a Facing the canopy, grasp both left risers in the left hand and both right risers in the right. Walk toward the canopy keeping all the line from the respected line groups in the respected hands. Separate the canopy left and right.

-1b Check continuity. When the canopy is separated left and right the center panels of the canopy span the two sides. Lift these two panels (top panel should be mesh) and the attached four lines. These 4 lines must be the 4 lines that are on the inside of each link, without passing or wrapping around any other lines or groups of lines. If they go directly to the link continue with 2.3-1c, if not STOP and fix continuity.

-1c Make the skirt even by straightening the seam at the apex.

-1d Locate the diaper or front left seam. Starting with this panel, hold the lines in one hand and flake all panels. Once complete lay canopy down, with all panels on one side. Diaper should be exposed and lay on packing surface.

-1e Flake each individual panel out from the skirt to the apex. Repeat this for half (10) of the panels. Fold the remaining half onto this stack.

-1f Flake the opposite half in the same manner as the first. When complete the canopy should be diaper down, 10 panels on one side and 10 on the other. Drawing 5.6-2. There should be no fabric in the middle (air channel), take a look. Drawing 5.6-3. Clear any fabric from the air channel.

5.3-2 Using the diaper. Place a 45 degree fold at the skirt, when complete each side should be symmetrical and the skirt reinforcement should parallel the lines and the radial seams. Drawing 5.6-4.

-2a Fold into thirds. Make a long fold of canopy that is parallel to the radial seams. It should finish just past the center. Repeat for other side. Drawing 5.6-5.

-2b Release tension from container. Place a fold about 6 inches up from the skirt, this should fold the diaper in half.

-2c Locate the two locking stow rubber bands at the top of the diaper, Pass them through their respected grommets on the top side of the diaper and close the diaper with a stow on each side. All the lines must stay between these two grommets as it comes from the canopy. Drawing 5.6-6.

-2d Continue stowing the lines in a left to right fashion until within 6 inches of the connector links. Drawing 5.6-7.

5.3-3 No diaper. Line stows in container. Place a rubber band on the canopy 6 inches down from the apex lines. This will close off the air channel allowing for quicker inflation. Drawing 5.6-8.

-3a Fold canopy in long third folds, that parallel the radial seams. Note: there is no 45 degree fold as when using the diaper. Drawing 5.6-9.

-3b Release tension from container. Slide container toward canopy while placing the risers into the container. Place the risers toward the center and group the lines near the bottom of the container.

-3c Make a line stow at the bottom of the container, either left or right. Continue stowing the lines back and forth across the container, on top of the risers, until within 12 to 18 inches of the bottom of the canopy. Drawing 5.6-10.

5.3-4 Canopy into the container.

-4a Grasp skirt/diaper and lift into the bottom of the container. Make a fold of canopy near the top of the container.

-4b Continue S-folding the canopy into the container. Each top fold should get slightly smaller to fill the bottom of the container. The apex and apex lines should finish on top. Drawing 5.6-11.

5.3-5 Closing the container, Apex DP see Section 6

## **5.4 Use**

The H20 is designed and intended to be used for water jumps/ landings only. Using an H20 or any round parachute over land or in locations where a water landing is not guaranteed is foolish and dangerous, therefore must not be attempted. Water jumps bring in new dangers including drowning. Additional training and preparation is needed before attempting any water jumps.

The H20 parachute has 2 basic configurations. For instance, without a diaper free fall delays between 0 and 3 seconds are common but must never exceed 4 seconds. On no diaper jumps the apex is closed off with a rubber band that is positioned about 6 inches down on the canopy. This rubber band easily blows off or breaks during inflation. However, it helps the timeliness of the low airspeed opening. No diaper free fall delays beyond 4 seconds run a very high risk of damaging the equipment or injuring the jumper and this may be fatal. The diaper is used when free fall delays increase beyond 4 seconds. If you are unfamiliar with either method STOP and receive training on both items (and more) before continuing.

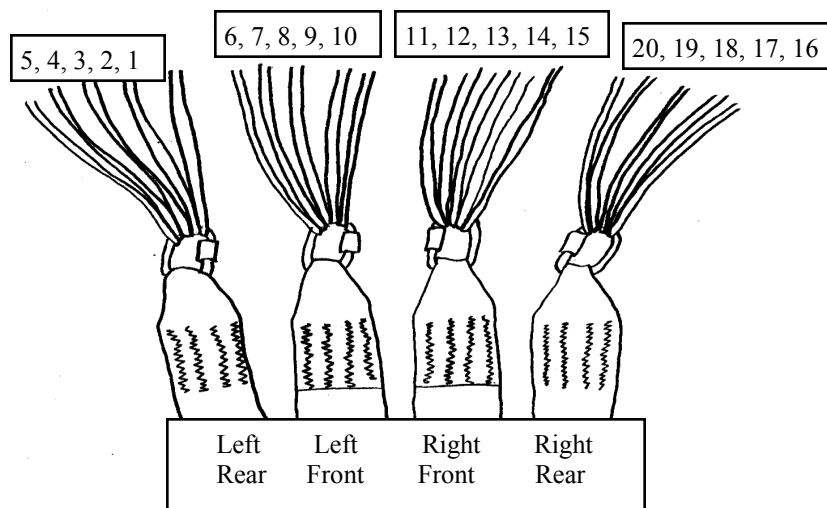
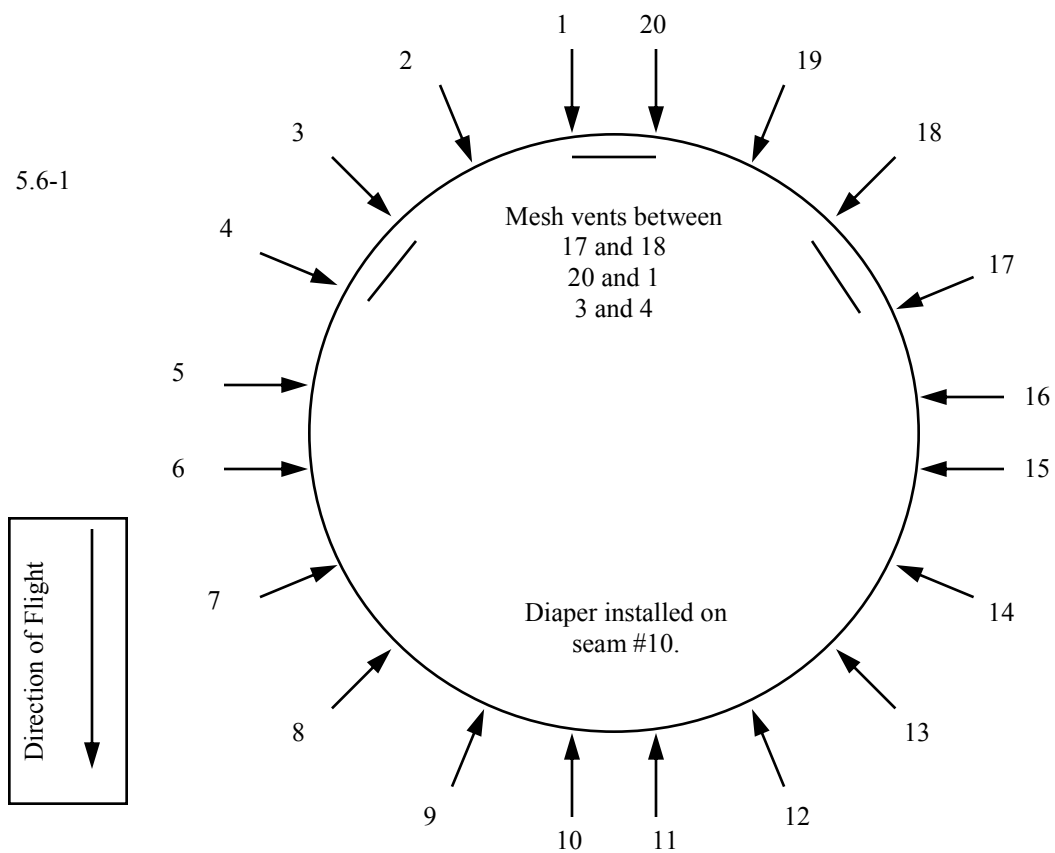
There is a great deal of knowledge and experience necessary to reduce the risk of injury and death. Gain such knowledge before you make any jumps.

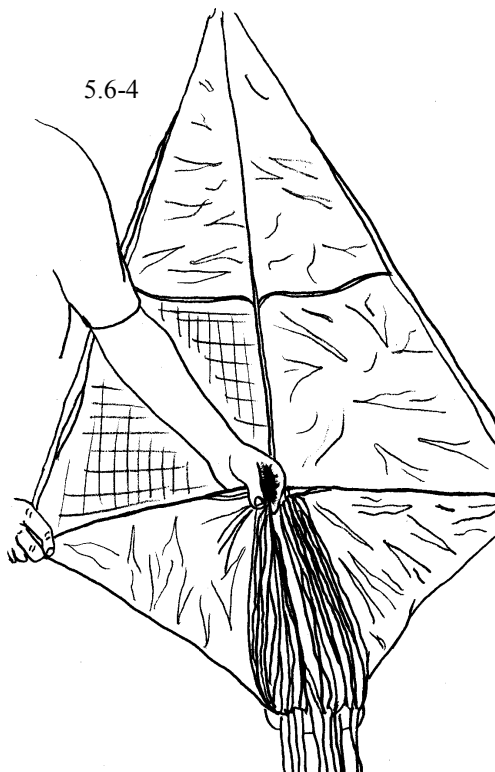
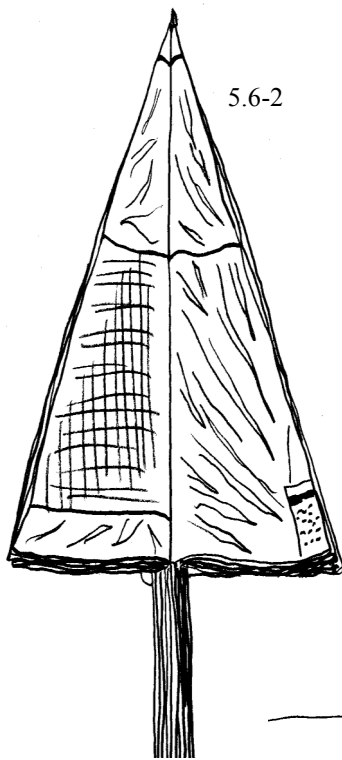
## **5.5 Maintenance**

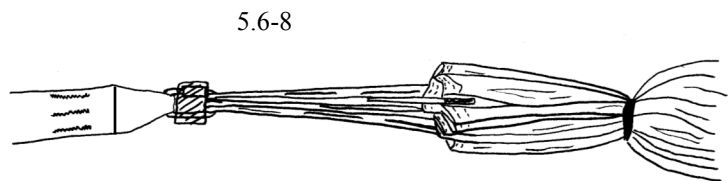
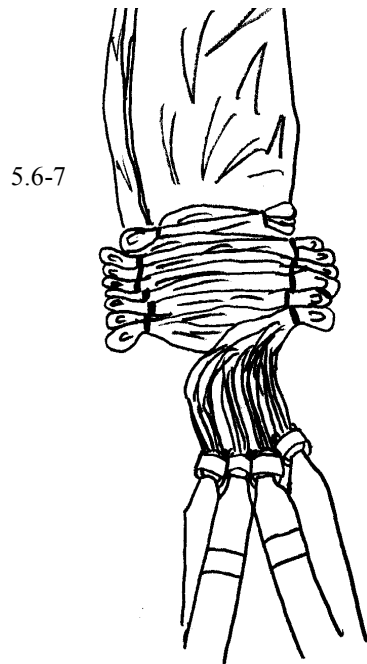
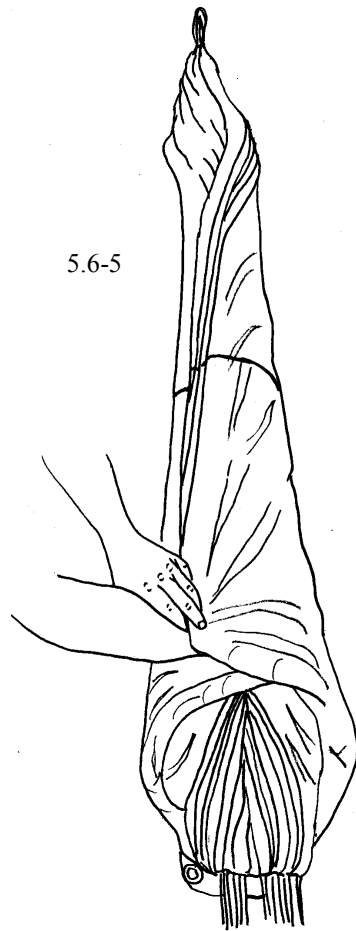
Canopy fabric is durable but not indestructible. Holes larger than 1/4 inch, holes within 10 inches of a line attachment or within the top third should be repaired before jumping. The H20 may be repaired by qualified persons. Patches should be done according to common parachute industry standards. Major repairs should be returned to Apex BASE for quality assurance. A major repair is one that has to get into any seam, reinforcement tape, or line attachment. Do not wash any canopy including an H20. After salt water landings the entire system should be rinsed with fresh water. Never pack or use a wet parachute. Contact Apex BASE Perris if you have questions concerning cleaning or contaminants. Lines may get damaged, inspect them regularly and replace when damaged. Inspection of the canopy is very important. It should be inspected regularly. An inspection should take place when any flight goes unusual, i.e. poor landing, tree landings and such, and any unusual openings. Inspection must take place on the external portions of the canopy, but you must not forget there is an internal part as well.

## 5.6 Drawings

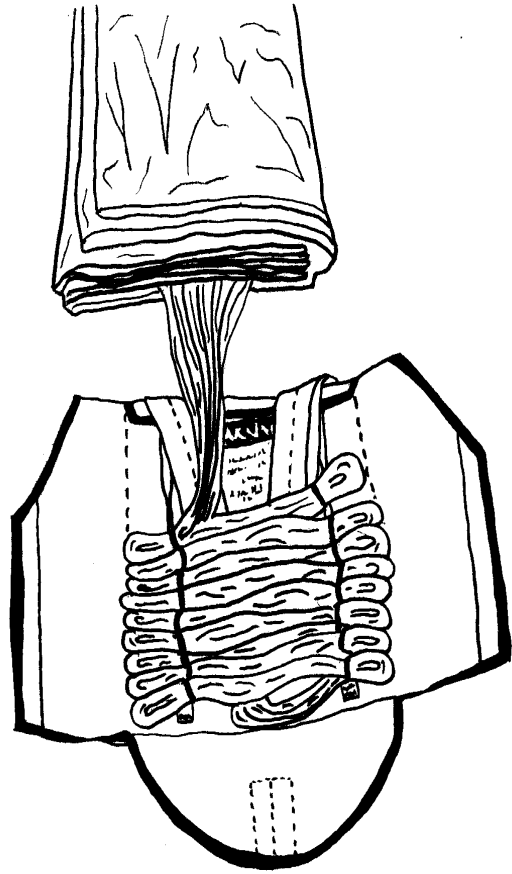
5.6-1



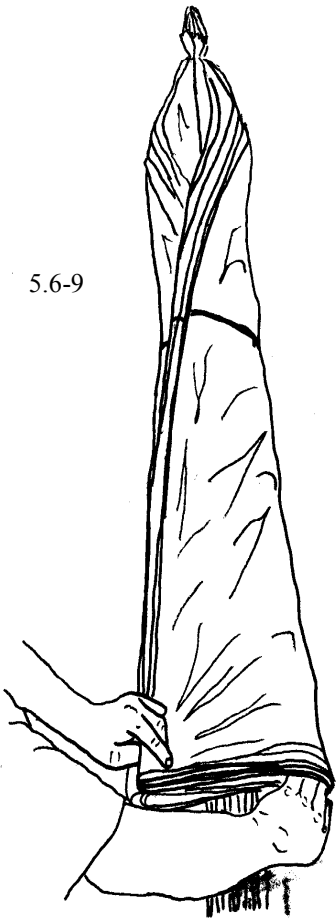




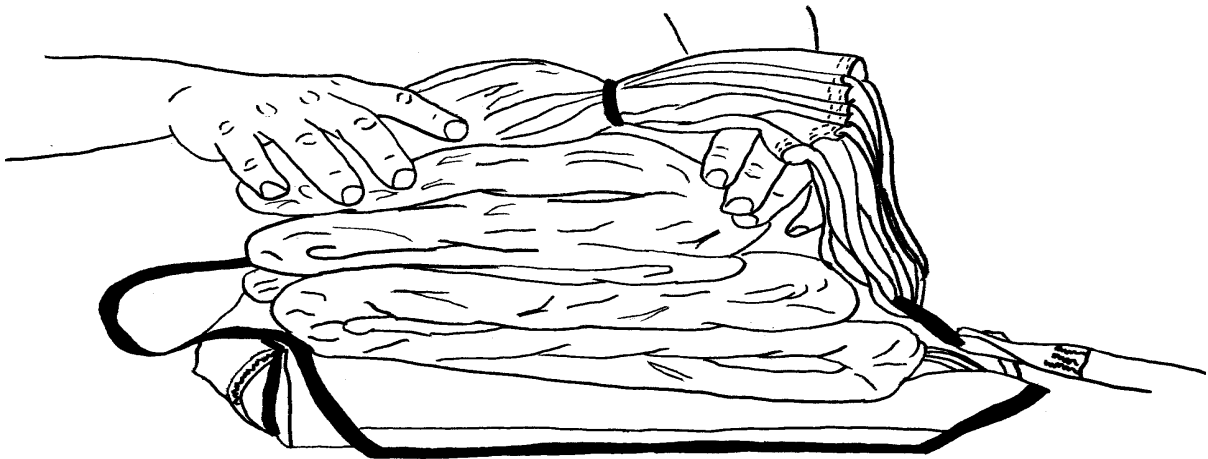
5.6-10



5.6-9



5.6-11



# Part B

## Harness Container

Apex DP  
Apex TL TLs



## **6-Apex DP**

### **6.1 Description**

The Apex DP is a single container, dual pin closed harness and container system. The Apex DP harness container components include:

- Container with 4 flaps
  - Multi keepers in top of container
  - 2 – Type 2A closing loops 3/4 inch (19 mm) in length
- BOC (bottom of container) pilot chute pocket
- Cutaway handle – 3 Ring system only
- Harness with 3 Ring release system (optional), chest strap and leg straps
- Bridle with two curved pins, 9 feet between pin and pilot chute end
- Hook Knife and pocket- optional

There are several sub components needed to complete the system including:

- Type 8 Integrity Risers (optional non-detachable riser “built in”)
- EZ Grab LRT Toggles
- Pilot chute- sizes will vary depending on individual needs.
- POD- sleeve type deployment device (optional)

Any Apex DP harness container will also need a parachute.

### **6.2 Assembly**

6.2-1 Assembling the risers onto the Apex DP, see Section 13.2 Risers

6.2-2 Assembling the bridle onto the canopy.

-2a Locate the loop closest to the pin end of the bridle. Pass this loop through the single bridle attachment ring or connector link of the Multi lines (or the apex link on the H20).

-2b Pass the remaining bridle through the same loop creating a larks head knot (for assemble with Multi see Section 4).

### **6.3 Packing**

The Apex DP can be used with one of two deployment systems- free packed canopy with Tail Pocket deployed lines – Section 2, or POD (short sleeve) deployment device – Section 11. Follow the instruction of the item used for folding the canopy and stowing the lines. This section will pick up once the lines have been stowed and the canopy is ready for the container. Keep the width of the canopy no wider than the Tail pocket, keep it as narrow as possible. Drawing 6.6-1

6.3-1 Tail Pocket. Complete section 2.3-1 through 2.3-7h.

-1a Grasp canopy and Tail Pocket so the lines will not unstow during the transition of the canopy from floor to container. Place the risers and canopy in the bottom of the container, be sure to take the canopy (with tail pocket) as deep into the bottom corners as possible. Drawing 6.6-2 optional Bottomless corners are available on the Apex DP and are not 3-dimensional during this step.

-1b Make a fold, of canopy, just above the Tail Pocket. Then a second fold at the bottom of the container. Drawing 6.6-3. This folding method will keep the bulk at the bottom of the container and will leave the shoulders very soft.

OR The first fold can be even with the “WARNING” on the warning label. A fold that is too high will put too much bulk in the top of the container. Keep center cell nose exposed. Make a second fold of canopy at the bottom corners of the container, this fold should be slightly (1-2 inches) longer than the bottom corners. The main objective is to distribute the canopy so the bottom corners are full. After the last fold, the top of the canopy will be approximately at mid container. Drawing 6.6-3

-1d Take the bridle towards the top of the container. Non Multi continue with 6.3-4

6.3-2 Multi only. See Section 4.3-2 for stowing the Multi lines in the container. Then continue with 6.3-4.

6.3-3 POD. Complete Section 11.3.

-3a Once the lines have been stowed, place the risers and POD into the container. The line stow pocket should

be placed down into the container, closing stows to the bottom of the container.  
-3b Bridle must come from the top of the POD and out the top of the container.

#### 6.3-4 Closing the container.

-4a Check to ensure the closing loops are made of Type 2A nylon and are 3/4 inch (19 mm) in length, this distance is measured from the top of the knot to the end of the loops. Insert a pull up cord in the closing loop located on the bottom flap.

-4b Pass the pull up cord through the bottom right side flap grommet, and pull taut. Then pass the pull up cord through the bottom left side flap grommet, and pull taut. The bridle must be above the grommets.

-4c Place the second curved pin (counting from the canopy) through the bottom closing loop. Drawing 6.6-4

-4d Insert a pull up cord in the closing loop located on the top flap. Any fabric should be tucked toward the sides of the container and shaped to fill any hollow spots. Do not stuff this fabric into the middle of the container for this will make the corners too soft. Tuck the dynamic corners in, encouraging them to fold along the bottom of the container.

-4e Pass the pull up cord through the top right side flap grommet, and pull taut. Then pass the pull up cord through the top left side flap grommet, and pull taut. Place the first curved pin through the top closing loop.

Drawing 6.6-5.

-4f Bridle above the top pin must have the "slack" Velcro mated. The remaining top bridle should be tucked under the left side flap. The bridle below the second pin should be tucked under the right side flap toward the BOC.

-4g Close pin protector flap and tuck the top into the Top Flap slot. Drawing 6.6-6 Check cutaway system.

-4h Refer to the pilot chute Section 15.3, for stowing the pilot chute.

-4i Count your tools. 4 clamps Pull up cord (s)

### **6.4 Use**

The Apex DP is intended for longer delays starting typically with stowed (not hand held) pilot chutes. In a normal parachute deployment the Apex DP would operate as follows – jumper deploys the pilot chute at a safe altitude, the pilot chute inflates, the inflated pilot chute removes the curved pins thus opening the container. The pilot chute should hold the canopy, as the jumper falls away, deploying all the lines, allowing the canopy to inflate.

Any problem with before mentioned sequence can have deadly consequences. The Apex DP may require more altitude or airspeed to complete any opening sequence. The use of longer closing loops may result in premature container openings therefore a horseshoe malfunction. The use of shorter closing loops may result in a pilot chute in tow malfunction or hesitation. Using different types of material for the closing loop may create unsatisfactory results including horseshoe and/or pilot chute in tow malfunctions.

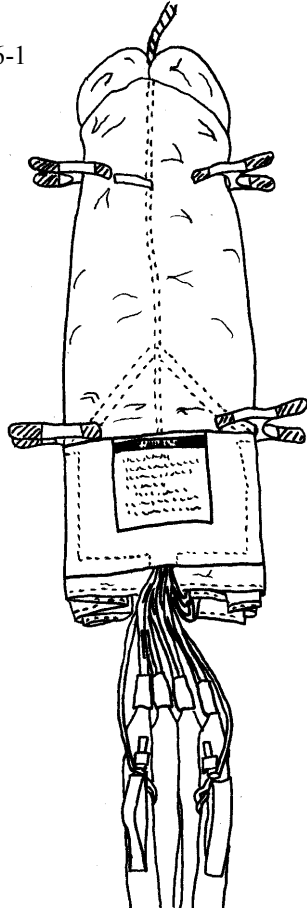
If jumping hand held or in low airspeed it is advised to open the pin protector flap from both the side and top tucks. Thread leg straps and complete a pre jump inspection on equipment before donning the equipment. The Apex DP is designed to fit snugly on the wearer when the harness is properly adjusted. Check the leg straps and main lift webs for twists before tightening leg straps. Stow excess either in the elastic keepers and/or in the channels provided on the leg pads. Thread chest strap and adjust it so the main lift webs are parallel. Check location and ability to deploy BOC stowed pilot chute. Insure nothing, including clothing or excess straps, will interfere with pilot chute deployment. Receive an equipment check.

### **6.5 Maintenance**

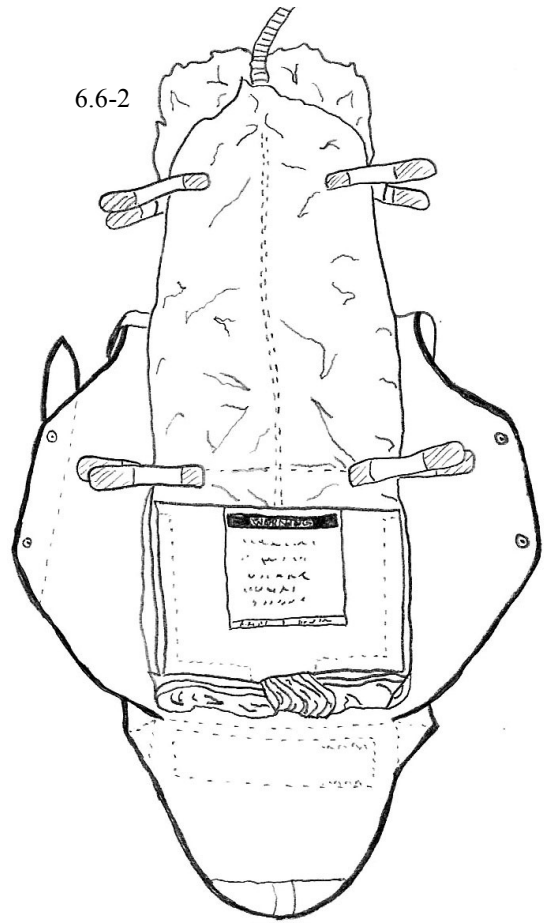
The Apex DP harness container has several points of inspection and a few points of common maintenance. The entire system (including risers and toggles covered in Sections 12, 13 and 14) must be inspected before each pack job. Inspect all webbing, hardware, grommets, loops and stitching. Inspect everything you can see. And look for the things you can not see. The bridle has some Velcro, the cutaway handle also has Velcro. Velcro will wear out due to use, replace as necessary. The spandex on the BOC may become stretched out over time and uses. Spandex that is stretched out or has a hole in it is potentially dangerous and should be replaced. All grommets should be burr free, meaning the inner passage of the grommet should be smooth and free of sharp edges that may cut the loops that pass through the grommet. The bridle with curved pins must be inspected, look for wear on both ends of bridle as well as the curved pin tapes and stitches. The cutaway cables must be clean and free of any burrs that may damage or become stuck on a riser loop. Any major repair involving the harness or container must be returned to Apex BASE for quality assurance. Use only Apex BASE replacement parts. Closing loops must be replaced when worn, do not wait for a closing loop to fail. Replace it before it creates an unsafe situation. Replace the loop with one made of Type 2a nylon that is 3/4 (20 mm) in length, measured from top of loop to the top of an over hand knot.

## 6.6 Drawings

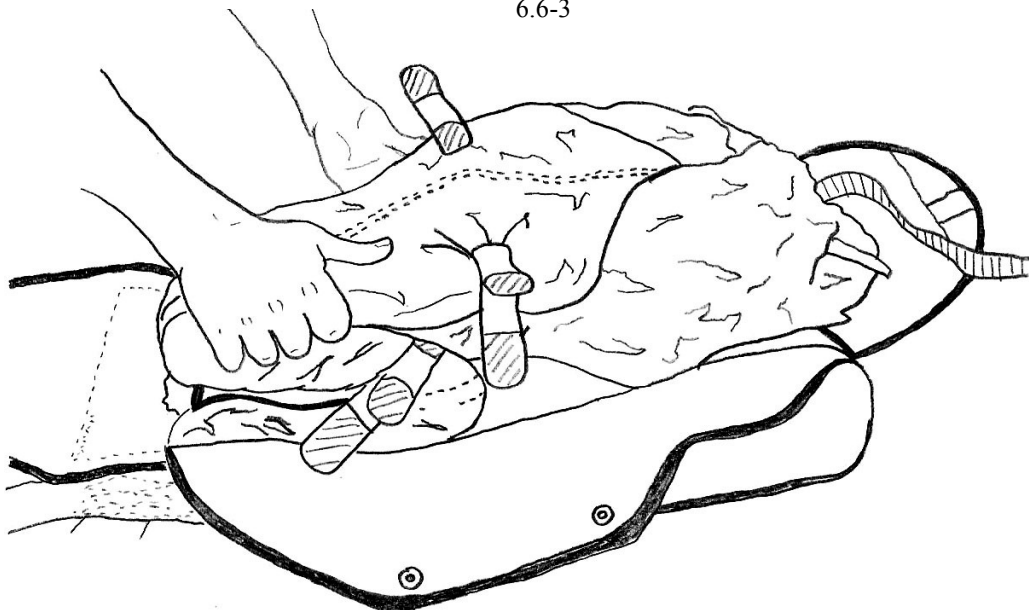
6.6-1

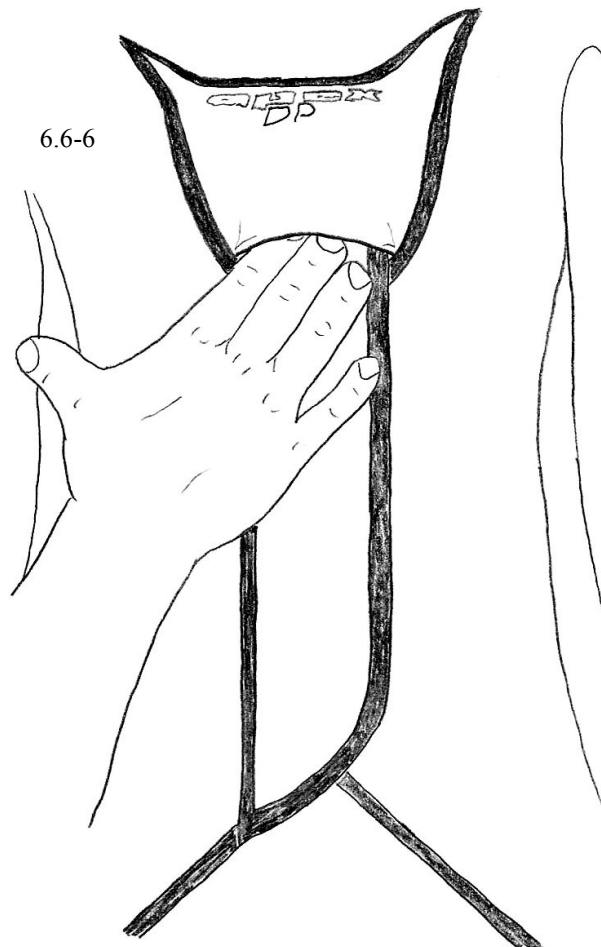
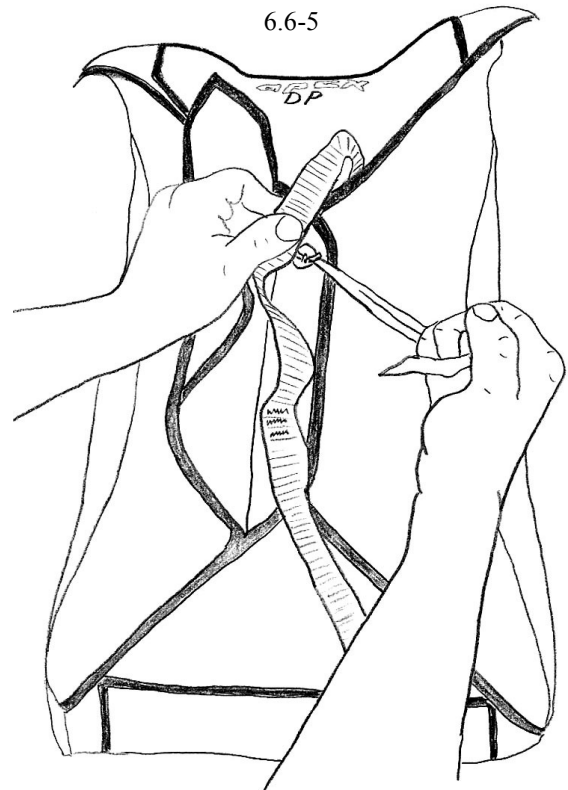
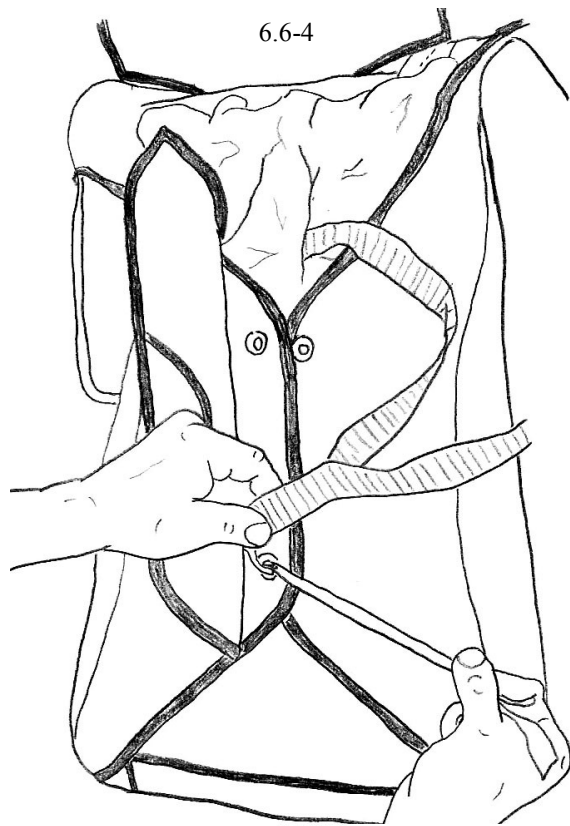


6.6-2



6.6-3





## **7-Apex TL** **Apex TLs**

### **7.1 Description**

The Apex TL and Apex TLs are single container, dual pin closed harness and container system. The Apex TL and Apex TLs harness container components include:

- Container with 4 flaps

  - 2 – Type 2A closing loops 3/4 inch (19 mm) in length (stowed in pocket behind warning label)

  - 2– Nylatron Loop retainers (stowed in pocket behind warning label)

  - 2– Type 2A closing loops 4 inches minimum. These loops are finger trapped and are used as the Through Loops.

- BOC (bottom of container) pilot chute pocket

- Cutaway handle – 3 Ring system only

- Harness with 3 Ring release system (optional), chest strap and leg straps

- Bridle with two curved pins, 9 feet between pin and pilot chute end

- Hook Knife and pocket- optional

There are several sub components needed to complete the system including:

- Type 8 Integrity Risers (optional non-detachable riser “built in”)

- EZ Grab LRT Toggles

- Pilot chute- sizes will vary depending on individual needs.

Any Apex TL or Apex TLs harness container will also need a parachute. The canopy will need to be outfitted with Pass Through Channels to utilize the Through Loop closing.

### **7.2 Assembly**

7.2-1 Assembling the risers onto the Apex TL or TLs, see Section 13.2 Risers

7.2-2 Assembling the bridle onto the canopy.

- 2a Locate the loop closest to the pin end of the bridle. Pass this loop through the single bridle attachment ring or connector link of the Multi lines.

- 2b Pass the remaining bridle through the same loop creating a larks head knot (for assemble with Multi see Section 4).

### **7.3 Packing**

The Apex TL and TLs use a free packed canopy with Tail Pocket deployed lines – Section 2. Follow the instruction of the item used for folding the canopy and stowing the lines. This section will pick up once the lines have been stowed and the canopy is ready for the container. Keep the width of the canopy no wider than the Tail pocket, keep it as narrow as possible. Through Loop closing–

Check to ensure the closing loops are made of Type 2A nylon. Length will vary due to many factors including container and canopy size, packing style and other factors. Insert pull-up cords, one on each closing loop.

7.3-1 Complete section 2.3-1 through 2.3-7h. Drawing 7.6-1

- 1a Move the container so the top of the container is even with the Tail Pocket. This becomes the pivot point when the Tail Pocket is flipped over. Pull enough line from the Tail Pocket to allow the risers to lay flat in the container. Drawing 7.6-2

- 1b At the Tail Pocket, place one hand under the folded canopy while the other hand is on the Tail Pocket. Sandwich the Tail Pocket, between hands, and roll the Tail Pocket so that the Tail Pocket is at the top of the container and the remaining canopy is toward the bottom. Locate the Pass Through Channels-PTC and bring the pull-up cords through their respective PTC. Drawing 7.6-4

- 1c Make a fold, of canopy, even with the bottom of container. Drawing 7.6-5.

- 1d Create Molar shape. Split the canopy from the top creating a left and right section keeping the center cell in the middle. This length of the Molar split must be enough to have the center cell section clear (even with) the bottom closing loop. Drawing 7.6-6

- 1e Fold the top of the molar shape under itself. Drawing 7.6-7The fold should finish just above the top closing loop. A fold that is below the top closing loop may create an unsightly wrinkle in the side flap when finished. No

fold will create a bulky top area.  
-1f Non Multi continue with 7.3-3

7.3-2 Multi only. See Section 4.3-2 for stowing the Multi lines in the container. Then continue with 7.3-3.

7.3-3 Closing the container.

-3a Both pull up cords must be accessible. Pass the top pull up cord through the top flap grommet and pull taught. Use curved pin (closest to the canopy) as temporary closing of the top flap. Pass the bottom pull up cord through the bottom flap grommet and pull taught. Use second curved pin to as temporary closing of the bottom flap. Drawing 7.6-8 Move remaining bridle and pilot chute to bottom of container.

-3b The bridle must come from the canopy, between the two closing loops, to the top flap then to the bottom flap.

-3c Pass the pull-up cords through the respective grommet in the left side flap. Any fabric should be tucked toward the sides of the container and shaped to fill any hollow spots. Use curved pins as temporary closing.

Drawing 7.6-9

-3d Pass the pull-up cords through the respective grommet in the right side flap. Any fabric should be tucked toward the sides of the container and shaped to fill any hollow spots. Use curved pins for final closing. The bridle should exit the container between the top and bottom grommets (loops) pass upward to the top grommet/loop then down vertically on the left side of the bottom grommet/loop with both pins pointing to the right. Drawing 7.6-10

-3e The bridle below the top pin should have the "slack" Velcro mated. The remaining bridle (toward the canopy) should be tucked under the right side flap. The bridle below the second pin (toward the pilot chute) should be tucked under the right side flap toward the BOC. A channel is provide to cover the bridle path to the BOC.

-3f Tuck the bottomless corners in, encouraging the fold deep into the container. The fold is generally placed up the side wall but may be placed across the bottom (behind the BOC).

-3g Close pin protector flap by tucking the flap into the right side cover. Drawing 7.6-11 Check cutaway system.

-3h Refer to the pilot chute Section 15.3, for stowing the pilot chute.

-3i Count your tools. 4 clamps, 2 Pull up cord

## **7.4 Use**

The Apex TL and Apex TLs are equipped to accommodate a through loop closing as described in section 7.3. The Apex TL and TLs are also equipped to accommodate a non-through loop closing similar to the Apex DP with closing loops mounted on the top and bottom flap. Beware of excessive pin tension when using either closing method due to a closing loop being too short.

The Apex TL and TLs are intended for longer delays starting typically with stowed (not hand held) pilot chutes. In a normal parachute deployment the Apex TL and TLs would operate as follows – jumper deploys the pilot chute at a safe altitude, the pilot chute inflates, the inflated pilot chute opens the pin protector flap, removes the curved pins thus opening the container. The pilot chute should hold the canopy, as the jumper falls away, deploying all the lines, allowing the canopy to inflate. Any problem or delay with before mentioned sequence can have deadly consequences. The Apex TL and TLs may require more altitude or airspeed to complete any opening sequence. The use of a closing loop(s) that is too long may result in premature container openings therefore a horse-shoe malfunction. The use of a closing loop(s) that is too short may result in a pilot chute in tow malfunction or hesitation. Using different types of material for the closing loop may create unsatisfactory results including horse-shoe and/or pilot chute in tow malfunctions. To reduce snag potential use ONLY closing loops that have been finger trapped as the Through Loops. If jumping hand held it is advised remove the plastic stiffener along the top of the pin protector flap. Any jump involving sub terminal airspeed the force required to open the pin pro flap must be considered and factored into the opening.

Thread leg straps and complete a pre jump inspection on equipment before donning the equipment. The Apex TL and TLs are designed to fit snugly on the wearer when the harness is properly adjusted. Check the leg straps and main lift webs for twists before tightening leg straps. Stow excess either in the elastic keepers and/or in the channels provided on the leg pads. Thread chest strap and adjust it so the main lift webs are parallel. Check location and ability to deploy BOC stowed pilot chute. Insure nothing, including clothing or excess straps, will interfere with pilot chute deployment. Receive an equipment check.

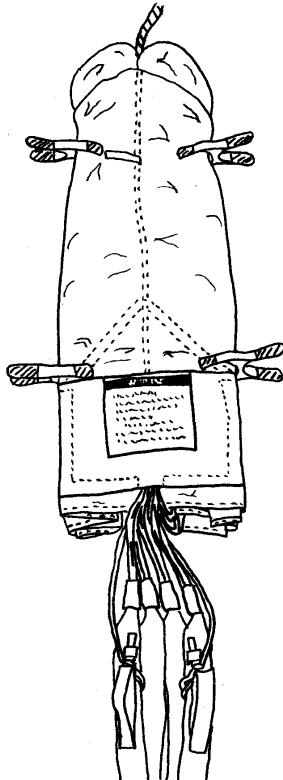
## **7.5 Maintenance**

The Apex TL and Apex TLs harness container has several points of inspection and a few points of common maintenance. The entire system (including risers and toggles covered in Sections 12, 13 and 14) must be inspected before each pack job. Inspect all webbing, hardware, grommets, loops and stitching. Inspect everything you can see. And look for the things you can not see. The bridle has some Velcro, the cutaway handle also has Velcro. Velcro will wear out due to use, replace as necessary. The spandex on the BOC may become stretched out over time and

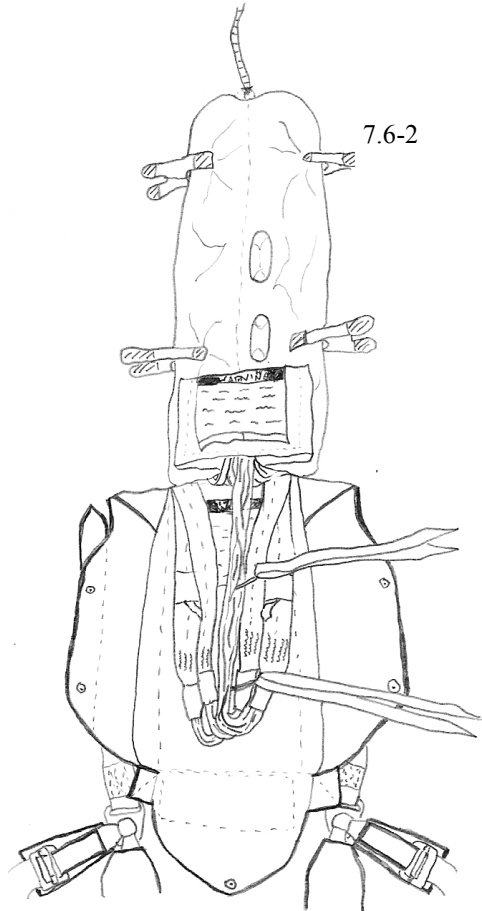
uses. Spandex that is stretched out or has a hole in it is potentially dangerous and should be replaced. All grommets should be burr free, meaning the inner passage of the grommet should be smooth and free of sharp edges that may cut the loops that pass through the grommet. The bridle with curved pins must be inspected, look for wear on both ends of bridle as well as the curved pin tapes and stitches. The cutaway cables must be clean and free of any burrs that may damage or become stuck on a riser loop. Any major repair involving the harness or container must be returned to Apex BASE for quality assurance. Use only Apex BASE replacement parts. Closing loops must be replaced when worn, do not wait for a closing loop to fail. Replace it before it creates an unsafe situation. Replace the loop with one made of Type 2a nylon.

## **7.6 Drawings**

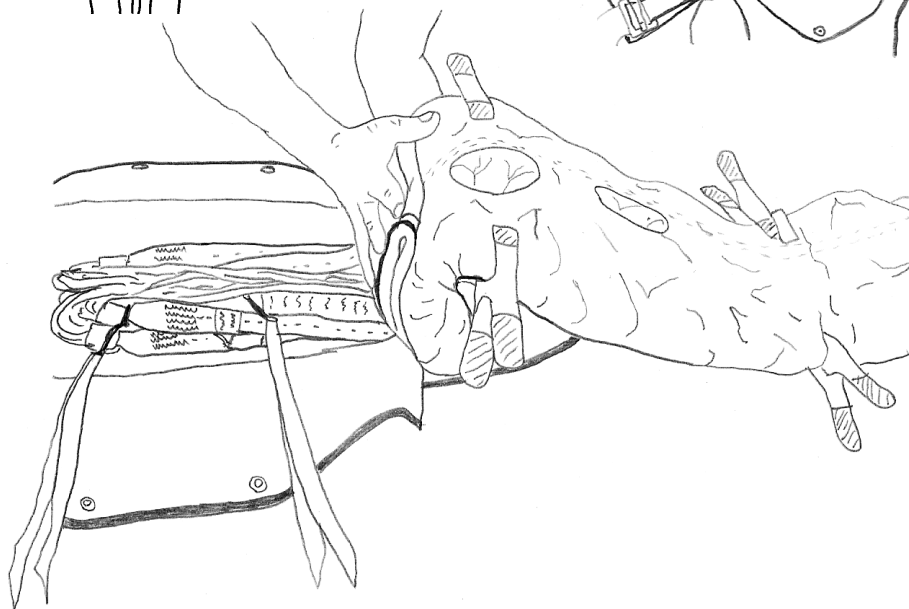
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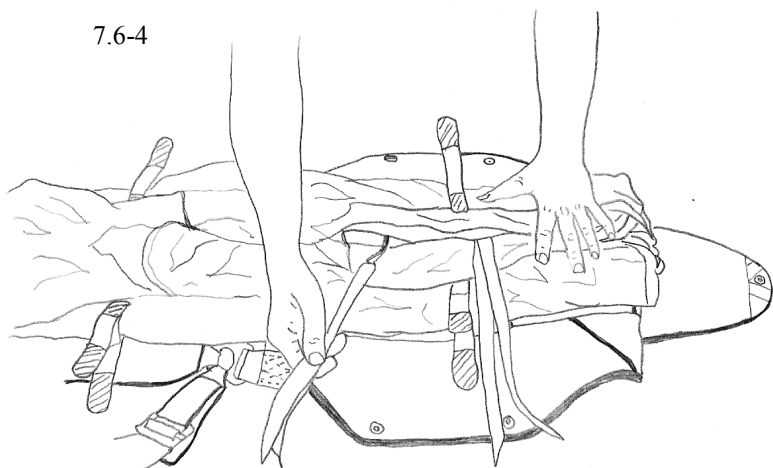
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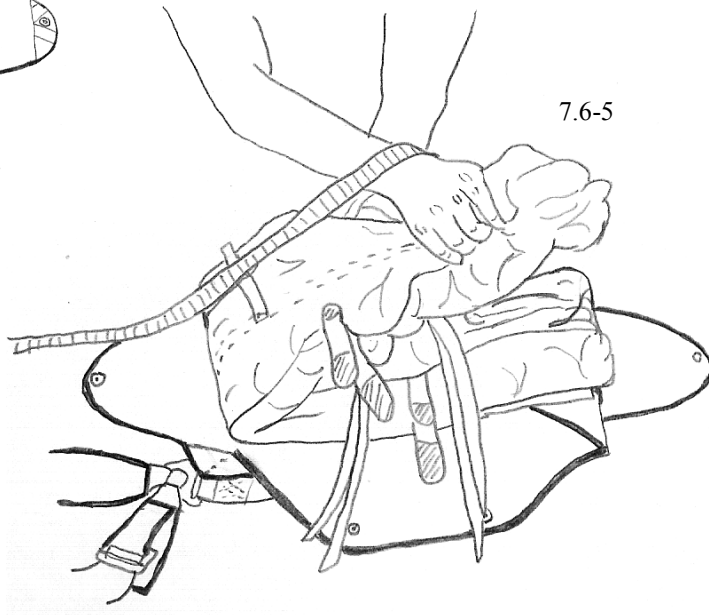
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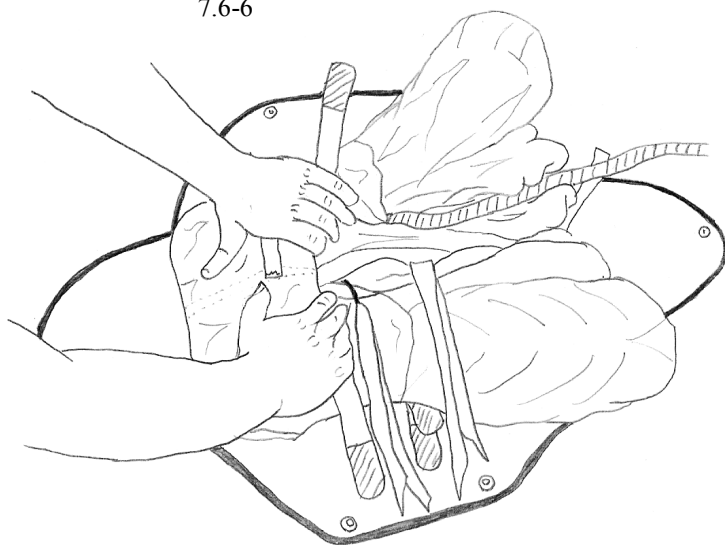
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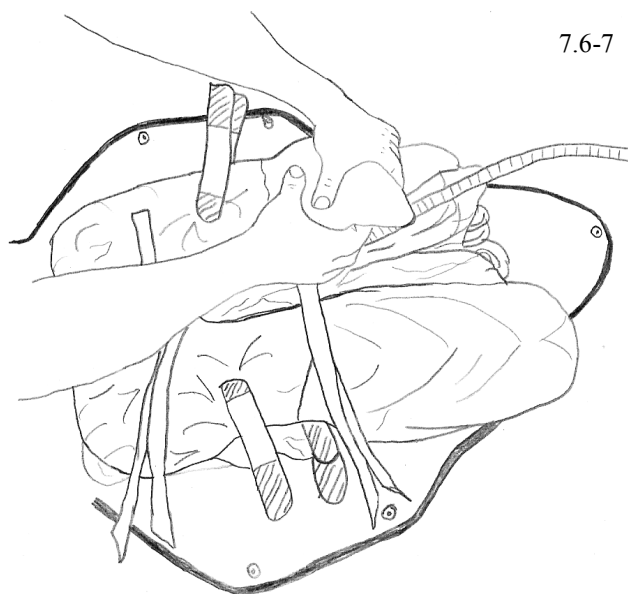
7.6-5



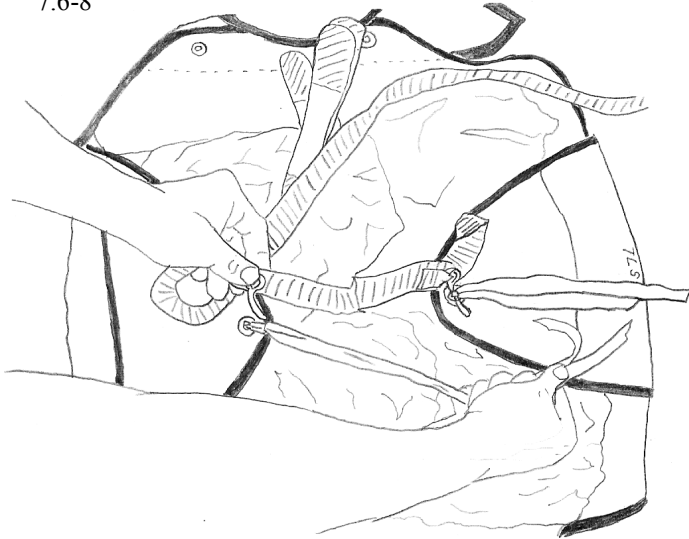
7.6-6



7.6-7



7.6-8



7.6-9

Waiting updated artwork  
Close LEFT side flap

7.6-10

Waiting updated artwork  
Close RIGHT side flap

7.6-11

Waiting updated artwork  
Dress container

# Part C

## Components

Alpine  
Risers  
Toggles  
Pilot Chutes



# 10- Alpine

## 10.1 Description

The Alpine is a climbing harness that has been integrated into a parachute harness. It is designed so the jumper can opt to use the Alpine features when needed, and when it is not needed, the user has the ability to use the Apex DP in the normal manner without any interference from the Alpine features. To achieve this the Alpine climbing harness can be stowed away on the Apex DP for non-Alpine type jumps. The Alpine is shipped in a non-Alpine mode. This means the Alpine features are all stowed away on the rig. The Alpine has several features the user must be familiar with before use.

- Built in belly band with guide loop for a carabiner.

- Removable crotch strap

- Two buckles under the leg pad cover, to be attached to the crotch strap during Alpine use.

- Back Pad Slot with Retrieving Loop is provided to carry both the belly band and the crotch strap when the Alpine is not in use.

## 10.2 Assembly

Donning of the Apex DP when not using the Alpine features is done in the normal manner with two leg straps and one chest strap after determining that the Alpine features are properly stowed away. However, donning the Apex DP and using the Alpine features requires some forethought and assembly. When the Alpine features are needed remove the belly band and the crotch strap from the back pad slot and from the retrieving loop. Assemble the crotch strap onto the two FC4035 buckles on the leg straps (see Drawing 10.6-1). Insure proper assembly. **Running ends MUST be doubled back through the buckles.** Once the crotch strap is installed, on both the right and left leg strap, don the Apex DP in the normal manner. Remove belly band buckle (FC4035) from Velcro. Connect the belly band to the belly band buckle (see Drawing 10.6-1). The sewn Guide Loop should be at the midpoint of the body from right to left. Insure proper assembly with all 3 running ends of the Alpine webbing, i.e. webbing doubled back through their respective buckles. Stow the excess leg strap webbing in the elastic keeper and /or tuck it under the leg pad cover, just behind the leg strap hardware.

## 10.3 Packing

The Alpine does not have any special "Packing ". Refer to "Assembly and Use" for information on configuring in the Alpine and non-Alpine mode.

## 10.4 Use

When connecting the Alpine to a rope or locking carabiner any "tie in" must use accepted and safe climbing techniques. It is the users responsibility to understand such techniques and use them safely. Apex BASE will not attempt to teach climbing techniques and encourages the Alpine user to gain such knowledge through qualified instruction. **The Alpine must be connected using both the belly band and the crotch strap.** A locking carabiner or rope must pass around the belly band and the crotch strap. The rope or carabiner should pass through the Guide Loop on the belly band. **The Guide Loop MUST NOT take the load.** It is designed to keep the rope or carabiner centered. The load must pass to the continuous belly band, not the Guide Loop.

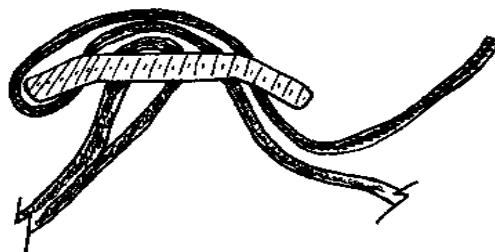
Configuring in the non-Alpine mode. The belly band should pass through the keeper on the right lumbar. Insert the belly band and crotch strap into the back pad slot by placing both items into the retrieving loop and fold the belly band and the crotch strap around the retrieving loop. Do not separate the retrieving loop from the belly band and crotch strap when stowed. They will stay in this configuration until the next time the Alpine is needed. Excess retrieving loop must be stowed in the back pad pocket.

## 10.5 Maintenance

The Alpine is a low maintenance item, however, it must be inspected before each use. The Alpine is a more complex system than a standard parachute harness and has more individual parts. This requires additional inspection. Be sure to inspect the items listed in "Description" paying close attention to any wear on webbing created by the FC4035 buckles, and the harness stitching on the main lift web at the hip (lumbar/leg strap/belly band) intersection. The Alpine must be inspected for damage and stitch integrity after a fall. Any questionable items should be inspected by a qualified individual or returned to Apex BASE.

## **10.6 Drawings**

10.6-1



**This diagram shows the proper way of attaching all three buckles on the ALPINE.**

**Note the running ends are ALWAYS doubled back through the FC4035 buckles.**

# **12- WLO Toggles version 2**

## **Warning**

### **Release System**

Releasable components may release when they should not, as a result injury or death may occur. Non-releasable substitution may be available. For more information please read page 6.

### **12.1 Description**

The WLO (What Line-Over?) toggle incorporates a release capability to release the control line in the event of a line-over. The WLO does require additional emergency procedures. The WLO LRT toggles are not your standard toggles, they do have a stiff folded end, a loop for the hand, and pile Velcro to mate with the riser. But there is more, they include a Release Lanyard with a Stainless Steel straight pin at one end and a small metal ring at the other. Between the pin and the ring there is hook Velcro and a cable stiffener. Only use a control line with a sewn toggle loop with the WLO toggle. If the control line is tied onto the WLO toggle (not recommended) the knot will prevent the passage of the control line through the keeper ring and slider, therefore preventing the line-over from clearing.

### **12.2 Assembly**

Determine assembly needs— No Slider or slider up?

Proper set up with no slider includes the line mod. Therefore, when the brakes are unstowed, the control line runs straight from the toggle (your hand) to the trailing edge of the canopy without passing through anything Drawing 14.6-4.

OR

Proper set up with a slider, the control lines MUST pass through the riser guide rings and the rear slider grommets. Drawing 14.6-5

WLO LRT toggle onto a control line with sewn loop.

12.2-1a Locate the right lower control line and a WLO toggle.

-1b Pass control line through the toggle grommet from the back of the toggle. Drawing 12.6-1

-1c Pass the pin through the toggle loop in the control line. Then tuck pin into the slot provided above grommet. Drawing 12.6-2. The pin should extend beyond the control line 3/4 of an inch (20 mm). The widening part of the pin should be visible immediately under the control line loop. This is a good visual reference that should be checked during each pack job— it will ensure that the pin is completely stowed.

-1d Mate the Release Lanyard Velcro on the front side of toggle and tuck the stiff tab into the slot above the Velcro (below grommet). Drawing 12.6-3

-1e Repeat 12.2-1a through 12.2-1d for the left lower control line and the remaining toggle.

-1f Confirm proper continuity and routing for no slider or slider. Drawing 14.6-4 or 14.6-5

### **12.3 Packing**

12.3-1 Setting brakes using the line mod with WLO LRT toggles, for no slider deployments.

-1a Ensure proper line mod set up, when the brakes are unstowed, the control line runs straight from the toggle (your hand) to the trailing edge of the canopy without passing through anything else.

-1b Insure proper upper and lower control line continuity.

-1c Determine which brake setting to be used. Then pass the riser loop through the cats eye loop in the control line. Drawing 14.6-6

-1d Pass the riser loop through the riser guide ring. Note: when using the line mod the control line does not pass through the guide ring. Drawing 14.6-7

-1e Put the top of the toggle through the riser loop and stow the top of the toggle in the keeper provided on the riser. Drawing 14.6-8 shows the left riser and toggle (top of toggle keeper to the inside.)

-1f Stow the excess control line by S-folding them into the elastic keeper provided on the front side of the rear riser. Drawing 14.6-9

-1g The finished brake stows should look like Drawing 14.6-12. The control lines both come from the outside, pass by the toggle toward the inside and around to the front of the riser.

-1h Check proper routing of the WLO LRT toggles. Viewing the finished stow from the profile, you should see the riser then Line, Ring, Toggle or LRT. The top of the toggle must never pass through the guide ring.

12.3-2 Setting brakes using a slider with the WLO LRT toggles, for slider up deployments.

-2a Ensure proper set up with a slider, the control lines MUST pass through the risers' guide rings and the slider grommets.

-2b Pull the toggle down so that the desired cats eye is below the guide ring. With a slider up deployment this is

typically the number 1 brake loop (counting from the toggle).

-2c Pass the top of the toggle through the cats eye Drawing 12.6-4, and stow the top of the toggle in the keeper provided on the riser. The riser loop is not used when a slider is being used. Simply pull the riser loop to one side. Drawing 14.6-11.

-2d Stow the excess control line by S-folding it into the elastic keeper provided on the front side of the rear riser. Drawing 14.6-9. The control lines both come from the outside, pass by the toggle toward the inside and around to the front of the riser. The top of the toggle must never pass through the guide ring.

#### **12.4 Use**

Normal Operation- To operate the WLO LRT toggle, firmly grasp the toggle hand loop, and pull down. This action will remove the top of the toggle from the riser loop (line mod) or cats eye (slider up) releasing the brake setting. Use the toggles to fly in a normal manner.

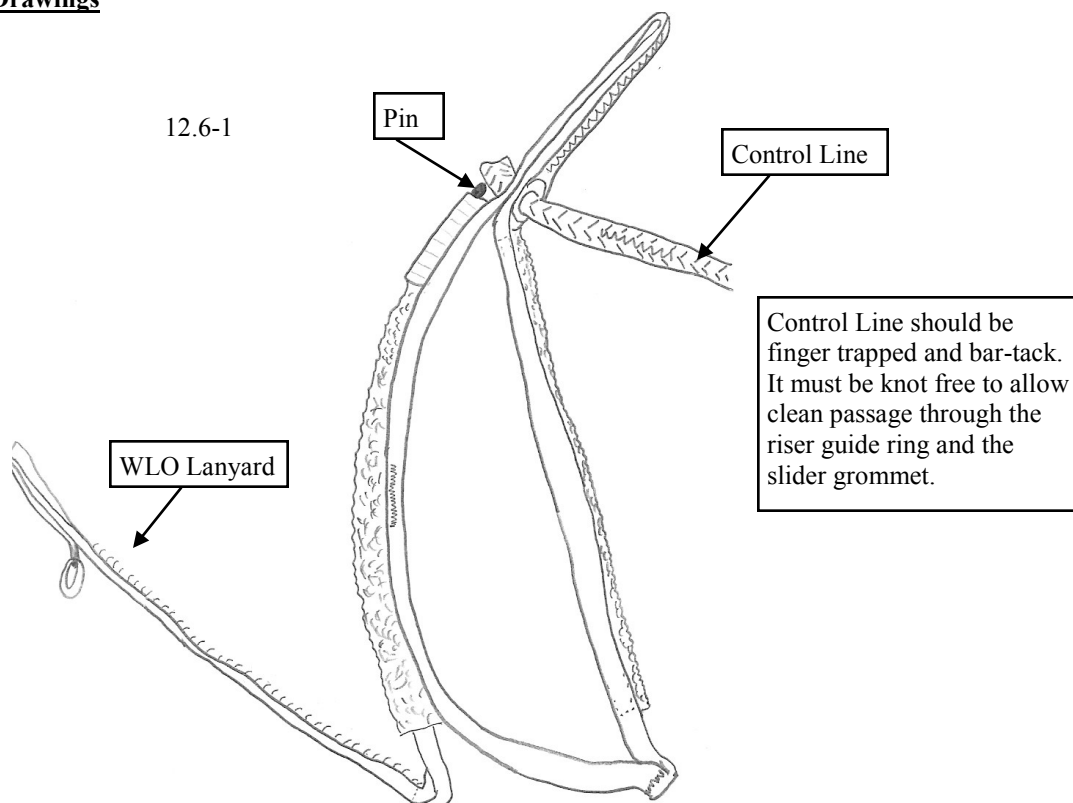
In the event of a slider-up line-over the WLO toggle can be used to free the control lines (which are typically the culprit of the line-over). Release the toggle in the normal manner as described above. Control lines may be “cycled” to possibly clear the offending line. If the line-over clears fly in normal manner. Be ready to avoid obstacles as altitude has likely been lost during the malfunction. If the line-over malfunction is not clear, let go of the NON offending toggle. Reach with free hand to meet the hand holding line-over toggle, grab ring (with free hand) and pull to remove tab and separate lanyard Velcro. Grasp lanyard and continue pulling lanyard to release pin from control line. The control lines should now be free clearing the line-over. However, the excess control line (that is stowed) may become “stuck” and could require manual release. Be ready to avoid obstacles as altitude has likely been lost during the malfunction. The toggle will now be completely free from the riser and the control line, therefore, it can be lost. Prepare for rear riser flight and landing. Directional control is achieved with rear riser input (pulling down slightly). Rear riser flares are more difficult because the parachute will stall easily.

Apex BASE does not recommend using the WLO emergency procedure, for no slider (slider down) jumps. Instead the Line Mod emergency procedure should be used. The Line Mod emergency procedure does require proficient use (as does the WLO). Moreover, at low altitudes, it is our belief that the Line Mod can be enacted quicker than using the WLO release procedure. The WLO toggle is intended for use (as an emergency procedure) with slider up deployments. It is for this reason we have provided both no slider and slider up details in 12.2 Assembly and 12.3 Packing.

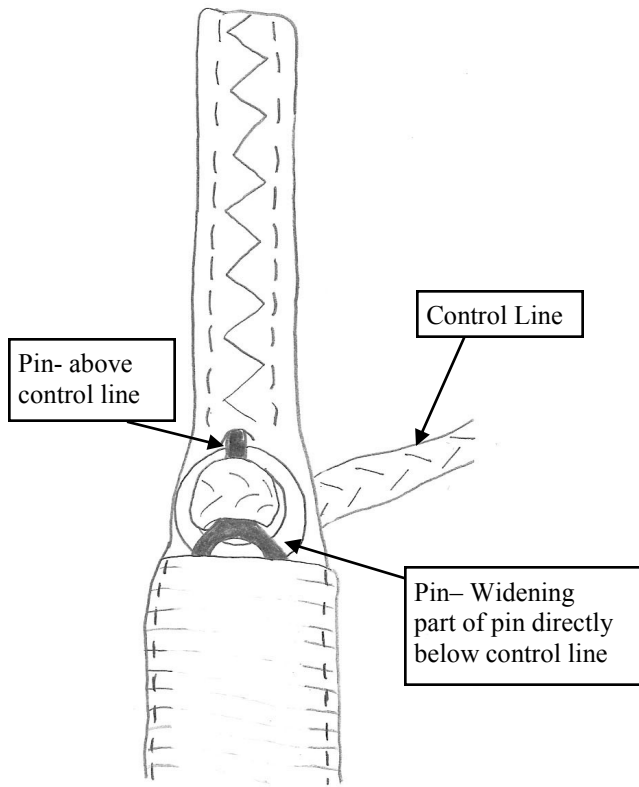
#### **12.5 Maintenance**

The pile Velcro on the toggle will wear out in time after use. This Velcro should be replaced around 75 to 100 uses. Any other damaged or worn items should be repaired or replaced. Use only Apex BASE replacement parts.

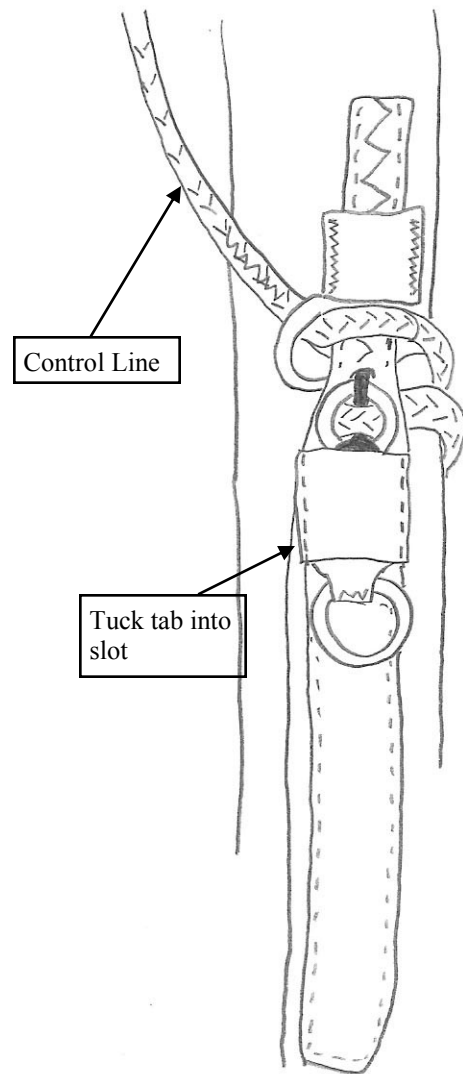
#### **12.6 Drawings**



12.6-2



12.6-3



Left

# **13- Risers**

## **Warning**

### **Release System**

Releasable components may release when they should not, as a result injury or death may occur. Non-releasable substitution may be available. For more information please read page 6.

### **13.1 Description**

Apex BASE has three harness style options for riser attachment. All three types are compatible with the EZ Grab LRT toggle system. Risers are constructed using Type 8 (1-23/32 inch) webbing.

1-The 3-Ring release riser with integrity style rear facing rings. This type of riser gives the user the most available options during any jump. Including the ability to "cutaway." With any single parachute system (no reserve) the need to cutaway is NOT the same as skydiving (with reserve) emergency procedure.

2-The detachable L-bar riser. This system has no "in the field" release capability. This type of riser is attached to the harness using an L-bar connector. It requires a straight blade screw driver to assemble. To disassemble, a screw driver and a leverage device or a mallet is needed. The L-bar riser has no cutaway capability. L-bar risers may be replaced if damaged.

3-The non-detachable risers are built into the harness. This system also has no release capability. The harness will need to be rebuilt if the risers are damaged.

The riser options described above all have the same toggle configuration, LRT.

The LRT toggle system requires a sewn loop between the guide ring and the risers. Most of the toggle set up is located on the rear of the rear riser. However, the excess line stow elastic is located on the front of the rear riser. On the front riser is a dive loop or knob.

### **13.2 Assembly**

LRT toggle instruction can be found in Section 14

#### **13.2-1 Connecting risers with the 3 Ring release.**

-1a Insert the cutaway cables into the respected housings. The long cable must be inserted into the long housing terminating at the wearers left shoulder. Insert the short cable into the short housing terminating on the right.

-1b Insure proper continuity between riser and canopy. Risers should be assembled onto canopy with the toggle keepers to the inside (inboard, mirror imaging each other).

-1c Grasp right riser (maintaining continuity) and pass the large riser ring through the right side harness ring. This must be done so that the riser stays in front of the harness ring.

-1d Rotate the large riser ring around the harness ring toward the medium riser ring. Pass the medium ring through the large riser ring (not the harness ring).

-1e Rotate the medium ring around the large ring toward the white loop. Pass the white loop through the center of the medium ring.

-1f Fold the Type 4 tape with the grommet toward the white loop. Pass the white loop through the grommet. Locate the right cable housing grommet. Insert the white loop through the cable housing grommet.

-1g Insert the yellow cutaway cable through the white loop. Place cable into channel on riser. Drawing 13.6-1

-1h Repeat 13.2-1b through 13.2-1g for the left side. Check both sides for proper assembly.

#### **13.2-2 Connecting risers with L-bars.**

-2a Insure good continuity between riser and canopy. Risers should be assembled onto canopy with the toggle keepers to the inside (inboard, mirror imaging each other).

-2b Locate the main lift web loop above the mud flap. Open L-bar. Place one half of the L-bar through riser loop and the other half through main lift web loop. Slide two halves together.

-2c Insert screws into L-bars. The screws must rotate 7 full turns. It is best to tighten one screw then the other and then continue to tighten them back and forth until no more turns are available.

-2d Repeat 13.2-2a through 13.2-2c for opposite riser.

See section 2.2 for connecting the canopy to the risers.

### **13.3 Packing**

LRT toggle instruction can be found in Section 14

13.3-1 The risers are packed into the pack tray of the container. They will lay against the pack pad and therefore the wearers back.

-1a Place the risers into the container, toggles down, rear risers to the outside and connector links toward the bottom corners of container.

-1b Place fold in toggle so the bartack at the bottom of the toggle is exposed and the toggle folds open during deployment. Drawing 14.6-3

-1c All four connector links should be equal distance from bottom of container.

### **13.4 Use**

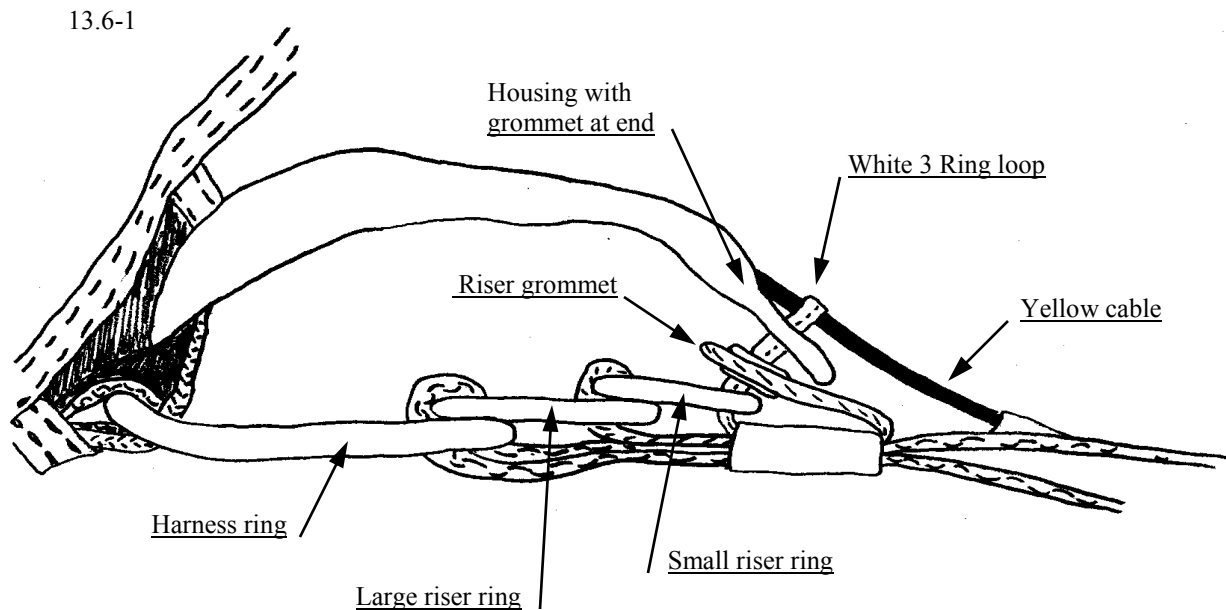
The 3-Ring riser has the ability to cutaway, with a single container system this is only useful after landing. Do not revert to "skydiving" or dual parachute emergency procedures. The cutaway ability is quite useful with water or tree landings. The 3-Ring release is by some accounts the weak link in a strong chain. Exceeding a safe free fall delay may cause serious damage to occur and possible failure of the release. Do understand that the 3-Ring is a "release system" and may release a riser(s) if the system is not properly assembled, properly maintained, if the handle (yellow cable) is inadvertently pulled or if the release is over-stressed or damaged.

L-bar and non detachable risers have no cutaway ability. It is advisable to carry a hook knife to cut a riser in the event of an emergency such as water landings.

### **13.5 Maintenance**

The highest maintenance point on any riser is the Velcro between the riser and toggle. However, the most critical inspection point on the riser is the white 3-Ring loop. Any damage or wear to the white 3-ring loop must be replaced or repaired before the next jump. The connector link end of the riser may receive some damage from the assembly and disassembly of the connector link. Any damage or wear to the riser must be dealt with seriously, because a riser failure is not acceptable and can be fatal.

### **13.6 Drawings**



# **14- EZ Grab LRT Toggles**

## **14.1 Description**

EZ Grab LRT toggles appear to be a standard type toggle with a stiff folded end, a loop for the hand, and pile Velcro to mate with the riser. The LRT toggle has several small features that make it unique, so please do not substitute any other toggles when using the LRT system.

## **14.2 Assembly**

Determine assembly needs— No slider or slider up?

Proper set up with no slider includes the line mod. Therefore, when the brakes are unstowed, the control line runs straight from the toggle (your hand) to the trailing edge of the canopy without passing through anything else Drawing 14.6-4.

OR

Proper set up with a slider, the control lines **MUST** pass through the riser guide rings and the slider grommets.

Drawing 14.6-5

LRT toggle onto a control line with sewn loop.

14.2-1a Locate the right lower control line and a EZ Grab toggle.

-1b Pass control line through the toggle grommet from the Velcro of the toggle. Drawing 14.6-1

-1c Pass the bottom of the toggle through the loop on the end of the control line. Drawing 14.6-2.

-1d Pull taught creating a larks head knot. Drawing 14.6-3

-1e Repeat 14.2-1a through 14.2-1e for the left lower control line and the remaining.

-1f Confirm proper continuity and routing for no slider or slider. Drawing 14.6-4 or 14.6-5

## **14.3 Packing**

14.3-1 Setting brakes using the line mod with LRT toggles, for no slider deployments.

-1a Ensure proper line mod set up, when the brakes are unstowed, the control line runs straight from the toggle (your hand) to the trailing edge of the canopy without passing through anything else.

-1b Insure proper upper and lower control line continuity.

-1c Determine which brake setting to be used. Then pass the riser loop through the cats eye loop in the control line. Drawing 14.6-6

-1d Pass the riser loop through the riser guide ring. Note: when using the line mod the control line does not pass through the guide ring. Drawing 14.6-7

-1e Put the top of the toggle through the riser loop and stow the top of the toggle in the keeper provided on the riser. Drawing 14.6-8 shows the left riser and toggle (top of toggle keeper to the inside.)

-1f Stow the excess control line by S-folding them into the elastic keeper provided on the front side of the rear riser. Drawing 14.6-9

-1g The finished brake stows should look like Drawing 14.6-12. The control lines both come from the outside, pass by the toggle toward the inside and around to the front of the riser.

-1h Check proper routing of the LRT toggles. Viewing the finished stow from the profile, you should see the riser then **Line, Ring, Toggle or LRT**. The top of the toggle must never pass through the guide ring.

14.3-2 Setting brakes using a slider with the LRT toggles, for slider up deployments.

-2a Ensure proper set up with a slider, the control lines **MUST** pass through the risers' guide rings and the slider grommets.

-2b Pull the toggle down so that the desired cats eye is below the guide ring. With a slider up deployment this is typically the number 1 brake loop (counting from the toggle).

-2c Pass the top of the toggle through the cats eye Drawing 14.6-10, and stow the top of the toggle in the keeper provided on the riser. The riser loop is not used when a slider is being used. Simply pull the riser loop to one side. Drawing 14.6-11

-2d Stow the excess control line by S-folding them into the elastic keeper provided on the front side of the rear riser. Drawing 14.6-9. The control lines both come from the outside, pass by the toggle toward the inside and around to the front of the riser. The top of the toggle must never pass through the guide ring.

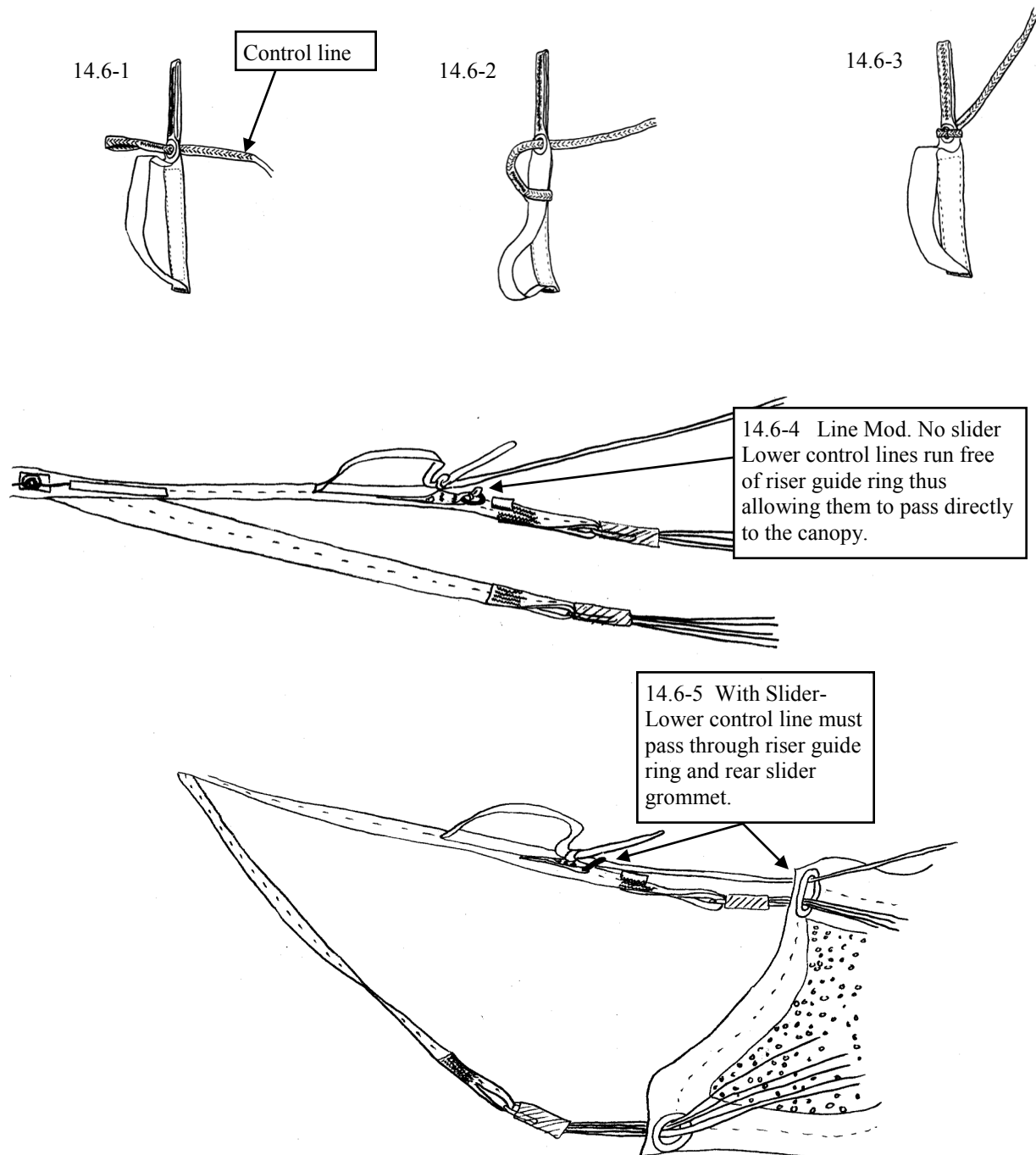
#### **14.4 Use**

To operate the LRT toggle, firmly grasp the toggle hand loop, and pull down. This action will remove the top of the toggle from the riser loop (line mod) or cats eye (slider up) freeing the control line. Use the toggles to fly in a normal manner.

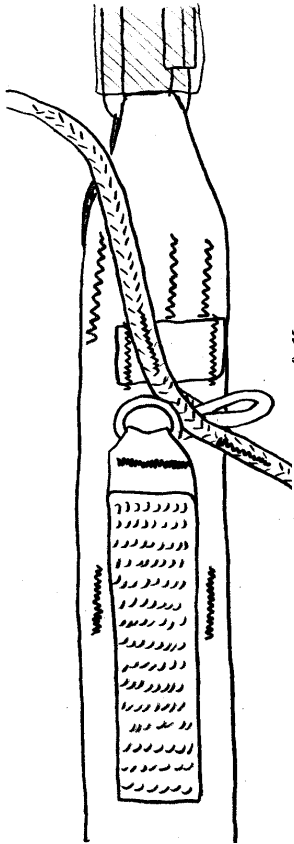
#### **14.5 Maintenance**

The pile Velcro on the toggle will wear out in time after use. This Velcro should be replaced around 75 to 100 uses. Any other damaged or worn items should be repaired or replaced. Use only Apex BASE replacement parts.

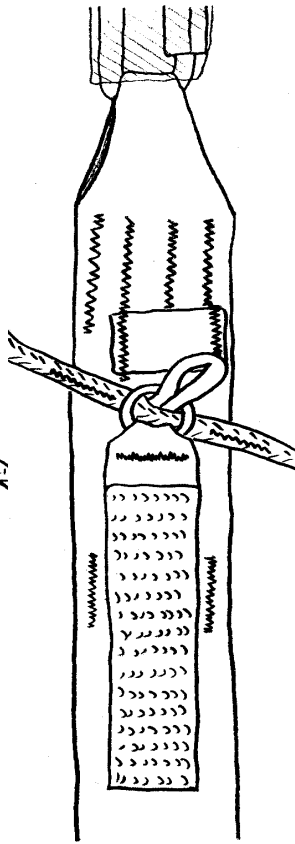
#### **14.6 Drawings**



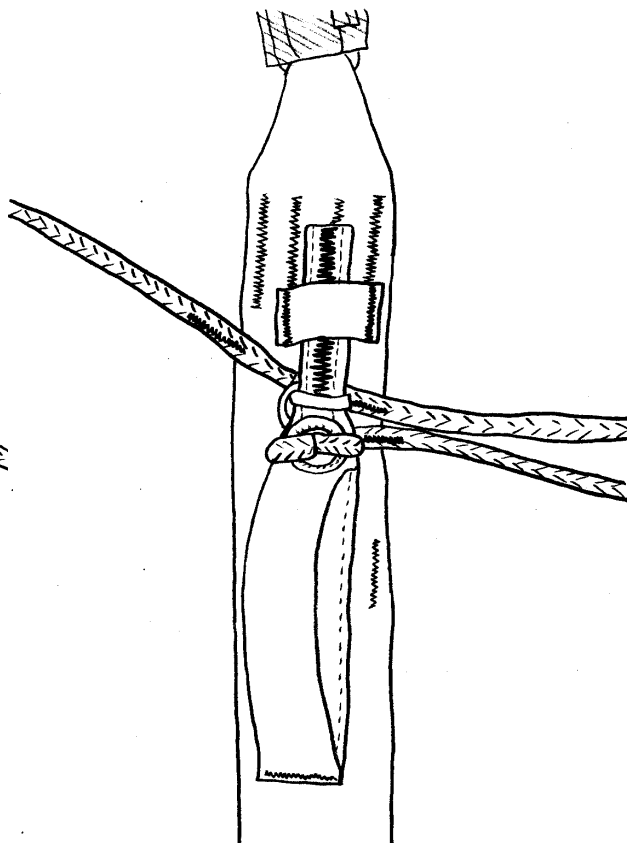
14.6-6



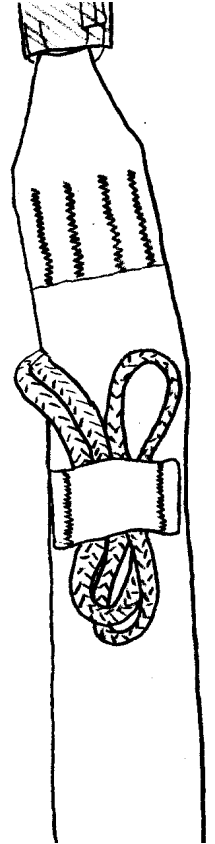
14.6-7



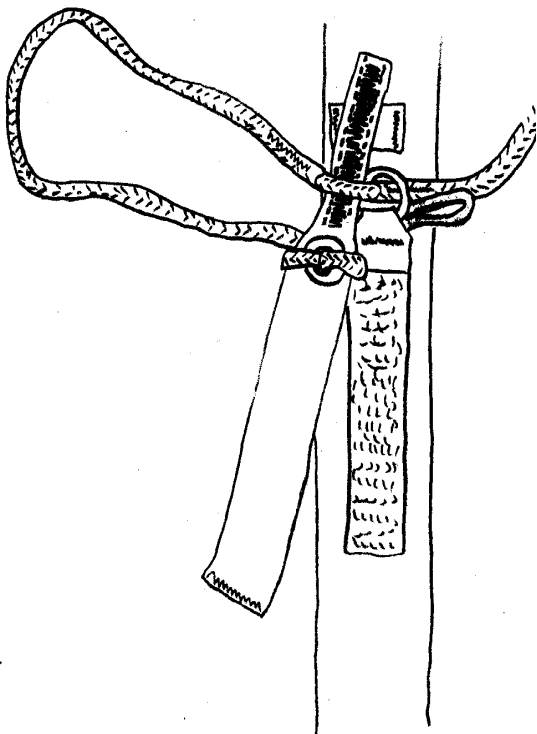
14.6-8



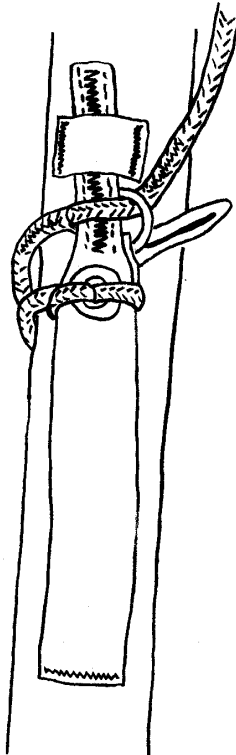
14.6-9



14.6-10



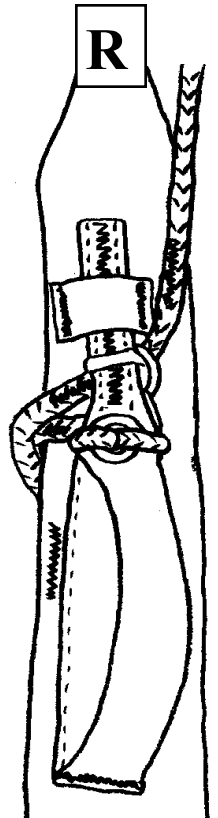
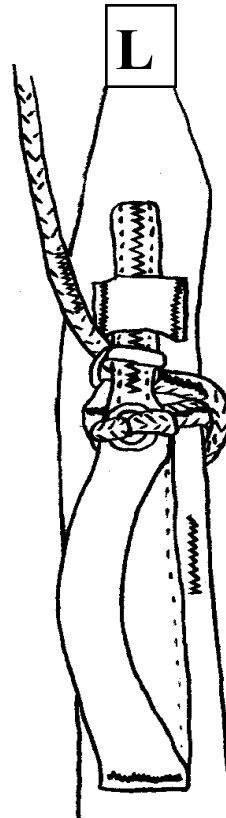
14.6-11



L

14.6-12

R



# **15- Pilot Chutes**

## **15.1 Description**

There are two types of pilot chute in common use for fixed object jumps – hand held and stowed. Hand held pilot chutes are typically sized between 42 and 48 inches in diameter. They should not have a handle on the top surface. Stowed pilot chutes are typically sized 40 inches and smaller. They may have a sewn plastic handle at the cap or a large fabric patch used as a handle. All BASE style pilot chutes should have reinforcement tape on both the ripstop as well as the mesh portions. Any pilot chute intended to be used for low airspeed deployments (free fall delays less than 10 seconds) should utilize large hole mesh. Tight, small hole (marquisette) mesh prevents consistent inflation at low airspeed and should only be used for terminal velocity.

A pilot chute will have the following nomenclature:

- Bridle attachment - A taped circle in the center of mesh divided by radial tapes. The center line will loop around the convergence of the radial tapes.
- Mesh with radial tapes- The mesh forms the bottom half of the pilot chute. A pilot chute will have 4, 6, or 8 radial tapes depending on size.
- Ripstop fabric with radial tapes- The ripstop (0-3 or ZP) forms the top half of the pilot chute, the radial tapes reinforce the ripstop for structural integrity. A pilot chute will have 4, 6, or 8 radial tapes depending on size.
- Cap- The pilot chute will have a cap sewn in the center of the ripstop. Pilot chutes with handles will have the handle attached in the cap area.
- Center line- A center line will be connected between the cap and the bridle attachment.
- Vent- A vent is optional on smaller pilot chutes. The vent reduces oscillation caused at higher airspeeds.

## **15.2 Assembly**

15.2-1 The pilot chute will be attached to the bridle using a larks head knot.

-1a Pass the bridle loop through the bridle attachment making sure the bridle goes through the loop in the center line as well as behind each of the radial tapes.

-1b Next pass all of the pilot chute fabric through the loop in the end of the bridle. Remove any twist in the bridle loop.

-1c Tighten the larks head knot around the bridle attachment of the pilot chute.

## **15.3 Packing**

### **15.3-1 Stowed**

-1a Grasp the pilot chute at the bridle attachment and hang pilot chute so that the center line becomes completely elongated. With the other hand grasp all the mesh and slide hand toward ripstop fabric stopping at the seam created between the mesh and the ripstop. Flip the pilot chute so it is now in a mushroom shape with the cap (handle) resting on top. Drawing 15.6-1

-1b Release the first hand and grab the ripstop fabric and the bulk created by the seam of the mesh and ripstop. The cap (handle) should remain exposed. Lay on solid surface.

-1c Lift one side of ripstop back towards handle. Make a fold in the mesh so the pilot chute bridle attachment faces towards the cap. The length of the fold should be such that the pilot chute, from cap to bottom of fold, is the same length as the BOC pilot chute pocket. Drawing 15.6-2

-1d S-fold the bridle on top of the mesh in 6 - 8 inch folds until within approximately 10 inches of the end of the bridle. Drawing 15.6-2

-1e Long fold mesh around bridle, keep it narrow and tight. Drawing 15.6-3

-1f Fold ripstop back over mesh (Drawing 15.6-4) and tri fold ripstop (Drawing 15.6-5) and continue a rolling fold until pilot chute is tightly contained and ready to insert into spandex pocket. Drawing 15.6-6

-1g Insert into BOC pocket leaving cap (handle) exposed. – For stowed jumps make sure bridle is secure and will not interfere with jumpers hand during deployment. Tuck all excess bridle under flap and / or into BOC pocket.

### **15.3-2 Hand Held**

Optional– Open the Pin Protector Flap on low airspeed (“go and throw” and 1 second delay) deployments.

-2a Don rig in normal manner and make all harness adjustments stowing all excess webbing.

-2b Remove pilot chute from BOC pocket. Grasp bridle with right hand. Make sure bridle runs from the lower pin

directly to the hand without passing through or around anything that may create a pilot chute in tow malfunction or pilot chute hesitation.

Optional- Tuck a small (1/2 inch) bite of bridle under the side flap near the shoulder.

-2c Keeping bridle in hand, between the thumb and forefinger, lift bridle to full arm extension. Grasp bridle at that point of full arm extension. Drawing 15.6-7

-2d S- fold the remaining bridle into hand, using 4 to 6 inch folds, working the way toward the pilot chute. Drawing 15.6-8 To reduce bulk, in the hand, the larks head knot at the bridle can be placed in the fold- not in the hand.

-2e At this time the pilot chute should be hanging by the bridle attachment point. Drag pilot chute through air causing it to inflate, then allow pilot chute to rest. This movement will elongate the center line of the pilot chute. If the pilot chute does not inflate **do not** continue.

-2f Continue to S-fold the pilot chute mesh into the right hand. Drawing 15.6-9 Optional – Then continue to S-fold the pilot chute ripstop into the hand. Drawing 15.6-10. To reduce bulk, in the hand, the seam between the mesh and the ripstop can be placed in the fold- not in the hand.

-2g The center line of the pilot chute should stay elongated through this entire procedure.

-2h Extend the arm to check bridle length and routing. Drawing 15.6-11

#### **15.4 Use**

Hand held pilot chutes have no handle and are intended to be used on free fall delays less than 4 seconds. Stowed pilot chutes are typically used from 3 seconds through terminal velocity. Refer to the Reference Chart Part D for helpful information on selecting the right pilot chute. Pilot chute performance may change with time and number of jumps and general wear on the pilot chute. Most of the pilot chute change will come from a permeability change of the ripstop fabric. Other factors such as trim, stretch or shrinkage may also effect pilot chute performance.

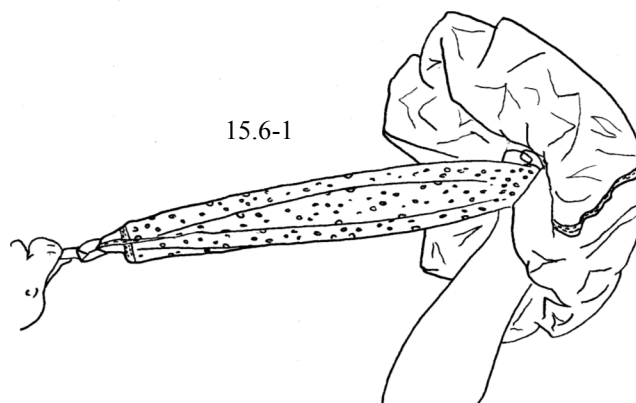
It has become common place to see large pilot chutes for fixed object jumping and is easily understood that at low airspeeds a large pilot chute is needed to get a container open and a parachute into its deployment sequence in a timely manner. Using a pilot chute that is too small for an intended airspeed may not have sufficient drag to open a container and deploy a parachute. However, a pilot chute that is too large may create out of sequence openings, center cell strip, and may change canopy inflation and/or flight characteristics. Opening the Pin Protector Flap is optional and sometime used on low airspeed deployments such as “go and throws”. Opening the Pin Pro Flap will allow all the force (created by the PC) to go directly to the pins and not waste valuable energy opening the Pin Pro Flap. Consult a knowledgeable persons for more information.

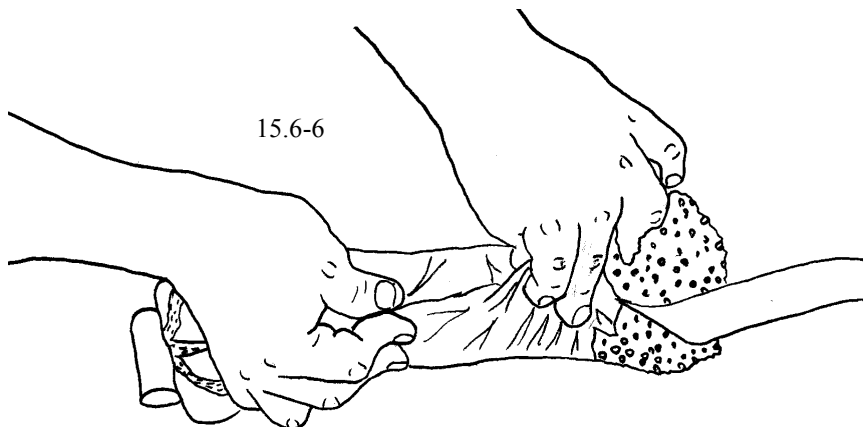
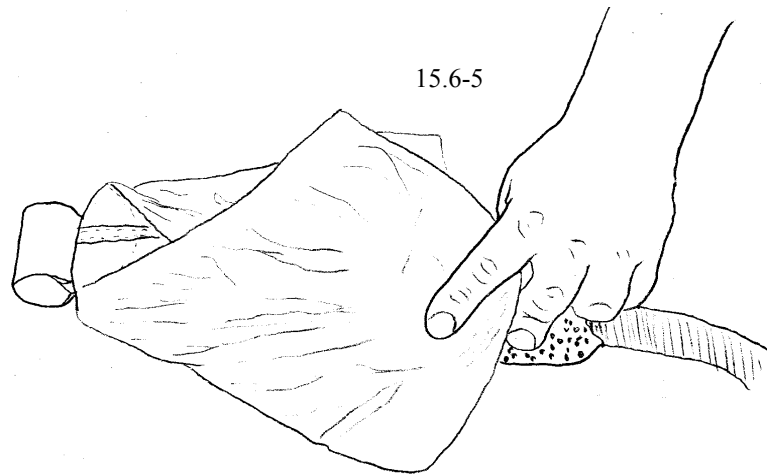
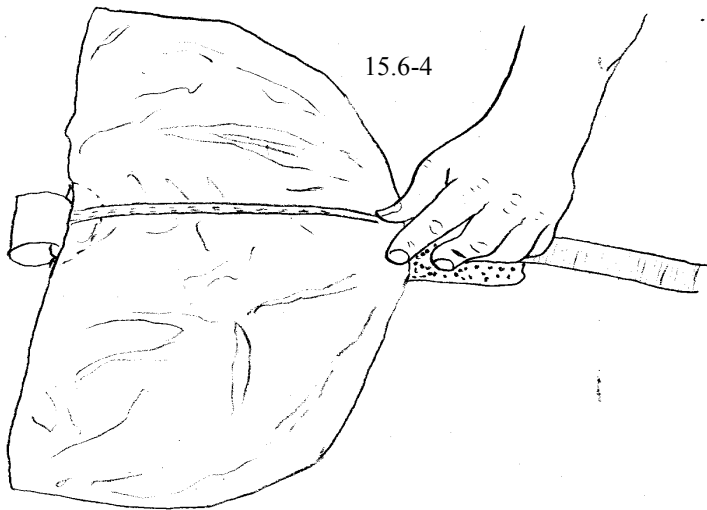
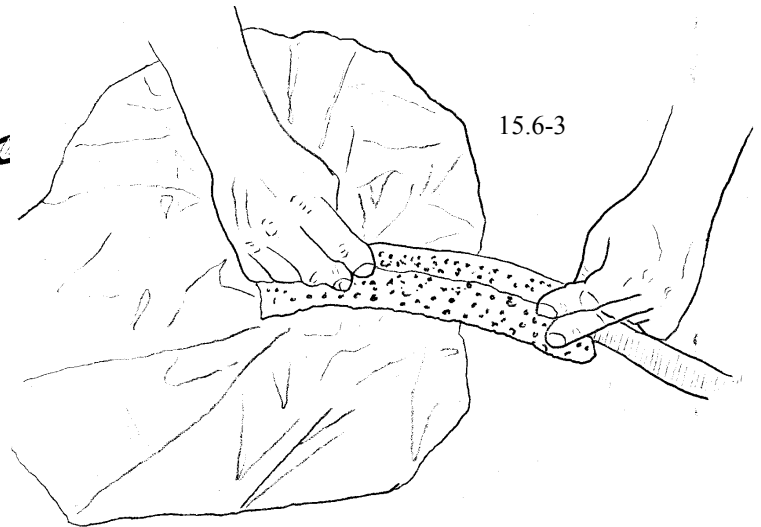
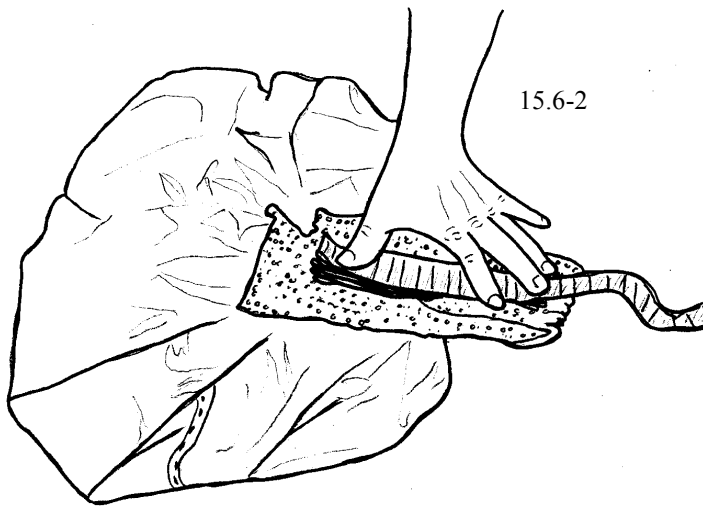
Using a hand held pilot chute is more technical than one may think. There are several different methods of folding and deploying a pilot chute as it relates to free fall delays. For instance, a "go and throw" delay would usually keep all of the ripstop fabric out of the hand and fold only the bridle and the mesh. While a 2 second and beyond delay would fold the entire pilot chute in the hand. Placement of the pilot chute can also greatly effect inflation time. Learn these and other vital techniques before attempting any jumps.

#### **15.5 Maintenance**

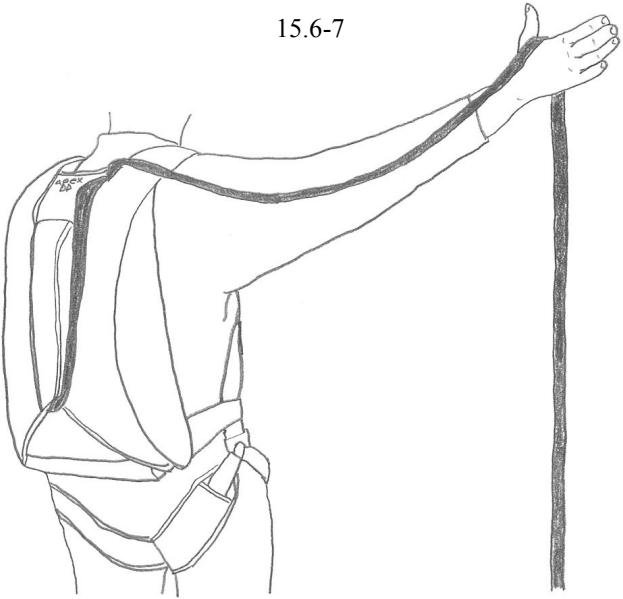
The pilot chute in itself does not have many maintenance items. However, it does wear out. The pilot chute gets a great deal of abuse. It is the first thing to be used during deployment and the last thing to be stowed during packing. The pilot chute is always being dragged through landing and packing areas. It is for these reasons the pilot chute must be inspected regularly and replaced or repaired immediately. Inspect all bartacks especially the bartack connecting the center line at the cap. If the pilot chute has a handle, the bartacks holding that handle must be in good condition.

#### **15.6 Drawings**

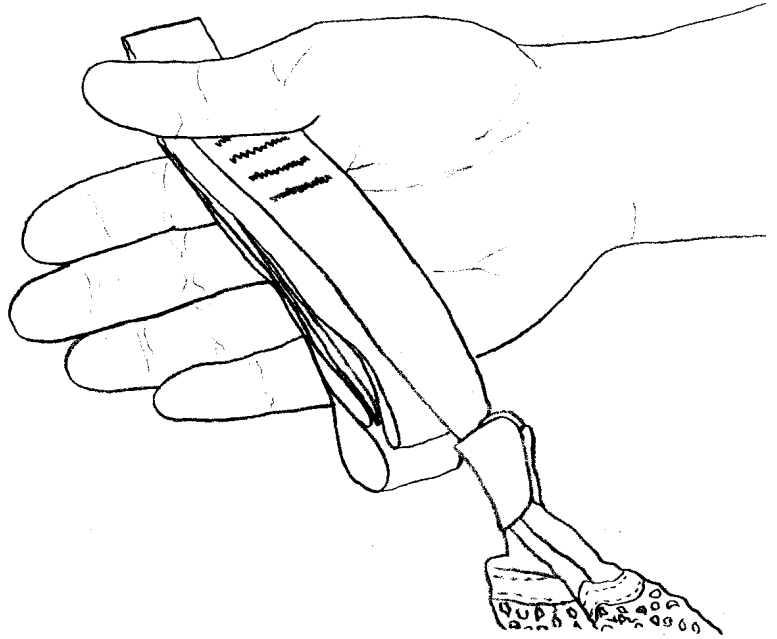




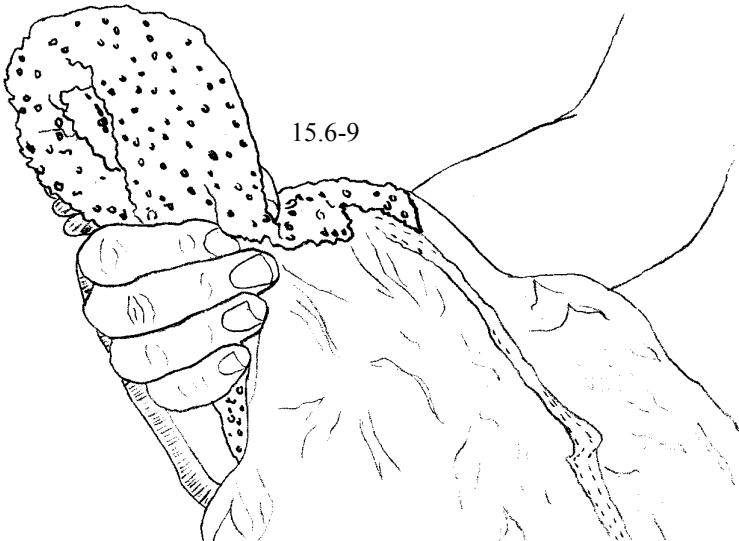
15.6-7



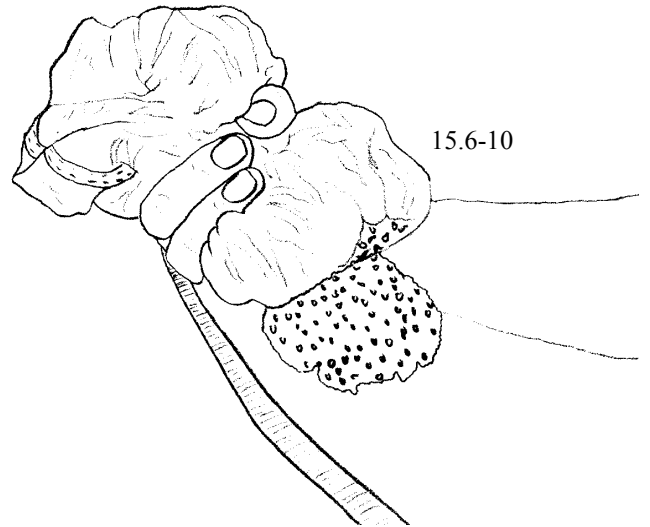
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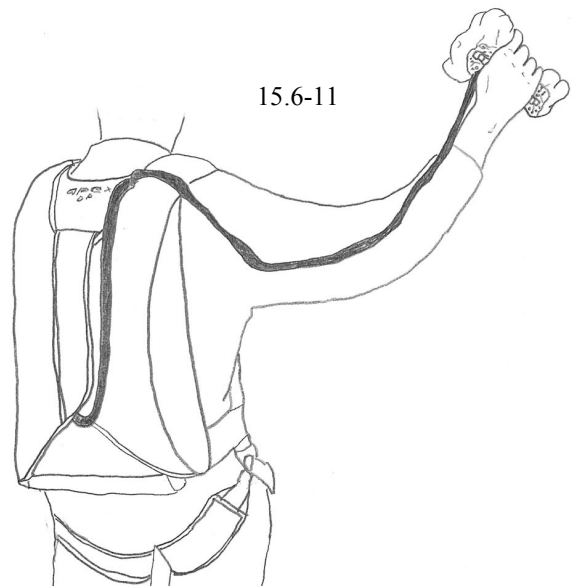
15.6-9



15.6-10



15.6-11



# Part D

## Miscellaneous

Reference Chart  
Inspection  
Specifications  
Continuity  
Glossary  
Equipment Check



## Reference Chart

### Height – Delay – Pilot Chute – Slider – POD – Container

Height	Delay	48	46	42	40	38	36	32	Mesh	Sail	PC location	POD	Velcro Closed	Pin Closed
200	0<1	FR	P								hand		GD	GD
300	0-1	GD	GD								hand		GD	GD
400	1-2	FR	GD	GD	P	P					h/st		GD	GD
500	2-3	P	FR	GD	FR	FR	P		FR		h/st		GD	GD
600	2-3	P	FR	GD	GD	FR	P	P	FR		h/st		GD	GD
700	3-4	P	P	FR	GD	GD	FR	P	GD		h/st		FR	GD
900	4-6			P	FR	GD	FR	P	GD		stowed		FR	GD
1100	6-7				FR	FR	GD	FR	GD		stowed	P	FR	GD
1500	7-9				FR	FR	GD	FR	GD	P	stowed	FR	P	GD
2000	9+				P	P	GD	GD	GD	FR	stowed	GD	P	GD
PC location		hand	hand	h/st	h/st	h/st	stowed	stowed						

GD = Good performance  
 FR = Fair performance  
 P = Poor performance  
 ■ = Black Death, Bad idea

hand = Hand held pilot chute  
 h/st = Hand held or stowed pilot chute  
 stowed = Stowed pilot chute in BOC

- Deployment options are dependent on several factors, two of which (altitude and delay) are mentioned in the table above. It is wise to use other factors to help make the decision of pilot chute selection and/or free fall delay. Some other factors to consider may be size and weight of canopy, age and performance of pilot chute, profile of the object, type and location of landing area. It is important to gauge pilot chute and free fall delays upon past experiences and always err on the conservative side.
- The option of a sail slider or mesh is relative to 3 factors; canopy performance, airspeed at deployment time, and opening altitude AGL.
- The decision rather to use a POD (or other bag type device) should be relevant to airspeed at deployment and horizontal distance from object. Because on heading performance is decreased with a bag type device the jumper should try to gain sufficient distance from the object before deployment time.
- On any jump that will take place above 3000 MSL, density altitude must be taken into consideration for all factors of equipment performance.
- The most common element of pilot chute size selection is based on airspeed/ delay. However with such a wide range of parachute sizes available today the user must consider the weight of his parachute. Example a smaller parachute of 200 sq. ft. might use a 38" when a larger 315 sq. ft. might need to use a 42" to get similar results at the same airspeed.

# Inspection

Thorough and regular inspections of the entire parachute, harness and container system is essential to safety. Inspection should take place during each pack job. However, this inspection will only detect the more obvious and pronounced problems. From time to time a far more thorough and intensive inspection must take place. How often will depend on the type of jumps, performance, openings, landings, etc. At least every 10 jumps. Any unusual performance, opening, landing must be followed by a thorough inspection. If an item appears to be worn or damaged, repair or replace it before the next use.

There are several things that can damage a parachute system. Due care must be taken to avoid exposure to chemicals, acids, fertilizers, sharp objects, heat, water, prolonged direct sunlight, and anything that may damage the integrity of the system. After salt water landings the entire system should be rinsed with fresh water.

The system should be inspected to the airworthiness of a reserve system not a main, remember it is a single parachute system.

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## Check list

### Harness

- Webbing and stitching
- Hardware
- Cutaway housings and grommets
- Cutaway handle and cable

### Container

- Container flaps and stiffeners
- Stitching
- Flap grommets
- BOC spandex

### Risers

- Webbing
- 3-ring assembly
- White loop at 3-ring
- Link attachments
- Guide ring webbing and bartacks
- Velcro and elastic

### Toggles

- Velcro
- Assembly

### Connector links

- Tight
- Covers

### Lines

- 4 riser groups
- 2 control line sets – cats eye
- Bartacks
- Continuity

### Slider

- Stitching
- Fabric and tapes
- Grommets

### Canopy

- Line attachment tabs
- Cells 1 through 7 bottom – Vtec
- Cells 1 through 7 internal – cross ports
- Cells 1 through 7 top
- Bridle attachment top bottom and internal (Multi x 3 cells)
- Stabilizers

### Tail Pocket

- Tabs and Velcro

### POD

- Stitching
- Fabric and tapes
- Grommets

### Bridle

- End loops
- Velcro
- Pins and pin attachment tab

### Pilot chute

- Bridle attachment and center line
- Mesh
- Ripstop
- Handle
- Vent

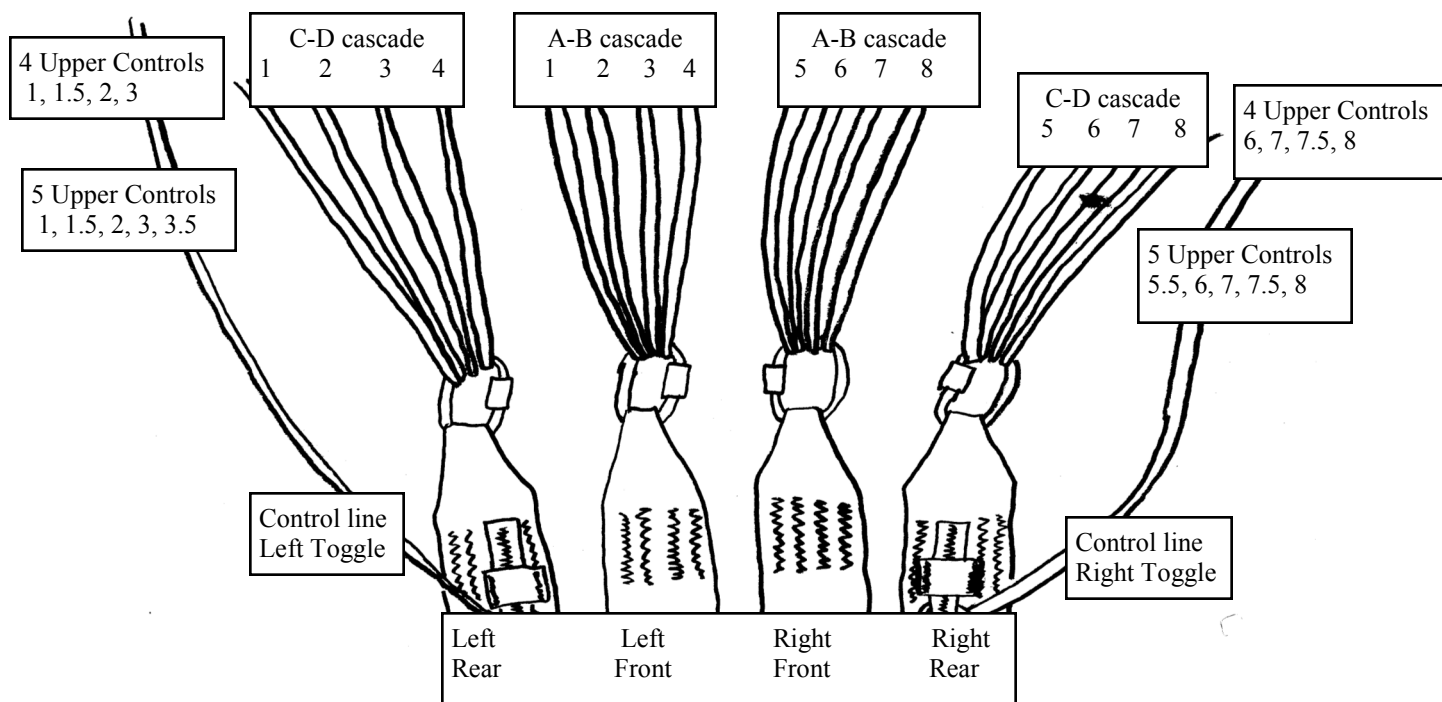
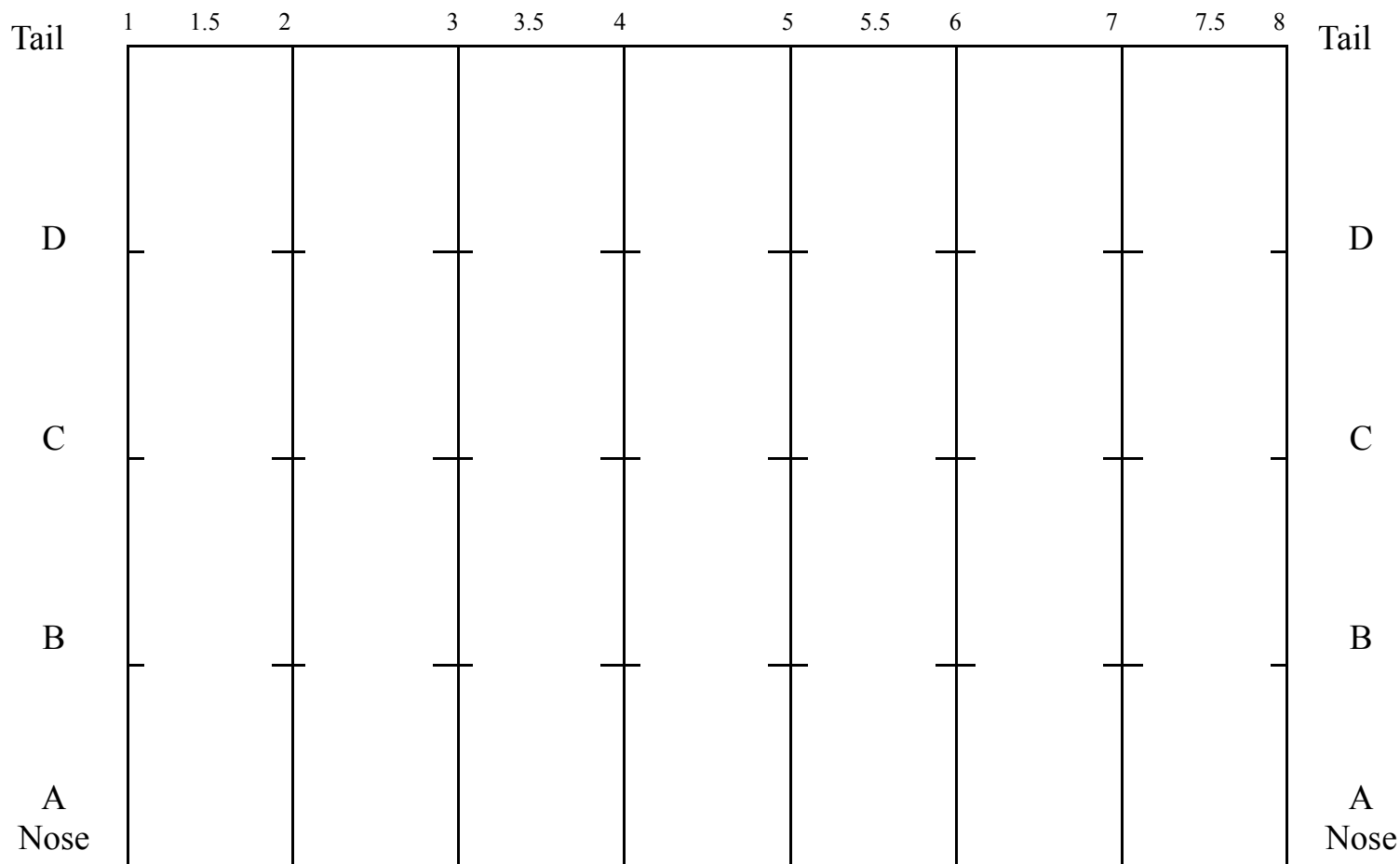
# Specifications

	FOX								FLiK								
	185	205	225	245	265	285	315		200	220	242	254	266	280	293	308	322
Chord	118	124	128.5	134	140	145	152		117.5	123	129	132.1	135.25	138.7	142	145.4	148.75
Span	231	244	252	263	276	285	298		245	257	269	275.75	282.5	289.5	296.5	303.75	311
Aspect Ratio	1.95	1.97	1.96	1.96	1.97	1.96	1.96		2.08	2.08	2.08	2.08	2.08	2.08	2.08	2.08	2.08
Square Footage	189	210	225	245	268	286	315		200	220	242	254	266	280	293	308	322
Weight (lb.)	7	7.75	8.5	9.25	10	10.75	12		7.5	8.25	9	9.4	9.75	10.25	10.75	11	12
Recommended Suspended Weight at Sea Level	125	140	157	175	193	212	236		136	154	172	183	194	205	217	229	241
Trim (inches)																	
A – B	2.75	3	3	3.25	3.25	3.5	3.75		3	3	3.25	3.25	3.5	3.5	3.5	3.7	3.75
A – C	9.75	10.25	10.25	10.75	11.25	11.5	11.75		9	9.5	10	10.25	10.5	10.75	11	11.3	11.5
A – D	19.75	20.75	21.5	22.5	23.25	24.25	25.75		19.75	20.75	21.75	22.5	23	23.5	24	24.6	25.25
A – Br 1	14.25	15.5	16.5	16.75	17.5	18.25	20		15.5	16.25	17	17.5	18	18.3	18.75	19.25	19.75
A – Br 2	10.5	12.25	12.25	12.5	13	13.75	15		12.25	13	13.5	14	14.25	14.6	14.38	15.3	15.75
A – UCI									20	21	22	23.5	23.25	24.7	24.25	25.9	25.5
Base Line	120.25	126.5	132	137.5	142.75	148.5	157.75		122	128	134	137.25	140.5	144.1	147.5	151	154.5
Slider	PN 1724	PN 1724	PN 2024	PN 2024	PN 2328	PN 2328	PN 2328		PN 1724	PN 2024	PN 2024	PN 2024	PN 2328	PN 2328	PN 2328	PN 2328	PN 2328
Multi Lines																	
Red	38	36.5	40	42.25	45.25	48.75			42	42	45	45	45	49	49	49	49
White	36	36.5	37.75	39.75	41.25	42.5			36	36	40	40	40	44	44	44	44

FLiK		182		200		220		242		266		293		322		354
FOX		185		205		225		245		265		285		315		
Rock Dragon		177		199		222		244		266		288		313		
Apex DP	H2O-19															
	DPW			DP 2		DP 3		DP 4		DP 6		DP 7		DP 8		DP 9
	Apex DP firm	DPW				DP 2		DP 3		DP 5		DP 6		DP 7		DP 8
Apex TL								TL5		TL6		TL7				
			UltraLite	UltraLite	UltraLite	UltraLite	UltraLite	UltraLite	UltraLite	UltraLite	UltraLite	UltraLite	UltraLite	UltraLite	UltraLite	UltraLite
Apex TLs						TLs2		TLs3		TLs4		TLs5				

# Line / Riser Continuity as viewed from bottom surface of canopy.

Stabilizers are on #1 and #8 – Area between #4 and #5 is the center cell – A lines are the shortest



# Glossary

- AGL – Above Ground Level – Refers to altitude above the ground.
- Apex DP - Dual pin, single container system.
- Apex TL - Dual pin, single container system with Through Loops. Requires Pass Through Channels on the canopy
- Apex TLs - Dual pin, single container system with Through Loops. The “s” denotes small container volume.  
Requires Pass Through Channels on the canopy
- Bartacks – Type of sewing machine stitch. It is most noticeable for its zigzag pattern. Generally used to reinforce other stitching. Commonly found on lines, canopy and container.
- BASE- (aka BASE jump, Fixed Object jump)- A parachute jump that begins with an exit from a stationary point or a moving apparatus that is not defend as an aircraft.
- Cascade lines – A suspension line that joins another line between the canopy and the connector link. This results in a single line at the link and two attachment points at the canopy.
- Center cell strip (CCS) – The act of the center cell being lifted more rapidly than the remaining canopy during deployment. CCS can create out of sequence, or asymmetrical openings. CCS can be compounded by oversized pilot chutes for a given airspeed.
- CFM – The typical fabric used today comes in two types of permeability 0-3 cfm and ZP. Most BASE canopies use 0-3, meaning that the fabric will allow between zero and three cubic feet of air to pass through a square foot of cloth in one minute under 1/2 an inch of water pressure. This number is when the fabric is new from the fabric manufacturer and will increase with use and handling. 0-3 is commonly referred to as F-111. ZP has zero permeability (porosity) when new and will maintain zero much longer.
- Control lines – The lines between the trailing edge of the canopy and the toggle, also known as steering lines and brake lines. Control lines are divided into 4 parts – left and right, upper and lower. The lowers are a single piece with brake settings and toggle loops. The uppers consist of 4 or 5 lines that terminate at the canopy.
- Continuity – The relationship of lines to canopy. Canopy continuity also includes the risers. Multi continuity would include the lines between the bridle and the canopy. See Line/Riser continuity in Part D.
- Cross-port – Holes cut into the rib sections of the canopy to balance the air pressure within the cells across the full span. Cross-ports are not cut into the outboard rib on either end.
- Dagger—Seven cell, low aspect ratio, BASE specific parachute. Manufactured by Precision Aerodynamics.
- FLiK - Seven cell, low aspect ratio, BASE specific parachute. Manufactured by Apex BASE.
- Four Line Check – A simplified check of continuity in which one line from each riser is used. Typically, the outboard line (#1 and 8) on the link is used which will coincide with the outboard (end cell) on the canopy. Repeat using left and right, front and rear risers. A four line check will not confirm control line continuity. A four line check must only be used after good “assembly” continuity has been confirmed.
- FOX – Fixed Object Xpress, Seven cell, low aspect ratio, BASE specific parachute. Manufactured by Apex BASE.
- Guide Ring – A small ring located on the rear of the rear riser. It must be 4 inches from the top edge of the riser. The control lines must pass through the guide ring on slider up packing. And the control lines must run free of the guide ring for no slider jumps.
- L-Bar Riser – A riser that is connected to the harness with an L-Bar connector. Requires a flat head screw driver to assemble and disassemble. The L-Bar has no cutaway capability and is used in place of the 3-ring.
- Leading Edge– The front edge of an airfoil. In this manual it refers to front edge of the canopy. Same as “nose” of the canopy.
- Line Mod – The Line Mod is an equipment set up that removes the control lines from any restrictive keeper (guide ring and slider grommets) and allows the jumper to release the control line in the event of a line over malfunction. To be used on no slider jumps only. The Line Mod also requires an emergency procedure.
- Line Over – A malfunction where a control line crosses the top surface, pinching the canopy. A line over will typically create a turning or spinning condition.
- Load Bearing Seam – The seam that carries the line attachment tabs for the suspension lines. May be part of a load bearing rib.
- Lumbar – A section of harness webbing between the container and the main lift web. It is found near the hip

when the rig is donned.

**Main Lift Web** – The section of webbing that runs vertically on the body. As the name implies it is the main load bearing member of the harness. It usually has the 3-ring or L-bar near the top, with the chest strap below it, and makes contact with the lumbar near the bottom. On some harness styles the MLW continues around to become the leg strap.

**Mesh** – Nylon fabric designed to allow air to pass through it. Two types in common use large hole (most BASE pilot chutes) and small hole (marquisette) mesh for high airspeed pilot chutes and Vtec.

**MSL** – Mean Sea Level – Refers to altitude above average (mean) sea level.

**Multi** – Multiple bridle attachment.

**Non detachable Riser** – This riser is an integral part of the harness. It has no cutaway capability and would require harness rebuilding to replace if damaged.

**Non Load Bearing Seams** – A seam without a line attachment tab. May be part of a non-load bearing rib.

**No slider** – Deployment taking place without the aid of a slider. Other terms commonly used are slider down, slider off or slider removed.

**Permeability** – The mass rate of flow or the volume rate of flow per unit projected area of cloth for a prescribed pressure differential. Not to be confused with porosity.

**PLF**– Parachute Landing Fall- A method in which a landing jumper can distribute the landing force over several parts of the body hopefully avoiding serious injury. Very helpful to master when considering the rough terrain of most fixed object jumps.

**POD** – A deployment device. A cross between a sleeve and a bag. Used for high airspeed deployments.

**Porosity** – The ratio of void or interstitial area to total area of a cloth expressed in percent. The ratio of open space to covered area of a drag surface. Not to be confused with permeability.

**Prism** – Single pin, single container system.

**Reactor** – Single container, Velcro closed harness container system.

**Reefing**– A device or technique used to slow, control, or sequence the opening of a parachute.

**Rib** – The section of fabric installed between the top and bottom surface of the canopy and used to establish the airfoil shape of the canopy. The FLiK and FOX both have load and non load bearing ribs.

**Ripstop** – Parachute fabric with a small block pattern. The typical fabric used today comes in two types of permeability 0-3 cfm and ZP.

**Rock Dragon**—Seven cell, low aspect ratio, BASE specific parachute. Manufactured by Precision Aerodynamics.

**Skydive**– A parachute jump that begins with an exit from an aircraft.

**Tail Gate** – A reefing device aimed at reducing line-overs, invented by Basic Research, used on no slider jumps.

**Terminal Velocity** – Reached after approximately 12 seconds of free fall and approximately 120 mph or 191 kmph.

**Trailing Edge** – The back edge of an airfoil. In this manual it refers to back edge of the canopy. Same as “tail” of the canopy.

**Trim** – The difference in the length of the line groups A, B, C, D. The A’s are the shortest, the D’s are the longest and the angle they create produces the canopies “angle of attack.”

**Type 2A line** – Nylon line with a tensile strength of 100 pounds. Used as closing loop material. Identified as coreless braided white material with a diagonally dotted color stripe, usually black, green or brown.

**Tail Pocket** – The device used to contain the lines, when the canopy is free packed. Not to be used with a bag type device. Located at the canopy’s trailing edge, top surface center cell.

**Upper Control (Lines)** - The part of the Control Lines that is attached above the single Lower Control lines. The Upper Control lines consist of left and right and are mirror images of each other. Upper control lines may have 4 or 5 lines on each side. The five line set up will have the inboard (UCI) line longer than the remaining four

**Vertex** – Dual pin, single container system.

**Vtec** – Vent technology. Used on FLiK, FOX and Rock Dragon Vtec canopies. Bottom surface vents used to provide quicker pressurization for the ram air parachute.

**Vtec Cover** - Fabric covers used to close off the Vtec opening. The covers will open during inflation and close during flight.

**WLO**– What Line Over? Toggles with a release system designed for slider up. The WLO provides the ability to clear a slider-up line over.

# **Care and Equipment Checks**

## **Care of the parachute equipment**

Parachute equipment is life saving equipment and should be treated and cared for as such. Never store a parachute wet or even damp, keep it dry. Keep the parachute equipment out of the direct sun light. The ultra violet light from the sun will damage and weaken the parachute equipment. Store parachute equipment in a dry location. It is best to have the parachute packed during any storage. If the parachute can not be packed for storage then a good field pack (rigger roll) is desirable. It is bad practice to store the parachute equipment in a “stuffed” configuration. **Never keep equipment in a manner that appears to be ready to jump when it is not.**

## **Maintenance**

Each section has a maintenance area (.5) which will help with specifics of the item. All equipment must be inspected thoroughly and must be kept in airworthy condition. It is recommended to return equipment to Apex BASE Perris for any repairs. When a return is not possible or practical use only parachute industry standard methods for any repair. Use only qualified repair personnel for any repair. Use only approved material for any repair. Contact Apex BASE Perris for any assistance with methods, personnel or materials.

## **Modifications**

Do not make and/or do not allow anyone to make modifications or “improvements” to this equipment. We recommend returning any equipment for repairs or service to Apex BASE Perris.

Any equipment that has been returned to Apex BASE with an unapproved modification or unairworthy repair will be deemed unairworthy. If the equipment can be returned to an airworthy state, the cost associated with such would be the owners responsibility.

## **Equipment Check**

An equipment check is a smart and logical procedure that must take place before any jump. To be completed properly it would require a second (knowledgeable) person to check the container or back of the jumper. If a second person is not available the jumper must check the back of the system before donning the equipment. The equipment check should follow a logical order like top to bottom, front to back.

Starting at the front:

- Make sure 3 –ring system is assembled properly. The white loop must pass through 1 ring and 2 grommets and then locked off with yellow cable.
- Check chest strap for proper threading, and excess stowed.
- Check the cutaway handle is securely in place.
- Ensure the Main Lift Webs are not twisted. A twist in the MLW would also put a twist in the lumbar.
- Check the leg straps to be sure they are threaded correctly, snug and that the free ends are stowed.

To the back: Pin closed containers

- Open the pin protector flap, ensure good pin setting usually about 3/4 of the pin(s) through the closing loop.
- Apex DP – Check to see Velcro mated on bridle. Prism – Check to see sufficient slack above pin.
- Check to see if the pin will slide with minimal force, it must move freely.
- Check bridle routing. The bridle must go directly into the BOC, close pin protector flap. Or, directly to the hand without passing around or through anything else. When hand held leave pin protector flap open.
- Check clothing and protective gear – must not interfere with pilot chute and/or bridle.

Additional check points

- Helmet fastened and secure
- Knee and elbow pads on and secure. Right elbow pad clear from bridle interference.
- Boots secure and hook free or hooks covered
- Any additional equipment stowed and secure.

### **The Jump**

A jumper may be faced with any number of emergencies and/or malfunctions. Make sure to understand and rehearse emergency procedures before each and every jump. Emergencies may include but are not limited to line overs, off heading openings, object strikes, unstable exits, and many more. An emergency and/or malfunction can be life threatening and can cause death. **Make sure to receive direct and qualified instruction before attempting any parachuting or BASE jumping activities.**

### **Instruction**

Apex BASE is proud to be a moving force in the BASE industry. Throughout the years we have designed BASE specific equipment which has been used world wide. We have also developed and refined a method of instruction for BASE. This instruction (like the equipment) is BASE specific. The techniques and emergency procedures are designed for BASE and we keep them current with this fast paced sport. We encourage you to get qualified instruction before you begin BASE jumping. We would be happy to discuss our First BASE Jump Course– FBJC with you. For more information about any BASE specific training contact Apex BASE.

### **Final**

Apex BASE strives to supply the highest quality equipment and service. If we can be of any further assistance please feel free to contact us. Apex BASE hopes that you enjoy your equipment.

### **Credits**

Cover photo	Jimmy Pouchert
Part A, B photo	Chris Bazil
Part C photo	Will Kitto
Part D photo	Luiz Sabia
Design and format	Todd Shoebotham
Text, Illustrations	Todd Shoebotham