# RAVEN

# OWNER'S MANUAL

PRECISIONPARACHUTECOMPANY
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(615) 949-4688

S/N 463033
DOM N O V - 1986

FAA TSO-C23c CATEGORY B:
THIS PARACHUTE IS LIMITED TO USE BY PERSONS UP TO 115kg (254LB) FULLY EQUIPPED, AND UP TO 150 KNOTS.

# WARNXNG !

The Raven canopy is designed for high Performance, maxiizing speed and glide ratii. At higher canopy loadings (of more than about .78 pounds per square foot, the canopy will exhibit a rapid turn tendency if the toggles are depressed too rapidly, or too rar.

At lower wing loadings, the canopy will be more docile. Be sure to select the canopy you will jump based on loading (canopy area divided by the total suspended ueight. If you and your rig weigh 200 pounds, a loading of .78 would be achieved with slightly more than 250 square feet [Raven 3 or 4].)

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*Manufactures of Quality Deceleration & Recovery Systems*

1 NOVEMBER 1983

# PARACHUTE CONSTRUCTION AND PERFORMANCE SPECIFICATIONS

## RAVEN SERIES

| | RAVEN 1 | RAVEN 2 | RAVEN 3 | RAVEN 4 |
|---|---|---|---|---|
| SURFACE AREA | 181 $ft^2$ | 218 $ft^2$ | 249 $ft^2$ | 282 $ft^2$ |
| WEIGHT | 5.8 lbs | 6.5 lbs | 7.2 lbs | 7.9 lbs |
| FABRIC | 1.102 o-3 cfm | 1.1 oz o-3 cfm | 1.1 02 o-3 cfm | 1.1 oz o-3 cfm |
| WING SPAN | 19.8 ft | 21.6 ft | 23.2 ft | 24.8 ft |
| WING CHORD | 8.8 ft | 9.6 ft | 10.3 ft | 11.0 ft |
| ASPECT RATIO | 2.25:1 | 2.25:1 | 2.25:1 | 2.25:1 |
| MAX SUSP WT | 166 lbs | 198 lbs | 229 lbs | 261 lbs |
| TYPE CONSTRUCTION | 1 Beam | I Beam | I Beam | I Beam |
| LIFT/DRAG RATIO | 4:1 | 4:1 | 4:1 | 4:1 |
| PACK VOLUME | 412 $in^3$ | 454 $in^3$ | 564 $in^3$ | 646 $in^3$ |
| SUSP LINES | 525 Dacron | 525 Dacron | 525 Dacron | 525 Dacron |
| REEFING SYSTEM | Slider | Slider | Slider | Slider |
| DEPLOYMENT DEVICE | Bag | Bag | Bag | Bag |
| FORWARD SPEED | 25-30 mph | 25-30 mph | 25-30 mph | 25-30 mph |
| CROSS PORTING | STD | STD | STD | STD |
| PACKING TABS | STD | STD | STD | STD |
| CONTINUOUS LINES | STD | STD | STD | STD |
| CUSTOM COLORS | STD | STD | STD | STD |

# DISCLAIMER

### 0.0.0.1 DISCLAIMER

**Precision Parachute makes no warranty of any kind as to the fitness or** suitability **for any purpose of the RAVEN canopy. Precision Parachute Company also disclaims any liabiiity in tort for damages, direct or consequential, including personal injuries, resulting from a malfunction or** normal use or from **defect in design, material, workmanship or manufacture whether caused by negligence on the part of Precision Parachute Company or otherwise. By using Precision Parachute's products or allowing them to be used by others, buyer and user waives any liability of the manufacturer for personal injuries or other damages arising from its use.**

Chapter 1

# Flying the Raven Ram-air Canopy

## 1.1 DEPLOYMENT

### 1.1.0.1 Level deployment

Many square canopy malfunctions are caused by deployment in an improper attitude, as when the shoulders are not level with the horizon or the jumper is not in control during deployment. Initiate your deployment with enough time to ensure a controlled posture as the canopy is extracted.

If you are not qualified to pilot this canopy, get qualified. Then return to this text and resume reading.

### 1.1.0.2 Canopy check

After deployment is complete, check the canopy by:

1. looking overhead for evidence that all cells are not fully inflated.

2. Check the routing of Suspension lines and the position and condition of the slider .

3. Check that the canopy is flying straight with no tendency to turn.

### 1.1.0.3 Releasing the Brakes

The brakes are released after the canopy check is complete.

1. Look at both steering toggles on the back of the rear fisefs.

2. Grasp the toggles firmly, and pull down positively on both at the same time until you feel both brake stows release.

3. Hold equal tension on the steering toggles and slowly allow them to retract up against the stops.

4. Check again that the canopy is flying straight with no steering input required.

## 1.2 PLANNING THE APPROACH

### 1.2.0.1 The Importance of Beginning Early

The ram-air sport parachuting canopy is truly a low-Performance glider. With its mobility, controllability and speed it represents a great improvement over traditional "drag–only" devices such as the conventional round canopy. But like a glider pilot, we are charged with one immutable law – you only get one chance at every landing. The m consistent success can be acheived only by carefully planning our approaches and allowing for changing conditions during the approach. Approach planning should begin the moment the canopy is flying properly.

### 1.2.0.2 Turns and Speed

The ram-air canopy achieves its Performance through the ability to change the canopy's angle of attack. The ram-air pilot thus controls the speed (and therefore the glide angle and sink rate) of his canopy by changing its angle of attack.

When the steering toggles (or "brakes", as they are commonly called) are fully retracted ("up"), the canopy flies at its minimum angle of attack – producing maximum speed, maximum sink rate and maximum gliding distance. We don't really want to land the canopy under these conditions, but in order to achieve maximum Performance we must understand and be able to use the energy of the canopy differently at different times during each flight.

### 1.2.0.3 Fast and Slow Flying

The range of speed control goes from full glide to STALL. The greatest sink rate will occur at full glide. The most hazardous flying is that done close to the STALL. A Stall is produced when the steering lines are pulled far enough to incease the canopy's angle of attack beyond the point at which the smooth fiow of air is interrupted and the canopy deflates.

Stall recovery is accomplished by SLOWLY releasing the steering lines to allow the canopy to return to normal flying attitude. If recovery is not allowed, and the steering lines are kept extended, the canopy and jumper will begin a new descent without benefit of lift.

The middle of the road between full-glide Performance and the stall is a much more forgiving range as far as the canopy is concerned. The canopy will not glide as far at moderate

angles of attack (often called "half-brakes") as it will full–glide, but the sink rate is close to the minimum, and a decent "landing" can be accomplished at this speed and sink rate.

"Half-brakes" is acheived with the steering lines pulled about halfway down, at shoulder level or slightly below. This is the flight attitude to maintain in bumpy air or at any time you are unsure of conditions in the air or on the ground during landing.

### 1.2.0.4 Turning

Our ability to turn the ram-air canopy safely is limited by the altitude available to perform the turn; there must always be enough altitude. But the penalty for steep or sudden turns is always degraded Performance. Many ram-air pilots are injured seriously due to turns performed too close to the ground. We should make it a rufe never to turn more than gently (for the sake of small corrections) when we are less than 200 or 300 feet from the ground.

Turns are possible at any gliding speed, and those made at full glide will produce the greatest degradation of perf ormance. Those performed at lower speeds will result in slower turns as well as less of an increase in sink rate.

If we follow good practice, every approach should end where the landing phase begins – at about 100 feet of altitude, lined up with the landing target flying into the wind, flying at half-brakes. Flying at half-brakes will allow us to make corrections to either increase or decrease our glide. DO NOT allow yourself to get into DEEP brakes while trying to arrest a glide.

WARNING !.

A STALL AT LOW ALTITUDES IS POSSIBLY THE MOST HAZARDOUS CONDITION FOR THE RAM-AIR PILOT.

If an approach is properly planned, it will allow the pilot to return to full glide at no less than 30-40 feet and perform a graceful flare, arresting forward speed and sink rate simultaneously, arriving at touchdown with (ideally) no speed and no sink rate.

## 1.3 Landing

The landing of a ram-air canopy is no different from any landing in a heavier–than–air craft – it consists of arriving at the landing site with a good glide speed, and carefully coordinating an increase in angle of attack (called in this instance the FLARE) to arrest sink rate. A perfect landing results when the canopy stalls at the moment the pilot touches . the ground. Depending on Windspeed, the landing could be accomplished at zero forward speed or at 10 mph. With the average pilot and canopy combination, a flare should

be begun at about 10 feet of altitude when the windspt , i zero. Normally, the higher the Windspeed the longer you ca wait to begin a flare. Good technique here will result onl from consistent practice.

## 1.4 Landing at half-brakes

For the inexperienced ram-air pilot, or for experience pilots either impaired or subjected to harsh conditions, th landing can be accomplished at half-brakes. Choose th landing area and line up into the wind. Hold the brak setting through the landing, and perform a parachute landin fall (PLF) as you would for a round canopy. Do not att p the last-minute flare, and DO NOT release the brakes durin the approach at any time.

# Chapter 2

# Packing the Raven Canopy

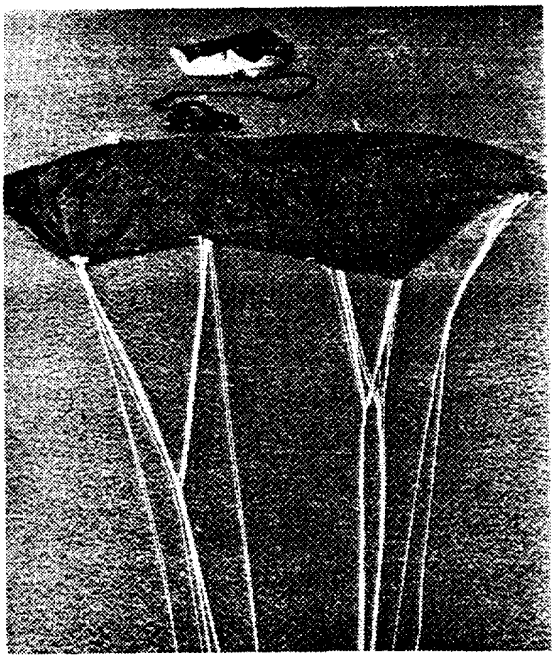
## 2.1 WARNING !

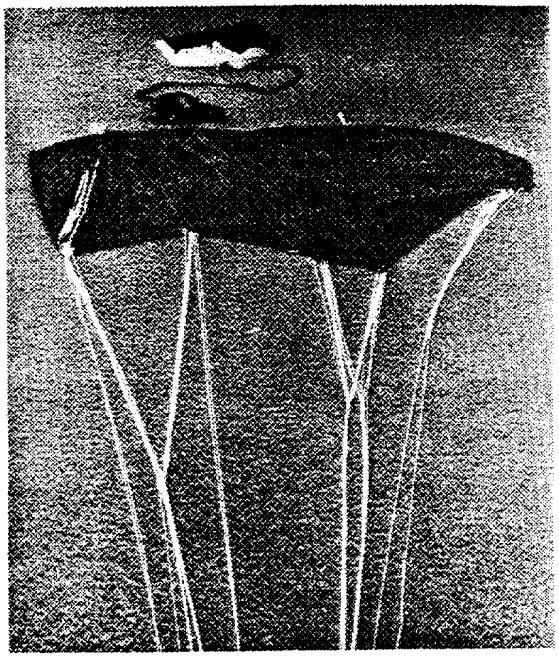
The Raven ram-air canopy is shipped uninstalled. It is the owner's responsibility to have it installed on the harness/container system by a qualified rigger, and to ascertain that the canopy is correctly installed and oriented according to the instructions of the harness manufacturer. This manual assumes proper installation and orientation has been completed.

ALL SQUARES CAN BE PACKED BACKWARD.

The factory recommends BAG DEPLOYMENT. This canopy has not been tested for other than BAG DEPLOYMENT.

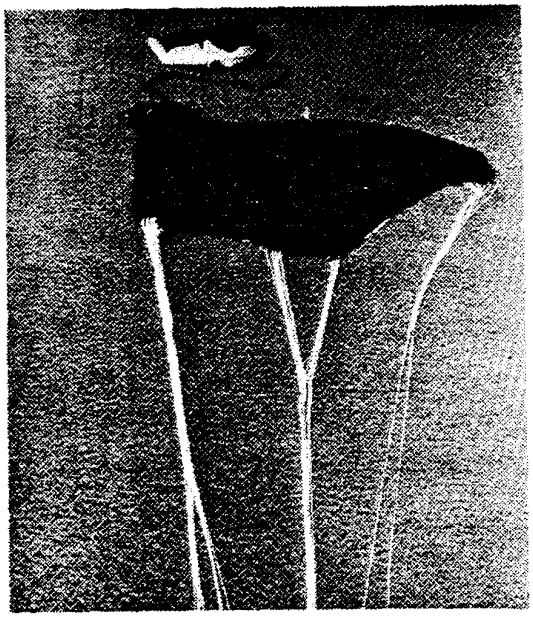
## 2.2 **Packing** Steps

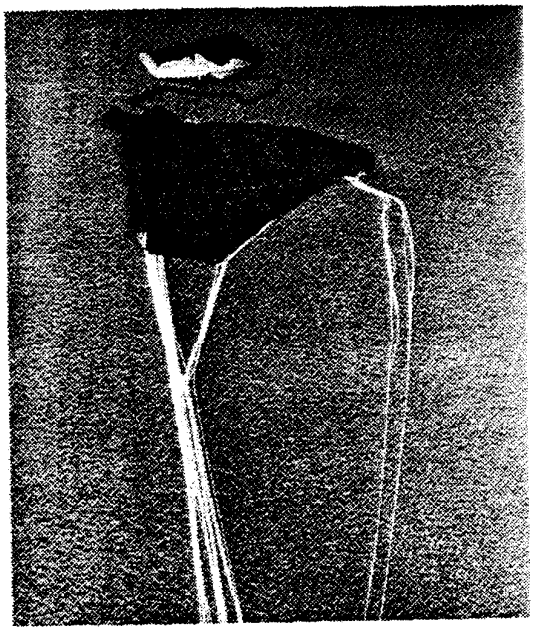


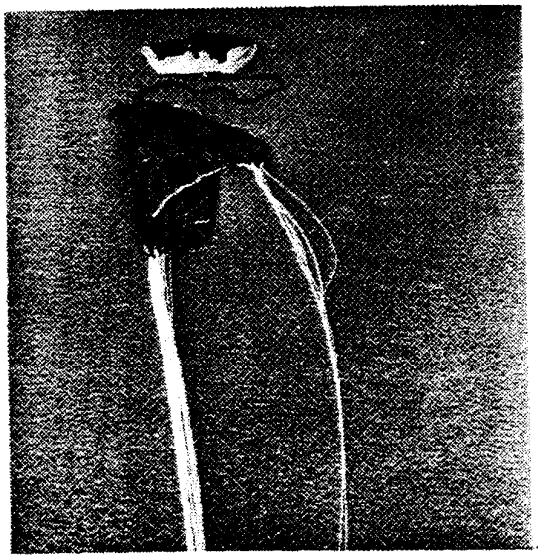


1. **Orient the canopy on its side as shown with nose left and the slider down. Flake the canopy by grasping the lower front and lower rear packing tabs and pulling the associated line group taut. Repeat for each cell un til all seven are pleated or "flaked" and all line groups are taut and stacked upon one another. Check the line orientation and the orientation of canopy to harness.**

2. **Fold the nose back as shown.**





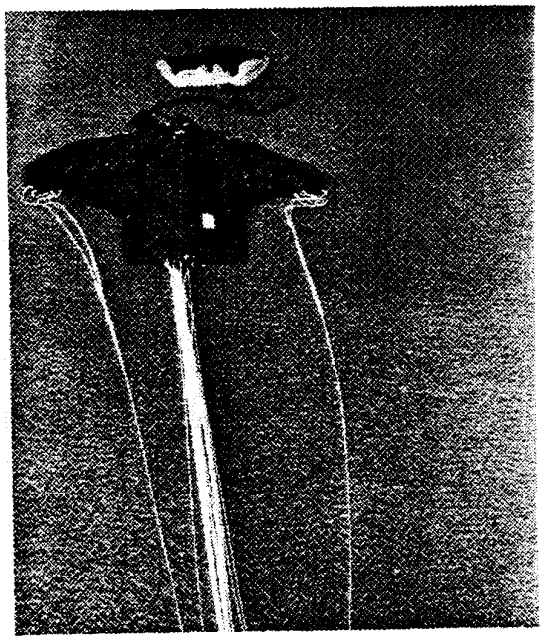


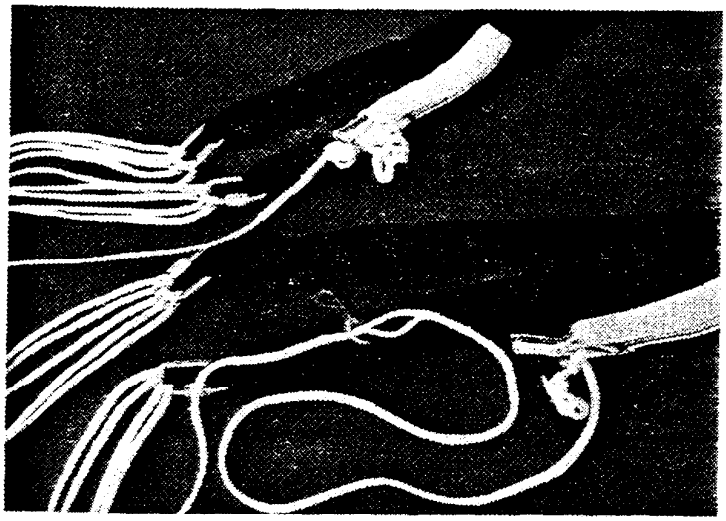
3. Grasp the canopy above "B" lines and stack "B" lines on top of "A" lines

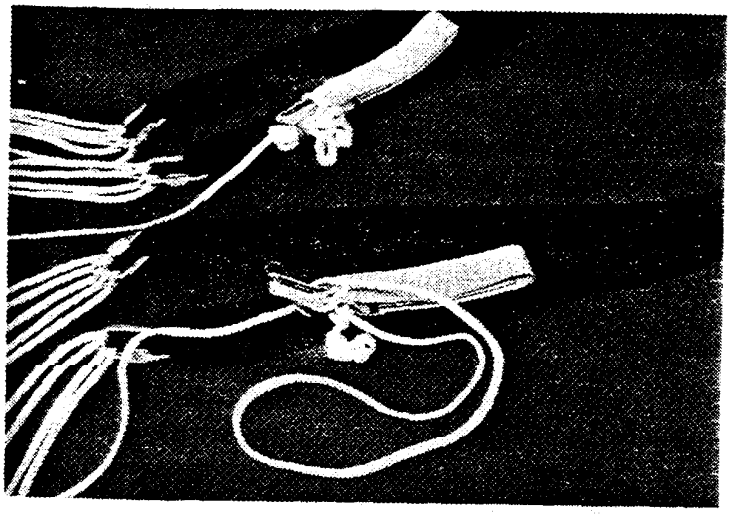
4. Grasp the "C" lines and stack them on top of the A - B stack.

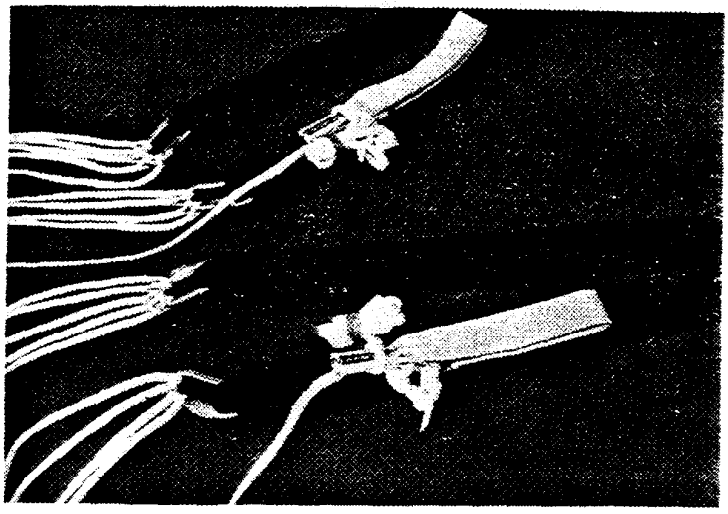
5. Stack "D" lines on top of the A-B-C stack

6. Split the tail as shown so the left and right control line group are on either side of the center cell.







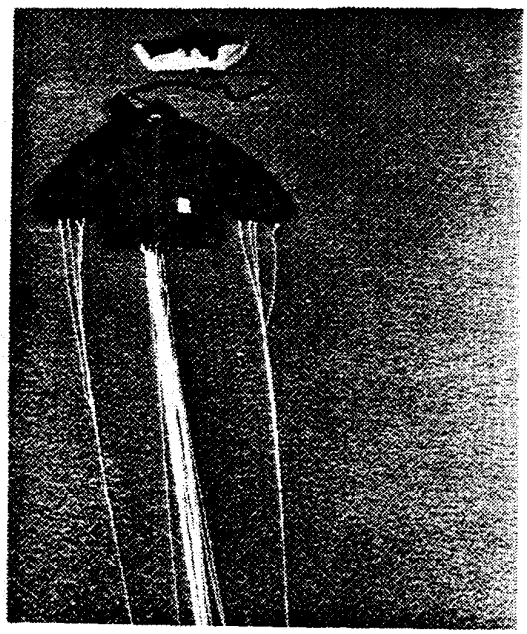


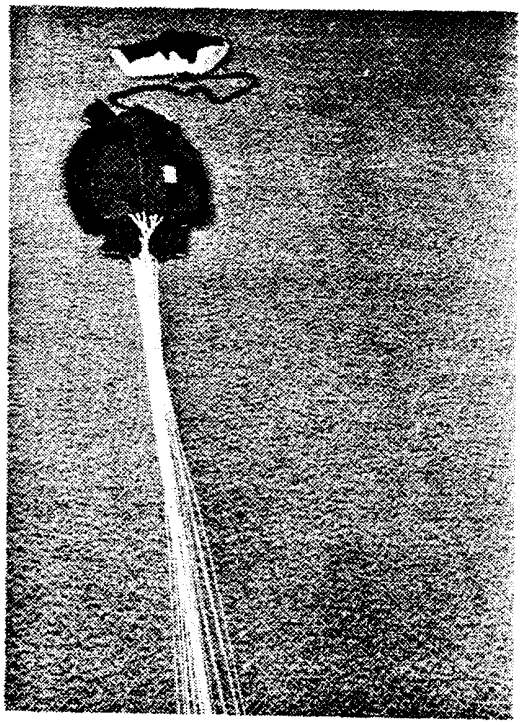
7. Set the brakes. Brake setting technique will vary according to the harness/container system. These photos show the Relative Workshop type system with one brake stowed, one unstowed.

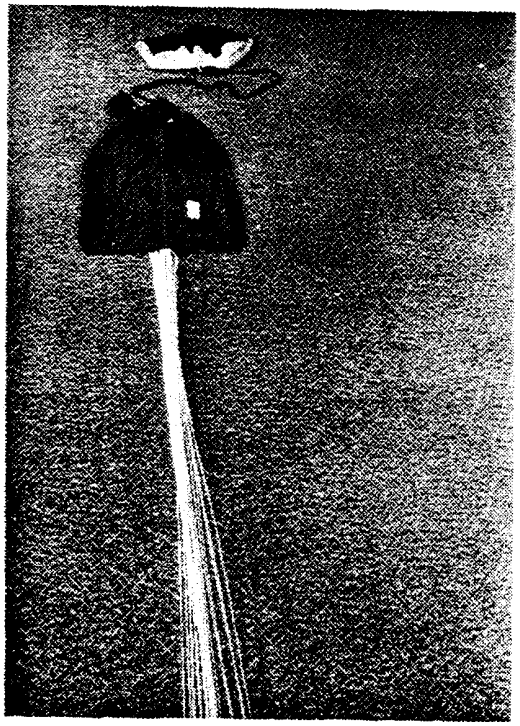
8. (Continued)

9. (Continued)

10. This photo shows the tail split after the brakes have been set.

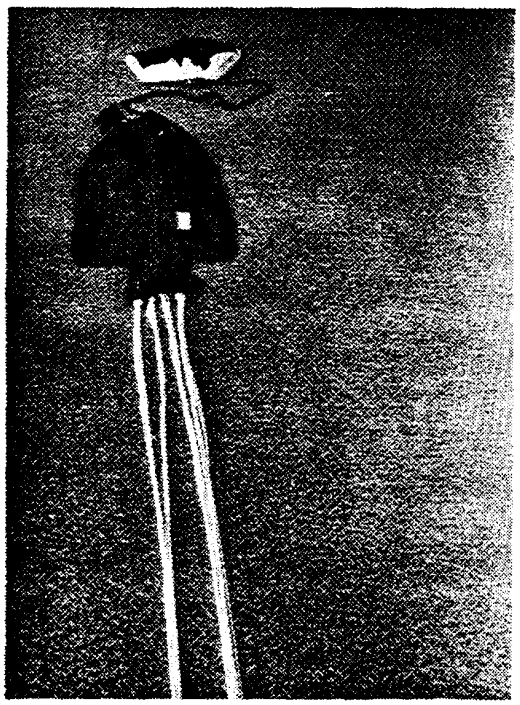


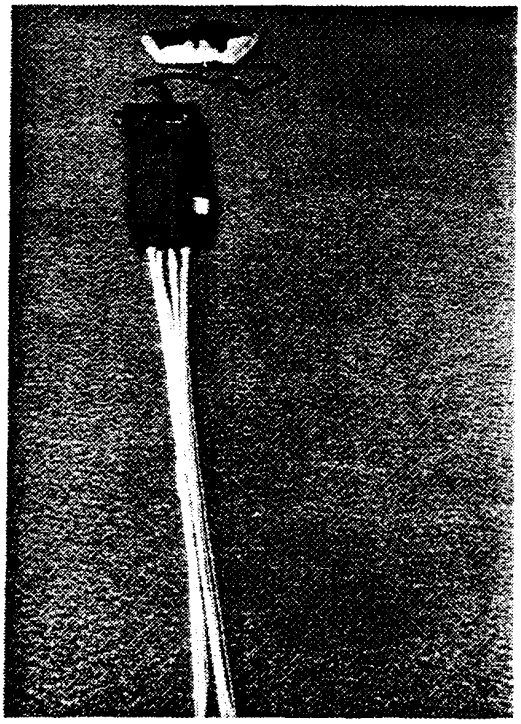




11. Flake the tail.

12. Pull down the center cell of the tail to cover the canopy as shown.



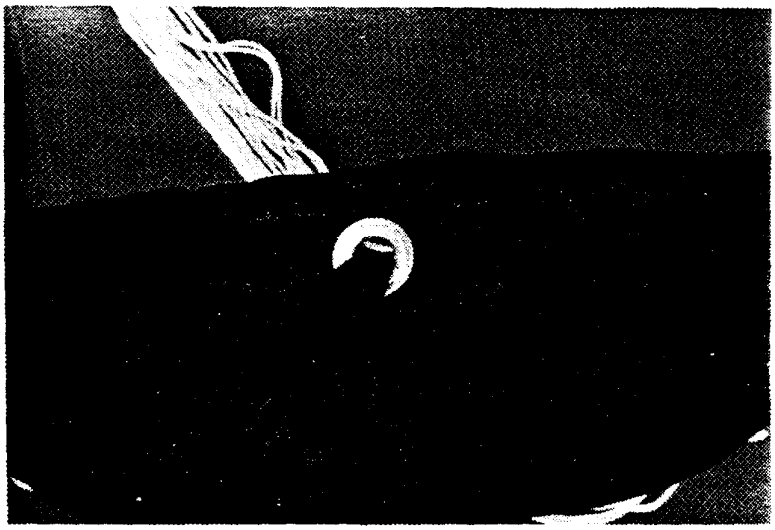


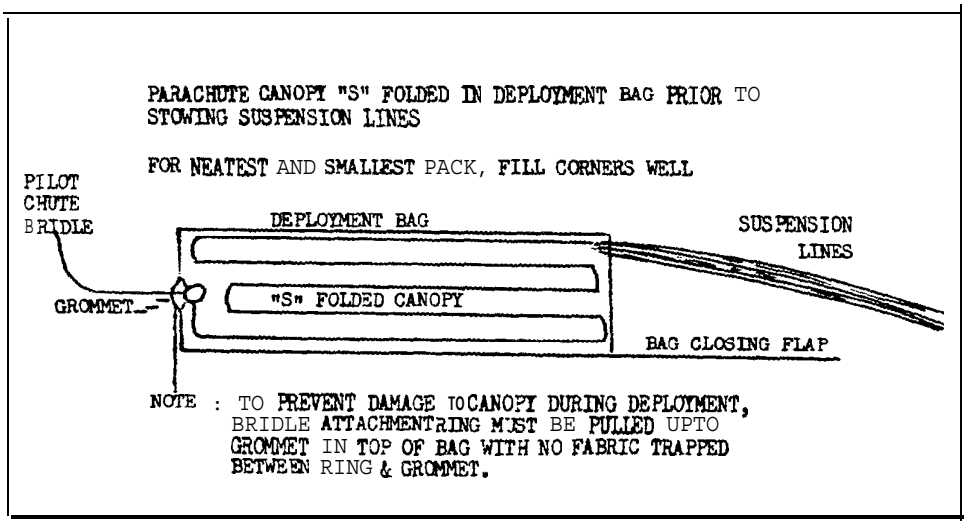
13. Pult up the slider.

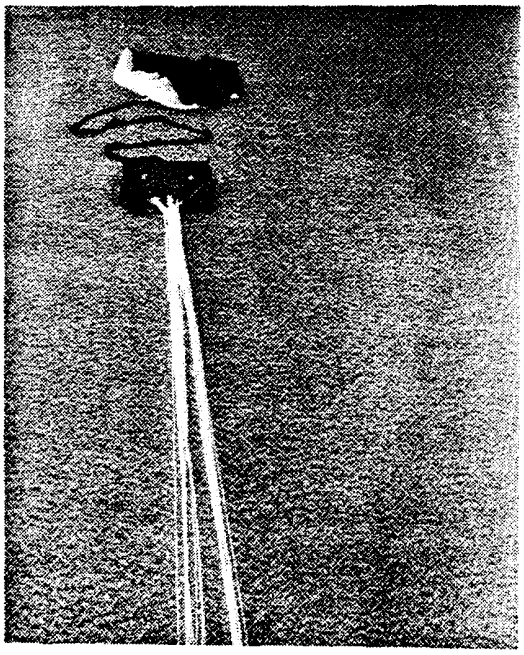
14. Tunnel the canopy (dress to the width of the deployment bag, with the slider UNDER the tail.) Pull the bag down over the top of the canopy.

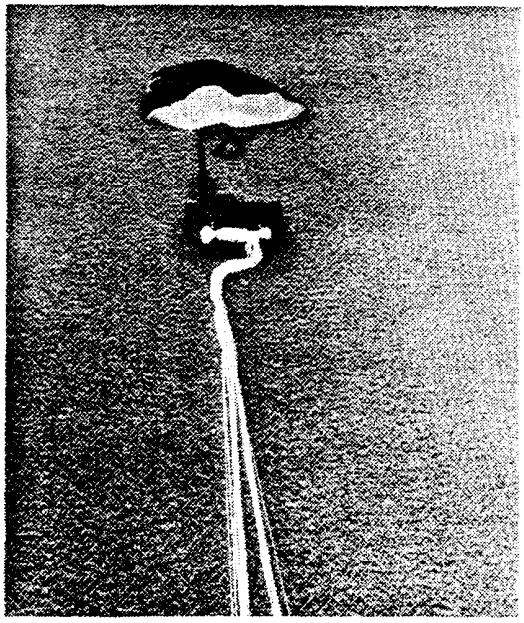
15. Check the bridle attach ring. The ring should pull up against the bag grommet and there should be no fabric between the ring and the grommet.

16. This illustration shows a cross-section of the canopy S-folded in the bag.



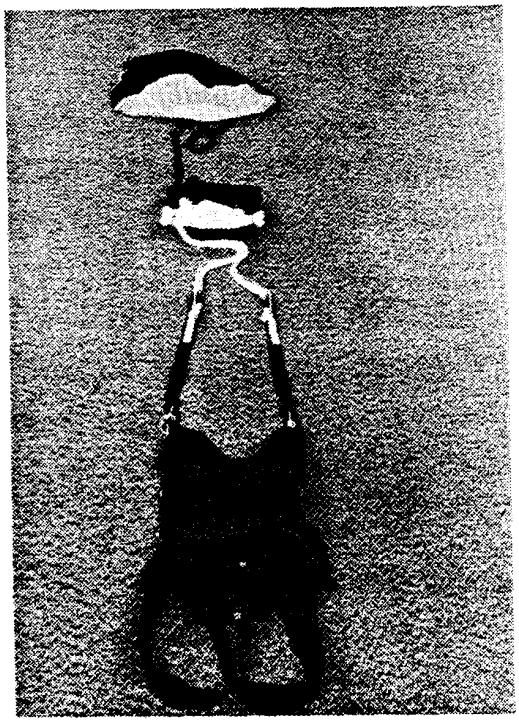






17. Dress the bag prior to stowing the lines.

18. Closing stows should be made in accordance to the bag configuration, with the f ollowing guidelines: Route the lines cleanly, and don't stow more than one inch of lines on the outside of the stowing bands.



19. **Stow lines to within no less than six inches, no more than 16 inches.**

## 2.2.0.1 Closing

**Continue in accordance with Container maufacturer's instructions.**