

# *Butler Personnel Parachute Systems*

# **Butler Personnel Canopies**

# **Assembly and Packing Instructions**

*HX Series Canopies*  
and  
*Lopo Series Canopies*

Document Number: 50-1011

Revision G

December 20, 2024



Butler Personnel Parachutes  
P.O. Box 6098  
1820 Loudon Avenue, NW  
Roanoke, VA 24017-0098



[www.butlerparachutes.com](http://www.butlerparachutes.com)  
Phone: 540-342-2501  
FAX: 540-342-4037  
[info@butlerparachutes.com](mailto:info@butlerparachutes.com)

<b>Title</b>	<b>Butler Personnel Canopies, Assembly and Packing</b>
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Issue	Description	Date	Approving Authority
0.1	Baseline Document	3/27/09	XX
1.0	Initial Release	2/12/10	Roberto Montañez
2.0	Revision A	2/12/10	Roberto Montañez
3.0	Revision B	10/15/13	Roberto Montañez
4.0	Revision C	11/4/15	Roberto Montañez
5.0	Revision D	2/1/18	Roberto Montañez
6.0	Revision E	2/20/19	Roberto Montañez
7.0	Revision F	7/9/23	Roberto Montañez
8.0	Revision G	12/20/24	Roberto Montañez

### List of Effective Changes

The portion of the text affected by the changes to the preceding released document are indicated by a black vertical bar in the left outer margins of the page.

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25 .....	Appendix A

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Since we have no control over the actual conditions of usage we make no guarantee, expressed or implied, that a parachute system will successfully save a particular individual regardless of correct manufacture, assembly, packing and usage in any and all conditions under which it might be used.

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## **Warranty for Emergency Parachute Systems**

Butler Personnel Parachute Systems, Inc. (hereafter referred to as BPS) manufactures the finest emergency parachute systems in the world. Accordingly, subject to the Terms & Conditions set forth below, we warrant that our emergency parachute systems are free from defects in materials, workmanship and design for a period of five years from the date of manufacture.

### **Terms & Conditions of Warranty**

This warranty excludes any condition that (in the sole opinion of BPS) has resulted from misuse, abuse, modification, improper maintenance, neglect, exposure to ultraviolet light, damage from aircraft parts and/or any other condition that is outside the realm of normal usage. Usage of this product in a manner that violates state or federal law is a misuse of the product and voids all warranties, express or implied. BPS shall not be liable in any manner whatsoever for damages related to the use of this product in an illegal manner.

This warranty excludes any condition related to color fastness, fading and/or the matching of any particular lot of materials with any color.

All BPS products have been thoroughly tested and found to be in conformance with all applicable FAA requirements for TSO C-23 certification in effect on the date of authorization. However, since we have no control over the actual conditions of usage, this warranty specifically excludes any guarantee, express or implied, that a parachute system will successfully save a particular individual in all conditions under which it might be used.

This warranty covers the product only when it is used in accordance with the manufacturer's instructions and within the stated and/or placarded operating limits regarding maximum pack opening airspeed and maximum gross weight for the lowest rated component of each assembly. Failure to follow these guidelines for the use of the product voids any and all warranties.

This warranty does include any changes that may be required under BPS Service Bulletins or FAA Airworthiness Directives, if issued. It does not include changes or updates that are recommended but not required.

The warranties and agreements herein set forth are exclusive and are expressly in lieu of all other warranties and agreements, express, implied, or statutory. There are no implied warranties of merchantability, workmanship or fitness for a particular purpose.

The customer's sole and exclusive remedy for any breach of this warranty is limited to repair or replacement of any BPS product deemed to be defective. BPS shall have no other liability for any incidental, consequential or punitive damages.

## 1. Introduction

The following symbols are used throughout this manual:



**Warnings** indicate a procedure or situation that may result in serious injury or death if instructions are not followed correctly.



**Cautions** indicate any situation or technique that will result in potential damage to the product, or render the product unsafe if instructions are not followed correctly.



**Notes** are used to emphasize important points, tips, and reminders.



Butler Parachute Systems, Inc. reserves the right to revise this publication without obligation to provide notification of such changes. Butler Parachute Systems, Inc. does its best to provide current and accurate information in this manual. However, Butler Parachute Systems, Inc. reserves the right to change any specifications and product configurations at its discretion without prior notice and without obligation to include such changes in this manual.

These instructions do not constitute complete instructions for assembling and packing a Butler Emergency Parachute. This manual outlines only the procedures for assembling, flaking and folding a Butler Personnel Emergency Parachute canopy. You must also have the appropriate manual for the container you are servicing and the manual titled *General Information for Parachute Riggers Servicing BPS Personnel Parachute Systems*. You may need additional manuals to pack the parachute if it has options that require maintenance and service not covered in the manuals listed above. The most current revision of our manuals can be found on our [website resource](#) page. Please contact Butler Parachute Systems if you are not sure you have the manuals you need.

The Butler Emergency Parachute is an important piece of survival equipment. Proper installation, maintenance and packing are necessary for the parachute to deliver the safety performance it is designed to provide. It is important that you become familiar with these instructions to properly install the components and fold the canopy. Improper installation of the components and improper folding of the canopy may result in failure of the parachute system during use.



Improper use or negligent care of this equipment can cause serious injury or death.

## 2. Service Life and Repack Interval

All personnel parachutes manufactured by Butler Parachute Systems, Inc. are manufactured and certified under the Technical Standard Order (C23) process of the Department of Transportation, Federal Aviation Administration (FAA). Our products have been sold all over the world, and thus may fall under many other sets of operating regulations. The following guidance is provided to determine the allowable service life and repack interval under the specific circumstances listed:

The following information is provided as guidance only.

- When used in civil aircraft **in the United States of America**, our products have a recommended service life of 20 years from the date it is placed in service or 25 years from the date of manufacture. However, this parachute must be inspected and repacked in accordance with the applicable Federal Aviation Regulations, every 180 days. If more than 180 days has passed since the last inspection and repack, then the parachute is considered unairworthy until such inspection is completed.
- When used in civil aircraft **outside the United States of America**, our products have a recommended service life of 20 years from the date it is placed in service or 25 years from the date of manufacture. The local regulations pertaining to parachute inspection and repacking (if any) may be applied, but in no case longer than two years between inspection and repack.

If the parachute equipment is subjected to any unusual or severe conditions such as dust, moisture, impact damage, etc., it should be serviced on a more frequent basis. Please review all information in the User Guide and service manuals before extending your repack cycle.

### 3. Rigger Responsibilities and Rating Limitations

We spare no effort in making our equipment the finest emergency parachutes available. However, parachute riggers in the field must also do their part to educate the user so he or she may fully benefit from the level of safety protection our systems offer. Parachute riggers should help the user understand his or her parachute and how to use it. We recommend that you become familiar with the User's Guide and answer any questions the user may have. We also recommend that you allow the user to don the parachute and pull the ripcord before each repack.

All routine maintenance and minor repairs that do not affect airworthiness may be performed by an FAA licensed Senior Parachute Rigger (or foreign equivalent) with the proper facilities and equipment.



Major repairs or alterations that may affect airworthiness must be returned to Butler Parachutes or a designated representative.

### 4. General Methods

Unless stated otherwise, secure all hand tacks and ties with a surgeons knot and locking knot.

All bartacks called for in this manual are 48-stitch type.

All directional references are as the equipment is worn by the user.

A canopy cloth pull test is recommended once every two years. A canopy cloth pull test is required at the ten and fifteen year anniversary of the date of manufacture. Follow the procedures outlined in PIA Technical Standard 108-1.

Always count your tools before and after you work on a parachute to ensure nothing is missing or left inside the parachute.

Butler Parachute Systems recommends that the four locking rubber bands on the diaper or deployment bag be replaced at every repack cycle.

## 5. Tools and Materials

We consider the following tools to be the minimum tools necessary to pack a complete emergency parachute system. While all the tools listed may not be necessary to perform the steps outlined in this manual, they are necessary to perform the packing service of a complete emergency parachute system from start to finish.

•	Temporary pins* with safety flag
•	Pull-up cords*, 50", made from CYPRES closing loop material
•	Packing weights, 4 minimum
•	Line separator (Optional)
•	Packing paddle
•	9mm or 3/8" wrench
•	Scissors & tacking needle
•	Lite Super Tack** cord (50 lb.) A-A-52080, Type 1, Size 3, Finish B
•	80-pound break tape (MIL-T-5661, Type 1, 1/4")
•	Closing loop material* (225 pound braided Dacron cord)
•	Stow Band, Rubber Band***, 1 1/4" X 3/8", <a href="#">Paragear PN: S7111</a>
•	Lead seal and thread

\* If the system you are packing has a CYPRES AAD installed, you must use closing loops made with CYPRES approved material (408 pound, 1.7 mm Spectra cord), CYPRES pull-up cords, and CYPRES closing pins.

\*\* Super Tack size 2 (80 lb.) is approved for use as an alternative.

\*\*\* Tube Stows for micro line, PN: Microbulk-nat, are approved for use as an alternative.

Required for initial assembly of an HX-series high speed canopy.

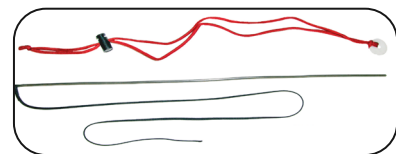
- Cable bodkin, PN: 801157 (or gun cleaning rod)
- Mil-T-5038, T3, 1/2" x 10"
- 3-cord cotton (15 lb.), ticket 8/4, A-A-52094B, Type V, Tex 270



Cable Bodkin

Additional tools required for packing a system with a deployment bag.

- 18" bodkin with 40" pull-up cord attached
- Locking pull-up cords with washer

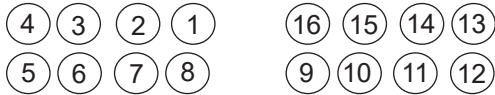




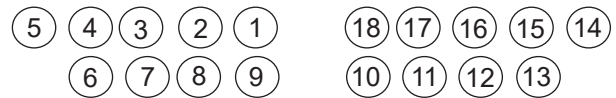
## 6. Common Assembly

### Line Continuity

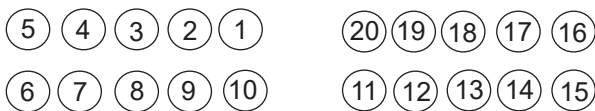
#### Lopo 350 & HX-300



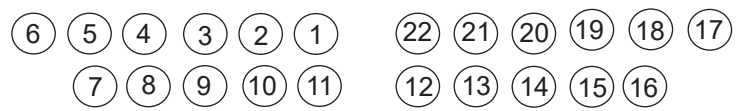
#### Lopo 450 & HX-400



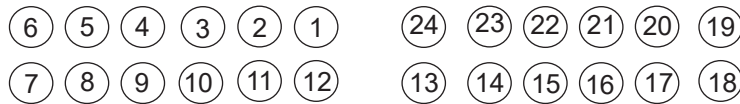
#### Lopo 550 & HX-500



#### HX-600



#### HX-500/24



Perform a continuity and four-line check on the canopy and connect the links to a tension board with the back line groups on the inside and the front line groups on the outside.

### 6.1

Tack\* the riser below the link.

Figure-eight a piece of tack cord\* through each group of the suspension line loops at the link and tie the lines together.

\* One-turn-single of Lite Super Tack (50 lb..) cord.



Do not tie any lines together from different riser groups.

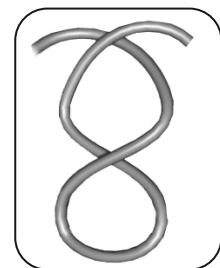


Figure-eight knot

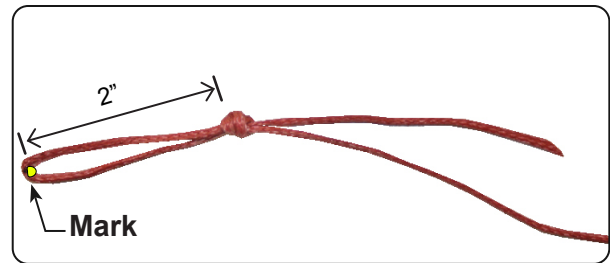


6.1 Tacking the risers.

6.2

The steering line is marked for the toggle location. Installing the toggle with the mark at the toggle grommet provides 2" of slack in the steering line\*.

Tie an overhand knot to make a 2" loop with the mark at the end of the loop.



6.2 Installing the steering line toggle.



\* It is the responsibility of the rigger installing the steering line to ensure there is enough slack in the steering line to prevent tension on the steering line when the canopy is inflated.

6.3

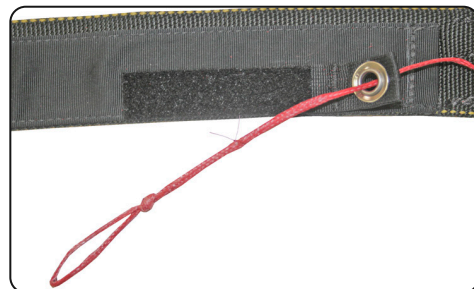
Finger trap and tack the excess steering line no longer than 1/4" below the knot with 24/4 cotton thread.



6.3 Installing the steering line toggle.

6.4

Thread the steering line through the steering line guide on the riser.



6.4 Threading the steering line guide.

6.5

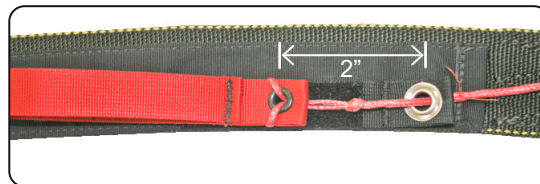
Thread the steering line through the toggle grommet from the back and form a Lark's Head knot.



6.5 Installing the steering line toggle.

6.6

Pull the toggle down so there is no slack in the steering line to ensure there is a minimum "  $\pm 1/2$ " of slack in the steering line.

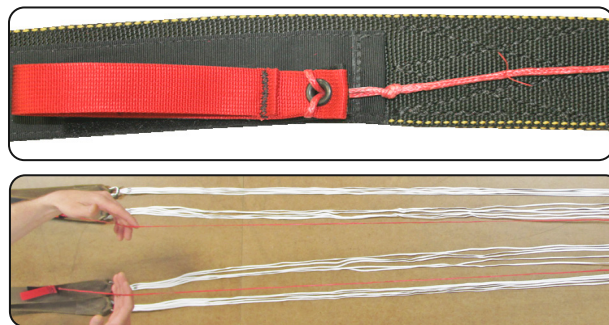


6.6 Inspecting the steering line slack.

6.7

Mate the toggle to the Velcro so the grommet on the toggle is on top of the grommet on the steering line guide.

Pickup the steering lines and ensure they run free-and-clear from the toggle to the cascade where it enters the suspension line.

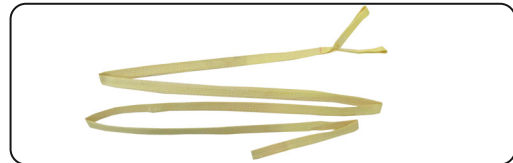


6.7 Setting the toggle.

## 7. HX-series Assembly



Channel Bridle - PN: 701094



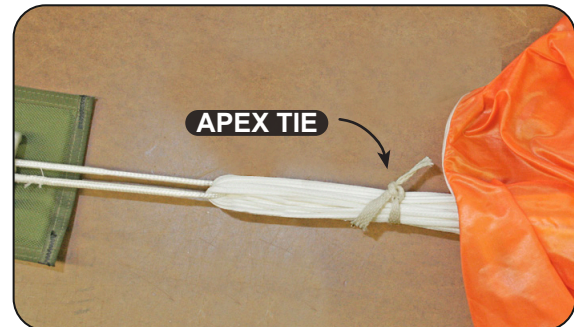
Zip-strip Bridle - PN: 701097

### 7.1


Straighten the canopy apex.

Tie the vent lines with a piece of break tape\* four-to-six inches from the top.

\* 80 lb.. Break Tape (Mil-T-5661), Type 1, 1/4"



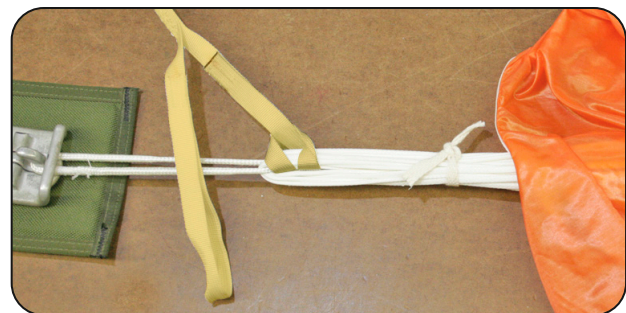
7.1 Apex tie.

 Make this tie as tight as possible.

### 7.2

The zip-strip bridle splits at one end with two looped ends.

Attach the zip-strip bridle to the apex with a Lark's Head knot.



7.2 Installing the zip-strip to the apex.



If you are packing a system that has a deployment bag, use the instructions outlined in the manual titled *Deployment Bag Assembly and Packing Instructions* to install the bridle and zip-strip.

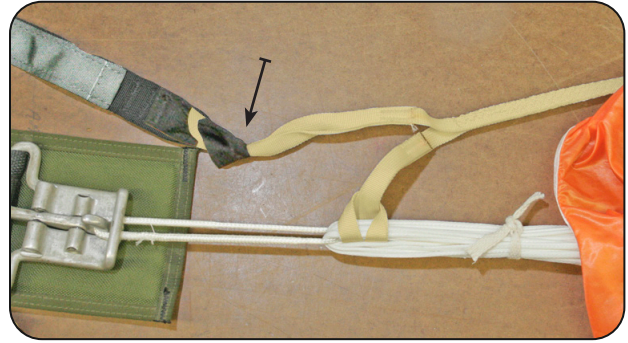
7.3

Attach the channel bridle to the zip-strip bridle with a Lark's Head knot.

Do not tighten the knot as you must pass the break loop through the knot.



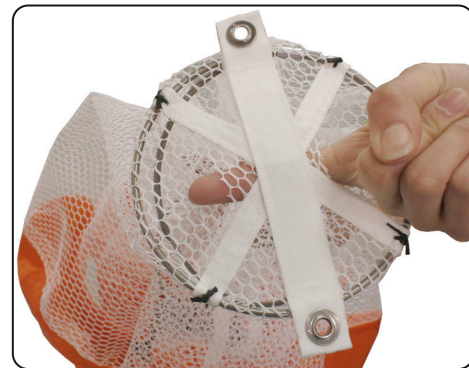
Do not tighten the Lark's Head knot.



7.3 Attaching the pilot chute bridle to the zip-strip.

7.4

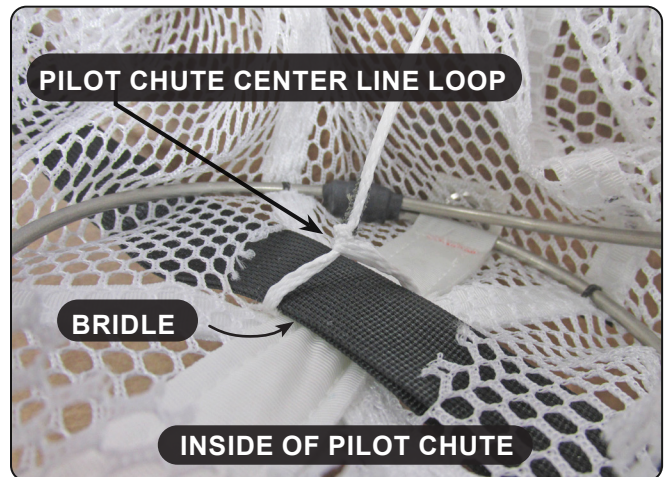
Cut two 1" slits in the mesh at the base of the pilot chute. Cut one slit on each side of the grommet tab.



7.4 Cutting the pilot chute mesh.

7.5

Thread the free end of the channel bridle around the bottom grommet strap on the pilot chute, and through the pilot chute center line loop.



7.5 Threading the channel bridle.

7.6

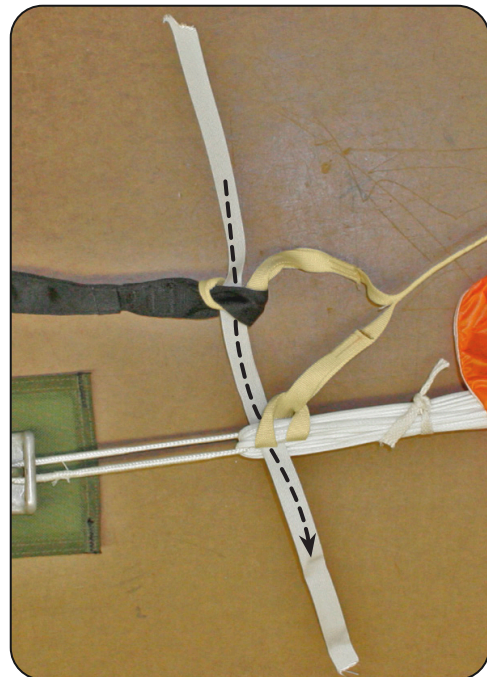
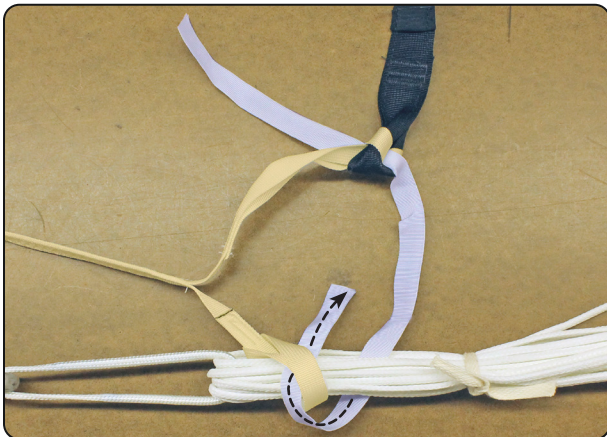
Pass the pilot chute through the loop on the channel bridle to form a Lark's Head knot.



Thread the break loop material through the Lark's Head knot on the channel bridle, then through the apex lines and the zip



7.6 Installing the pilot chute.



7.7 Threading the break loop.

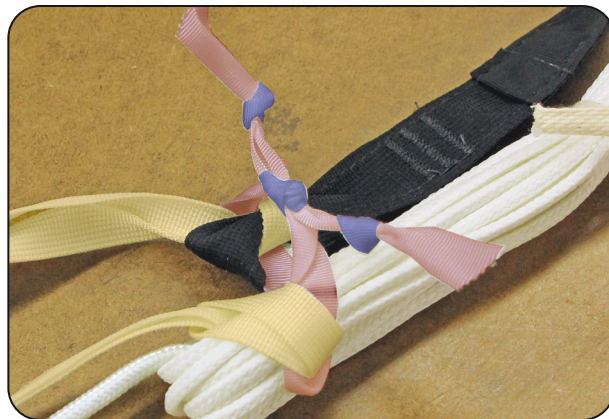
### 7.8

Form a 2"<sup>\*</sup> loop with the tape and tie with a square knot. Tie an overhand knot on each leg.

Tie an overhand knot on each free end of the tape.

Tighten the Lark's Head knot on the bridle.

<sup>\*</sup> Measured distance when extended.



7.8 Tying the break loop.

### 7.9

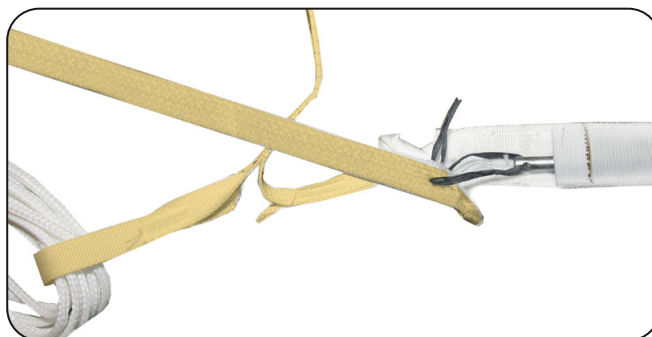
Insert the 6' bodkin through the channel on the pilot chute bridle.

Thread a piece of tack cord through the hole in the bodkin and through the tip of the zip-strip.

Pull the zip-strip through the channel.



Be sure the zip-strip is flat and has no twists in it before you begin to thread it through the channel.



7.9 Stowing the zip-strip.

7.10

Close the vent cap.

Tie the 4 center tie-tabs together with one-turn-doubled, 3-cord (8/4) cotton thread.



7.10 Tying the center tie-tabs.

7.11

Tie the 4 top tie-tabs together with one-turn-doubled, 3-cord (8/4) cotton thread.



7.11 Tying the top tie-tabs.



## 8. Lopo Series Assembly



If you are packing a system that has a deployment bag, use the instructions outlined in the manual titled *Deployment Bag Assembly and Packing Instructions* to install the bridle and zip-strip.



Pilot Chute Bridle - PN: 701062

### 8.1

Tie the vent lines following the steps in “7.1” on page 12.

Install the bridle on the apex lines using a Lark’s Head knot. Do not tighten the knot. Tack the knot so the bridle can float freely on the apex lines.



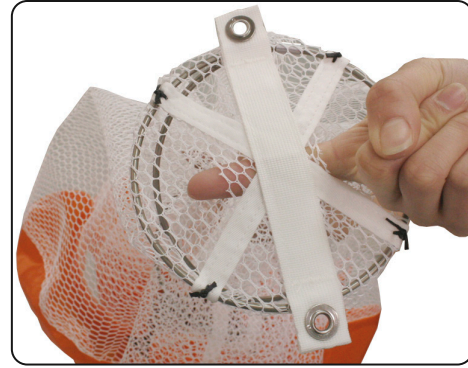
Do not tighten the Lark’s Head knot.



8.1 Bridle installation onto the apex.

8.2

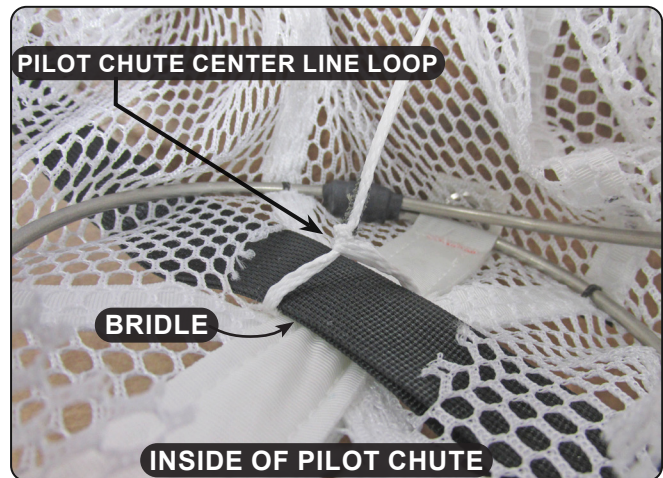
Cut two 1" slits in the mesh at the base of the pilot chute. Cut one slit on each side of the grommet tab.



8.2 Cutting the pilot chute mesh.

8.3

Thread the free end of the bridle around the bottom grommet strap on the pilot chute, and through the pilot chute center line loop.



8.3 Threading the bridle.

8.4

Pass the pilot chute through the loop on the channel bridle to form a Lark's Head knot.



8.4 Installing the pilot chute.

## 9. Folding the Canopy

Place the parachute face-down on the table and apply tension. Thoroughly inspect the entire parachute system for damage or wear.



### WARNING

If you find damage or wear on the parachute system, you must stop. Do not proceed with packing the parachute. Damage or wear that will effect the airworthiness of the parachute must be repaired or replaced before you pack the parachute.

it is the rigger's responsibility to determine the airworthiness of the parachute system. contact Butler Parachutes if you have questions regarding the airworthiness of the parachute system.

Loosen the Rapide links\* and retighten them hand-tight, plus one quarter turn with a wrench.

\* Genuine french maillon rapide links are the only connector links approved for installation on Butler products.

### 9.1

Position the slider approximately halfway between the canopy skirt and the risers. Check the continuity of the suspension lines and slider installation.



Be sure the suspension lines run free and clear through their respective slider grommet in the same order that the suspension line is installed on the connector link.

### 9.2

Flake the canopy with an equal number of gores on each side.



9.2 Flaking the canopy.

9.3

Ensure that the slider is clear of the suspension lines and centered between the two line groups.

Pull the slider up the suspension lines and place it in the canopy wind channel under the top gore of the canopy.



9.4

Dress the skirt of the slider.

Wrap a small packing weight around the suspension lines to maintain neatness.

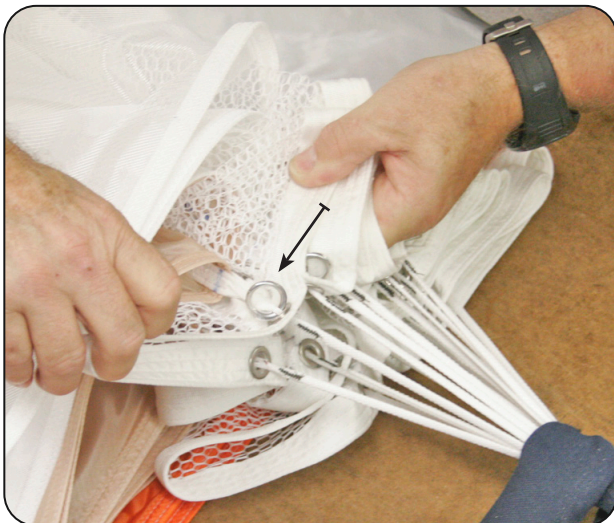
Pull each section of the skirt out from between the suspension lines. While you are dressing the skirt, ensure that each slider grommet is seated against the stop ring\*.

Stack the slider skirt in two groups with an equal number of skirt sections on each side of the suspension lines.



\* The lopo series does not have a stop ring. Seat the grommet against the canopy skirt.

9.3 Stowing the slider.



9.4 Dressing the slider skirt.



If you are packing a parachute equipped with a deployment bag, refer to the manual titled *Deployment Bag Packing Instructions* for further instruction.

## 10. Stowing the Suspension Lines

### 10.1

Dress the skirt of the canopy and fold it up and against the radial seam.



10.1 Dressing the canopy skirt.

### 10.2

Fold the canopy into fifths.



After the canopy is stowed in the diaper, you may adjust the width of the folds while packing it in the container for neatness and canopy distribution.



10.2 Folding the canopy.

### 10.3


Release the tension and pull the lines up and on top of the canopy past the diaper.



10.3 Wrapping the diaper.

### 10.4

Close the top locking stow with a loop of suspension line so it is facing away from the stow bands.

 Make the suspension line stow loops between 1" and 1 1/2" long.



10.4 Closing the first locking stow.

### 10.5

Close the second locking stow following the procedure in 10.4.

Fold the slider skirt so it will be inside the diaper after all the locking stows are closed.



10.5 Dressing the slider skirt.

10.6

Close the last locking stow following the procedure in 10 .4.

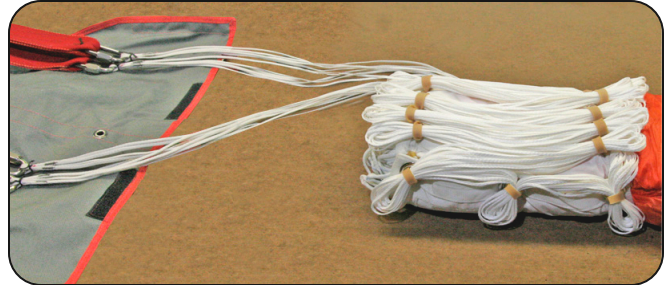


10.6 Closing the remaining locking stows.

10.7

Stow the remaining suspension lines starting with the stow band closest to the first locking stow.

Leave approximately 20" of line unstowed.



10.7 Stowing the suspension lines.

For further instruction regarding packing the canopy into a container, refer to the appropriate instructions for the container you are packing.

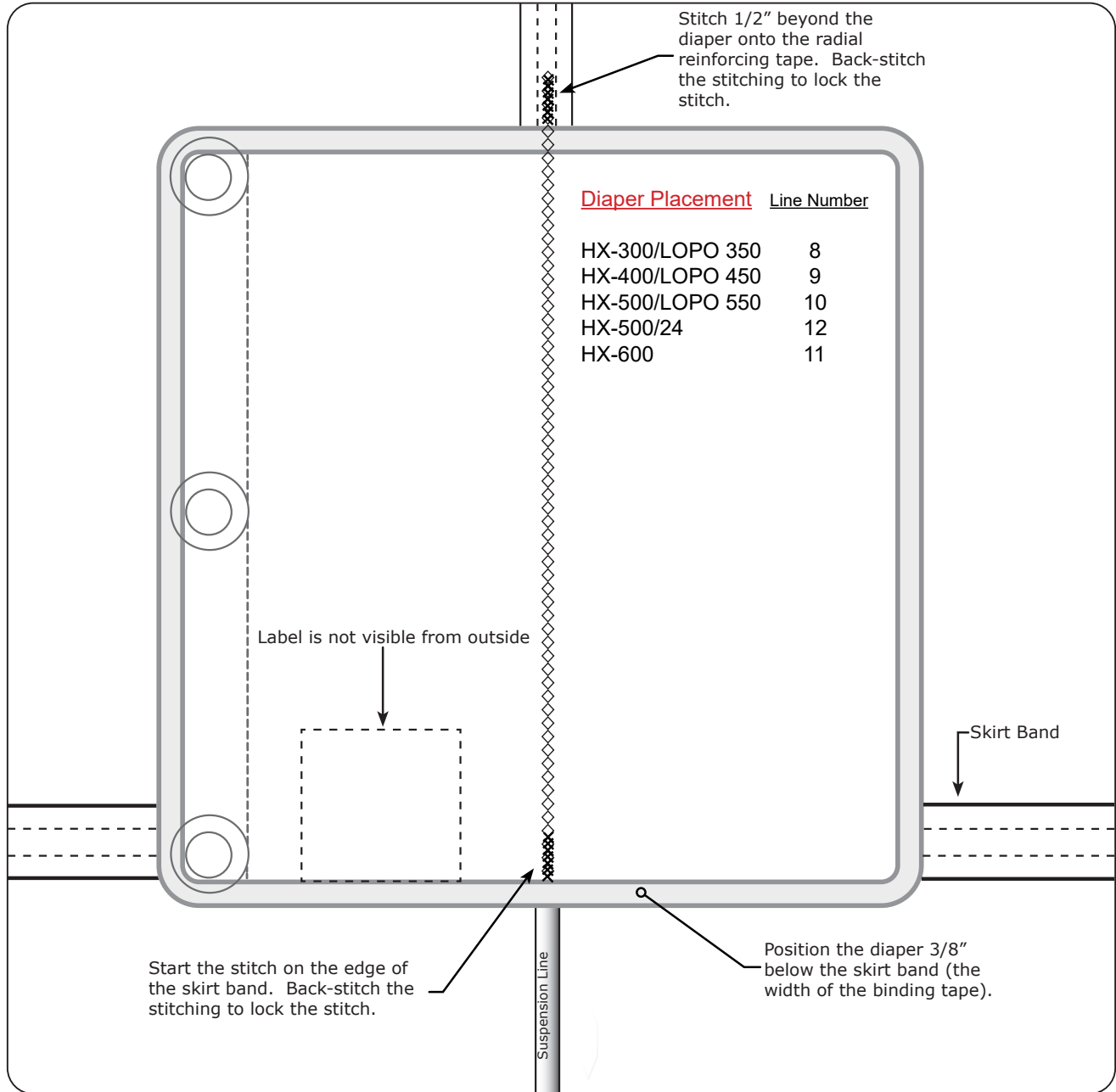


## Appendix A. Deployment Diaper Installation



A deployment diaper that is improperly installed can affect the safety and performance of the parachute system.

Improper use or negligent care of this equipment can cause serious injury or death.



Install the diaper on the outside of the front radial seam with the bottom edge of the diaper 3/8" (width of the binding tape) below the bottom of the skirt band.

Position the label facing down, and to the left.

Using a 304 zigzag stitch, sew directly down the chalk line starting at the bottom of the skirt band and ending 1/2" above the top of the diaper. Back-stitch the stitching at both ends to lock the stitch.

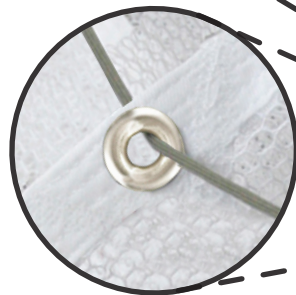
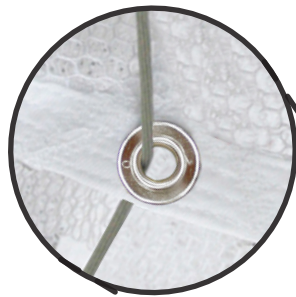
## Appendix B. Slider Installation

Install the slider so the grommet (smooth side) is facing down (toward the links) and the grommet washer is facing up toward the canopy.

Install the slider in the same sequential order as the suspension lines. Install the suspension lines on the canopy links as you install the slider. When you are finished with the installation, the slider should be centered between the two line groups.

Inspect the suspension lines and slider for continuity. Ensure that the suspension lines run free and clear through their respective slider grommets in the same order that the suspension line is installed on the connector link.

Washer (rimmed) faces up toward the canopy.



Grommet (smooth) faces down toward the links.

Slider runs free and clear of the suspension lines and is centered between the two line groups.

## Appendix C. Canopy Operating Limitations

P/N	Model	Diameter	Weight	Maximum Permitted Gross Weight @ 150 KEAS*	Maximum Recommended Gross Weight @ 150 KEAS*	Demonstrated Overload KIAS †	TSO Authorization
2101-1	Lopo 350	23'	6.0	220 lb.	175 lb.	264 lb. @ 180 KIAS	C23d
2101-2	Lopo 450	26'	7.0	285 lb.	235 lb.	345 lb. @ 180 KIAS	C23d
2101-3	Lopo 550	29'	8.0	330 lb..	300 lb.	420 lb. @ 180 KIAS	C23d
3101	HX-300	20'	5.8	250 lb.	160 lb.	300 lb. @ 180 KIAS	C23d
				Maximum Permitted Gross Weight @ 170 KEAS*	Maximum Recommended Gross Weight @ 170 KEAS*		
3102	HX-400	23'	6.4	333 lb.	225 lb.	400 lb. @ 180 KIAS	C23d
3103	HX-500	26'	7.9	416 lb.	280 lb.	500 lb. @ 205 KIAS	C23f
3106	HX-500/24	26'	8.5	416lb.	280 lb.	500 lb. @ 180 KIAS	C23d
3104	HX-600	28'	9.1	500 lb.	340 lb.	600 lb. @ 180 KIAS	C23d

\* Knots equivalent airspeed: the calibrated airspeed corrected for adiabatic compressible flow for the particular altitude.

+ Knots indicated airspeed: the speed shown on an aircraft's pitot-static airspeed indicator.



Butler Parachute Systems, Inc.  
1820 Loudon Avenue, NW  
P.O. Box 6098  
Roanoke, VA 24017-0098  
Telephone: (540) 342-2501 Fax: (540) 342-4037  
E-mail: [info@butlerparahcutes.com](mailto:info@butlerparahcutes.com)  
Web Site: [www.butlerparachutes.com](http://www.butlerparachutes.com)

