Vector II

Owner's Manual

with Vector 3 Addendum

When packing a Vector 3, follow the instructions on page 13A, 59A, and 59B

Vector II Owner's Manual

Sixth Edition, June 1993

This manual is applicable to the Vector II bearing the serial number:

Save this manual, your rigger may not have an applicable manual and will need it to service your Vector II. This manual does not cover the correct assembly and packing procedures for older Vector models.

WARNING

Sport parachuting is a hazardous activity that can result in injury or death.

Parachutes sometimes malfunction, even when they are properly designed, built, assembled, packed, maintained and used. The results of such malfunctions are sometimes serious injury or death.

The U.S. Parachute Association estimates that there are about 30,000 skydivers in the U.S., and these jumpers made approximately 2 million jumps in 1989. The Association reported 36 skydiving fatalities that year, meaning the probability of dying on a skydive is approximately 1 in 55,500. It also seems that the more experienced a skydiver is, the less likely he is to be killed while jumping.

Experts estimate that hundreds of people are also injured. Some of these deaths and injuries are the result of equipment malfunctions.

If you use your Vector II, or if you allow someone else to use it, you are acknowledging sport parachuting's risks and accepting the fact that the Vector or its components may malfunction.

If you are not willing to accept the risks of sport parachuting, or if you aren't willing to accept the possibility that your Vector II or its components may malfunction and perhaps cause you to be injured or killed, then you may return your Vector II for a full refund before it is used. Details on how to do this are printed below.

DISCLAIMER—NO WARRANTY

Because of the unavoidable danger associated with the use of this harness and container assembly, the manufacturer makes no warranty, either expressed or implied. The rig is sold with all faults and without any warranty of fitness for any purpose. Manufacturer also disclaims any liability in tort for damages, direct or consequential, including personal injuries, resulting from a malfunction or from a defect in design, material, workmanship, or manufacturing whether caused by negligence on the part of the manufacturer or otherwise.

By using this rig, 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, buyer may obtain a full refund of the purchase price by returning the parachute harness and container, before it is used, to manufacturer within 30 days from the date of original purchase with a letter stating why it was returned.

Neon and flourescent colored fabrics and tapes fade rapidly. Color brilliance may be lost within a year of manufacture. The RW Shop assumes no responsibility for this condition.

Cover photos: Mike McGowan, Rick Powell and Tom Sanders.

The Uninsured Relative Workshop, Inc., DBA
Relative Workshop
1645 Lexington Avenue • DeLand, Florida USA 32724 • (386) 736-7589 • Fax (386) 734-7537

Table of Contents

1. Introduction

Congratulations!

By choosing the Relative Workshop Vector II, you've shown that you'll settle for nothing less than the best.

BEFORE YOU JUMP YOUR VECTOR II

Please read this manual thoroughly before assembling or using your Vector II, even if you've owned or jumped a Vector before. We've recently made several important changes to the rig, and you should know about them before going into the air.

If, after reading this manual, you still have questions concerning the Vector II, please contact us. We'll be happy to help you.

If you have any suggestions or see a need for changes in the Vector II, please let us know by calling or writing the Relative Workshop, 1645 Lexington Ave., DeLand, FL 32724, phone: (904) 736-7589, fax: (904) 734-7537. We're open from Monday through Friday, from 8 am to 5 pm Eastern time.

New Features of the Vector II

The Relative Workshop made several improvements to the Vector I reserve system in September, 1988. Vector IIs incorporating these improvements can be identified by the "Vector II" marking on the container TSO label located under the pin protector flap of the reserve.

These changes include:

1. A new reserve pilot chute that features a stronger, redesigned spring and all-fabric (i.e., no mesh) construction.

Extensive aerial testing proved this new pilot chute enables the reserve to deploy significantly faster at both lower and higher airspeeds.

2. A different reserve flap closing sequence where the outside bottom flap closes last. (In previous versions of the vector, the outside top flap closed last.)

This change makes the reserve container more resistant to opening accidentally when it is rubbed against objects such as protrusions in an aircraft cabin.

3. The pin protector flaps on both the main and reserve containers are now held shut by tongues rather than Velcro. This change reduces the rig's maintenance requirements since the tongues—unlike Velcro—don't require periodic replacement.

(The new, all-fabric pilot chute may be installed on previous versions of the Vector, as well as the Relaitve Workshop Sprint and WonderHog.)

TRAINING REQUIRED

If you've never jumped a Vector II before, or if you're transitioning from other types of gear, be sure to receive instruction on its use from a certified instructor. This instruction should consist of a practice session in a suspended harness or on the ground where you practice both routine and emergency procedures.

This manual is not a course of instruction on how to make a parachute jump. Nor does it contain the various regulations that govern sport parachuting and related activities.

It is the responsibility of the owner to insure his Vector II is properly assembled, maintained, packed, worn and used. It is also his responsibility to seek out and obtain proper training before he uses it.

The person who inspects and packs both the main and reserve parachutes must be qualified to do so.

The owner of a Vector II should not loan it to another person without first determining that the person is fully capable of using it properly and safely.

Finally, nothing in this manual is meant to discourage the reader from using the Vector II in a reasonable and prudent way.

The information and specifications in this manual were in effect at the time of printing. The Relative Workshop, Inc., however, reserves the right to change the Vector II at any time without notice and without incurring any obligation.

ABOUT THE RELATIVE WORKSHOP

The Relative Workshop has been designing and building state-of-the-art skydiving rigs since 1975. We invented and patented the hand-deployed pilot chute and the 3-Ring release. We introduced innovative construction techniques that have made rigs safer, lighter and more comfortable. Many of these innovations have been adopted by the entire industry.

The Relative Workshop does more than just build rigs: We try to provide a total solution to your equipment needs. We offer most brands of main and reserve canopies, and we'll work to help you get the products that are best for you. We also offer jumpsuits and other accessories. We have the facilities and expert staff to assemble, pack and maintain your Vector II and its parachutes.

Finally, your satisfaction comes first. We want you to be happy with your Vector II, and we welcome your questions and comments.

DESCRIPTION OF THE VECTOR II

The Vector II is a piggyback harness and container system designed for freefall sport and military parachuting. It is available in a wide variety of container sizes to fit practically any main or reserve canopies, either round or ram-air. It is manufactured in accordance with FAA TSO c23(b).

Main Parachute System:

The main parachute system of your custom Vector II was built for either a hand deploy, ripcord, or pull-out deployment. Refer to the applicable section pertaining to your deployment system.

The main canopy may be jettisoned from the harness by its patented 3-Ring release system, a single point system that is activated by a soft handle located on the right main lift web.

The main container can be made compatible with KAP 3, Irving Height Finder FF-2, FXC and SSE AADs.

Reserve Parachute System:

The Vector II reserve container can be manufactured to accept round or ram-air reserve canopies. The reserve parachute container is held closed by a single pin. The reserve ripcord handle is made of metal and fits in a pocket on the left-hand main lift web.

The reserve system accepts all popular automatic activation devices produced by Airtec, FXC and SSE.

Harness:

The harness is constructed of Type 7 and Type 8 Mil-Spec webbing and new—not reconditioned—hardware.

> **WARNING**
>
> A harness that is either too small or too large for the jumper's body size can affect the safety and comfort during a parachute jump. If you are in question as to whether your harness fits properly, consult the manufacturer or an FAA Master Rigger.

ABOUT MODIFICATIONS

It is common for jumpers to "improve" their rigs by altering them. A high percentage of these alterations cause malfunctions or make the rig harder to use correctly.

Typical alterations include conversion to a "pull-out" pilot chute, changing the dimensions of the harness, changing the length of the bridle, installing automatic activation devices, and so forth.

Check with the Relative Workshop before you make any changes to your Vector II. It was designed and built the way it is after years of testing and development. There are reasons for having things the way they are—reasons that might not be apparent at first. Check with us before you allow any changes to be made; even "insignificant" alterations may have dangerous and unforeseen effects.

SECOND-HAND VECTORS

If you obtained your Vector II second-hand from a private party, be sure it is airworthy before using. Have a rigger or loft inspect it first.

If you prefer, the Relative Workshop will inspect your second-hand Vector. There is a reasonable charge for this service.

If you obtain replâcement parts from a source other than a Relative Workshop dealer, be sure they exactly match the parts they replace. (For example, be sure the reserve ripcord is long enough. If it isn't the rig might open prematurely.) Consult a rigger or loft whenever you replace any component of your Vector.

COMPONENTS

The Vector comes complete with these components:

- Harness and container
- Hand-deploy main pilot chute
- Main pilot chute bridle
- Main deployment bag
- Main locking loop
- Vector II reserve pilot chute
- Reserve ripcord
- Reserve locking loop
- Reserve pilot chute bridle
- Main risers and steering toggles
- 3-Ring release handle
- The Vector II Owner's Manual

Once you are sure you have these components, check to be sure the containers are sized properly for your main and reserve canopies. Refer to the TSO label on the pocket of the reserve packing data card to determine the size of the containers. Refer to the Vector II compatibility chart to determine what canopies will fit in your Vector II. (You'll find the packing data card pocket under the Vector monogram by lifting the reserve pin protector flap.)

If you use components that were not supplied with the harness and container, be sure they have the correct dimensions and are made of the same materials. For instance, be sure the breakaway cables are of the proper length.

Replacement components for the Vector II are readily available from the Relative Workshop.

U.S. Federal Aviation Administration regulations require that the reserve parachutes be inspected, maintained, assembled and packed by an appropriately rated Senior or Master Parachute Rigger. Other countries may have similar regulations.

2. Assembling and Packing the Main Parachute

INTRODUCTION

The Vector II is compatible with almost every parachute in common use today. The Vector II is available with a variety of main container sizes. Consult the Relative Workshop or your dealer to assure the volume of your main canopy size is compatible with your Vector II. Oversized or undersized canopy volumes may cause a pilot-chute-in-tow or premature opening of the main container. This manual does not provide specific instructions for folding all of the various main canopies on the market—that information must be obtained from the owner's manual for each canopy.

Since only a handful of round canopies are in use today by sport parachutists, these instructions were written for ram-air canopies. A jumper should check with a rigger for guidance on packing a round main canopy into a Vector.

ASSEMBLING THE MAIN PARACHUTE

Carefully inspect the main parachute for wear or manufacturing defects.

Attach the main parachute to the main risers included with the Vector II. Be sure the canopy is facing forward and that the lines extend from links to canopy without crossing over each other. Leaving the risers on the harness while attaching the canopy will help prevent confusion.

If the canopy uses Rapide links, make sure the barrel nuts completely cover the threads. After hand tightening, turn the barrel 1/4 turn with the proper sized wrench.

Attach the steering toggles to the control lines of the main canopy according to the instructions below.

WARNING

Slider bumpers must be properly installed to insure that they do not interfere with proper slider functioning and deployment of the canopy. Follow the canopy manufacturer's instructions for the correct procedures for installation and securing slider bumpers.

ATTACHING STEERING TOGGLES

The Vector II is supplied with steering toggles for the main canopy that are compatible with the Vector risers. It is important that the toggles and risers be compatible to prevent malfunctions.

It is also important that the toggles be located

along the steering lines so the canopy is in a true no-brake mode when the toggles are resting against the guide ring. If not, the canopy won't glide or land correctly.

Likewise, if the toggles are mounted too far down the steering lines, the canopy will be less responsive and the jumper might not be able to apply full brakes or stall the canopy. This can make it difficult to flare the canopy properly for landing.

These situations are likely to occur when a main canopy is hastily switched from one set of risers to another. If the guide rings on both sets of risers are not located the same distance from the connector links, the steering toggles must be moved to another location on the steering line.

It is also important to securely attach the toggles to the steering lines. Although some canopies may be adequately controlled by using the rear risers, a "lost" toggle can be hazardous in some circumstances, and may require a break-away and reserve deployment.

Toggle Installation Procedure

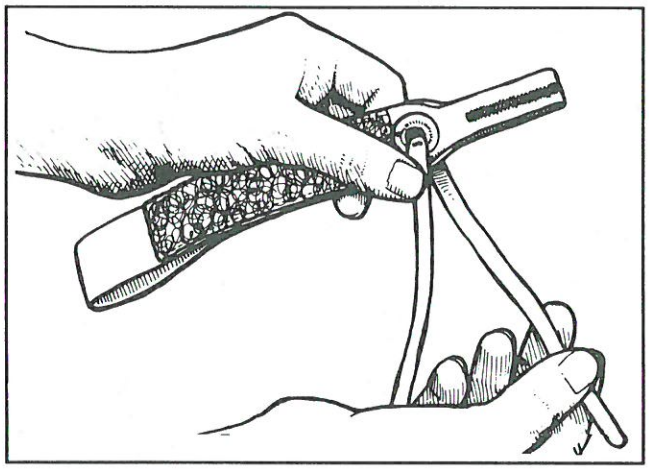
After the main canopy has been properly attached to the risers and while it is still laid on its side, attach the toggles to it by following these steps:

1. Starting at the tail of the canopy, trace the upper steering lines down to the lower steering line. The idea is to be sure the steering lines are routed correctly; they should not wrap around any suspension lines. The right-hand steering line must pass through the right-hand rear slider grommet, and the left-hand line must pass through the left-hand rear slider grommet.

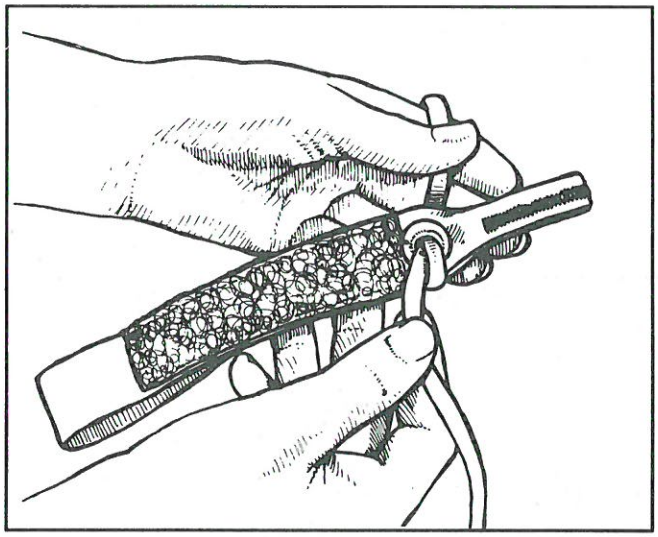
2. If the main canopy is already equipped with toggles, mark each steering line where it is knotted to the toggle. The purpose of this mark is to insure the new toggle is installed at exactly the same point on the steering line.

3. Remove one of the old toggles and pass the steering line through the keeper ring on the riser.

4. Pass the end of the steering line through the small hole in the Vector steering toggle. Adjust it so the mark on the steering line is approximately the same distance from the Vector toggle as it was from the old toggle.



5. Loop the running end around the toggle and thread it through the grommet again and pull it snug. Be sure the mark remains in the correct place.

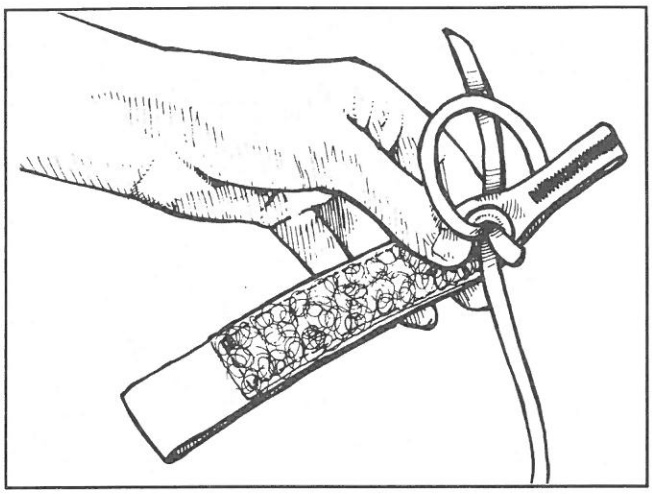


6. Loop the running end around the other side of the toggle and pass it through the grommet once again.

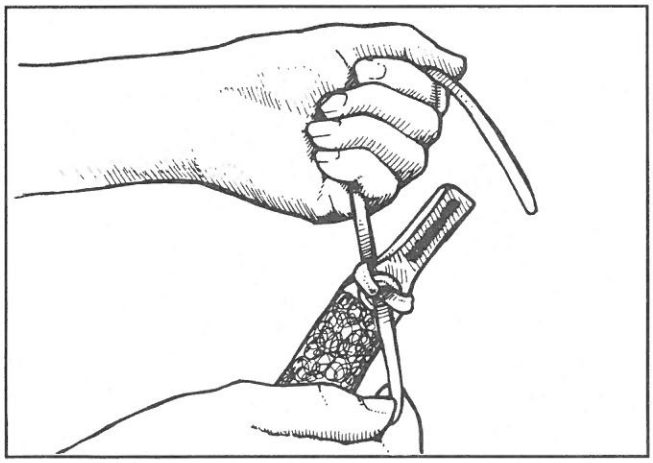
A Word About Spectra

Attaching toggles to Spectra steering lines sometimes requires a different method than the one shown here. The line is usually much thinner than Dacron line; a toggle might slip off if the above method is used. Use the method described in the reserve section of this manual,or refer to the canopy manufacturer's instructions.

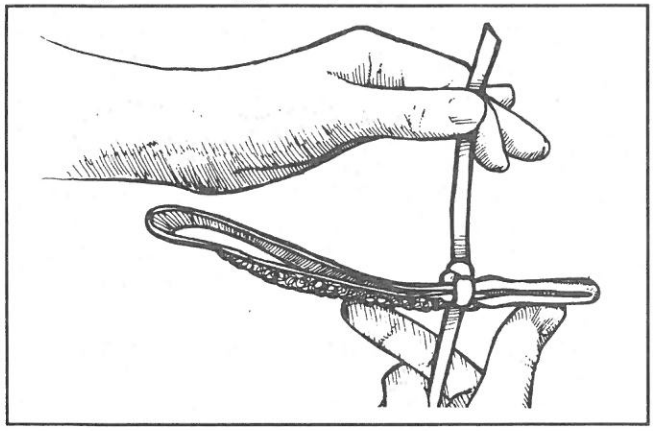
(One canopy manufacturer calls Spectra "Microline.")



7. Grasp the line on both sides of the toggle and pull it tight. Note that the Velcro side of the toggle faces the canopy. The line does a figure 8 through the grommet and exits on the other side of the toggle. Again—check the mark to be sure it is in the right place.



8. Tie an overhand knot in the free end of the line and tighten it right down to the toggle. Be sure it is snug, or the toggle may slip off the line.



9. Check the canopy with the deployment brakes set and not set to be sure it is correctly configured. The canopy owner's manual contains the proper brake settings and steering line lengths; there are no standardized dimensions. Unless the lines are of proper length, the canopy may not open or fly correctly.

10. Once the measurements have been verified, tighten the overhand knot at the toggle. It is generally not a good idea to cut off the excess steering line, as you might want to adjust the toggles after the canopy has been jumped. Any excess line should be daisy-chained on itself.

11. Inspect the installation. Check to be sure the steering lines are routed correctly.

OTHER INSPECTIONS & INSTALLATIONS

Inspect the canopy installation to make sure the risers aren't reversed or twisted. Then install the deployment bag and the pilot chute to the top of the canopy. The stop ring on the bridle must lie between the grommet in the deployment bag and the pilot chute.

Inspect the 3-Ring assembly according to the instructions in the 3-Ring chapter of this manual.

WARNING

About Collapsible Pilot Chutes:

Some parachute manufacturers recommend using a main deployment bag with a #8 grommet in the top of the bag and removal of the stop ring on the bridle. This allows the bag to slide down the bridle and collapse the main pilot chute. Be aware that this type of collapsible design can cause premature bag and pilot chute wear and abrasion which is not covered under any type of warranty from the Relative Workshop.

At this time this is the only method of collapsing the main pilot chute that is recommended by the Relative Workshop. Other collapsible pilot chute designs are not recommended because they may cause a pilot-chute-in-tow malfunction.

MAIN CANOPY PACKING INSTRUCTIONS

Instructions for packing specific main canopies are published by the canopy manufacturer and are beyond the scope of this manual.

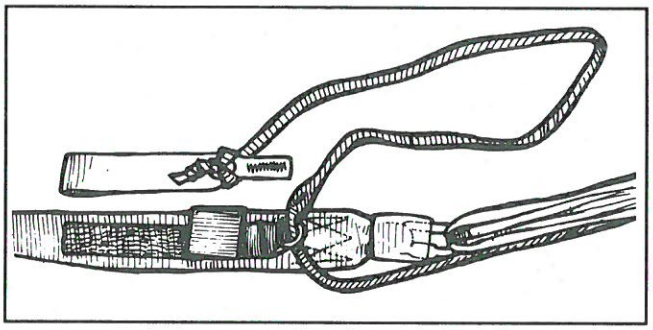
U.S. Federal Aviation Administration regulations require that the main parachute be packed only by an FAA-certificated rigger or the person who will use the parachute.

Setting the Deployment Brakes

Every ram-air canopy on the market today is equipped with "deployment brakes" to make it open more gently and reliably. The brakes work by keeping the tail of the canopy pulled down several inches during deployment. This prevents the canopy from surging forward as it inflates and begins flying.

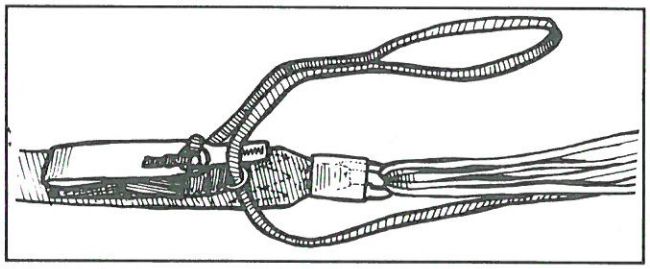
As mentioned previously, malfunctions and poor deployments can result if the brakes are not set during packing, or if they are set incorrectly, or if one or both releases before the canopy is completely inflated and stabilized. Combining incompatible toggles and risers can also create the same problems.

Not all rigs have risers that are configured like those shipped with the Vector. Different designs require different procedures, and a rigger should be consulted for the correct one.



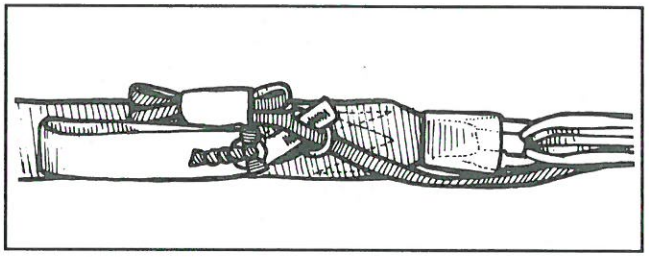
1. After the canopy is inspected, use the toggle to pull the right-hand steering line down until the brake loop just passes through the guide ring.

2. Insert the tapered end of the toggle all the way into the loop. Pull on the steering line above the guide ring to seat the toggle against the ring.

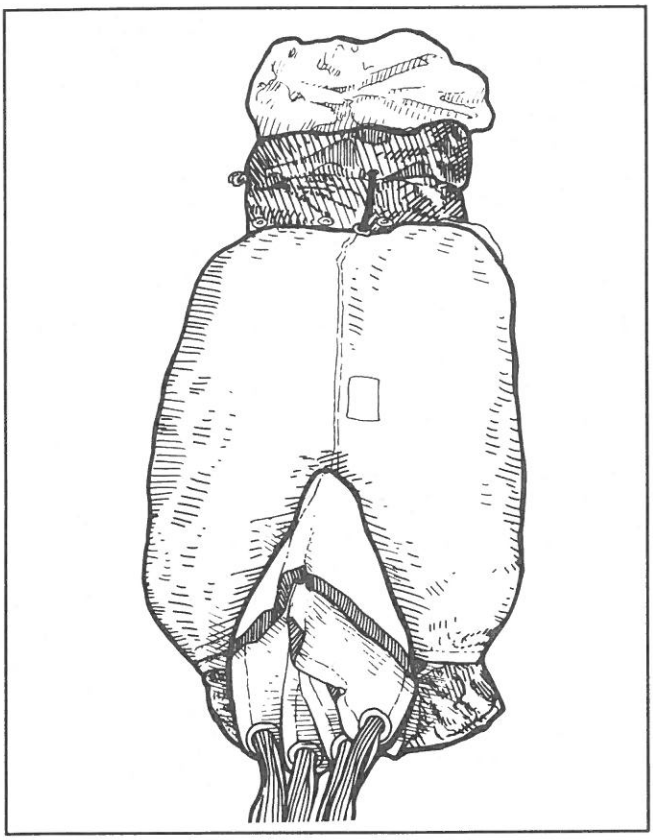


Mate the toggle Velcro with that on the riser. Check to be sure the tapered end of the toggle is completely seated in the loop. (It shouldn't be inserted past the end of the taper, or it may be difficult to extract in the air.)

3. Fold the bight of line between the toggle and loop with 3-inch folds and stow it in the Velcro tab next to the toggle.



4. Repeat the procedure for the left-hand toggle.

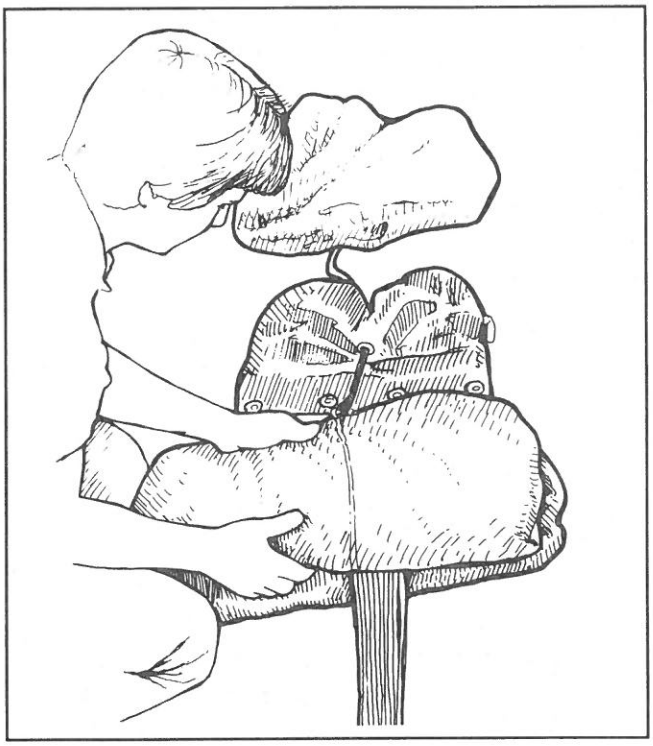


Flaking, Folding and Bagging

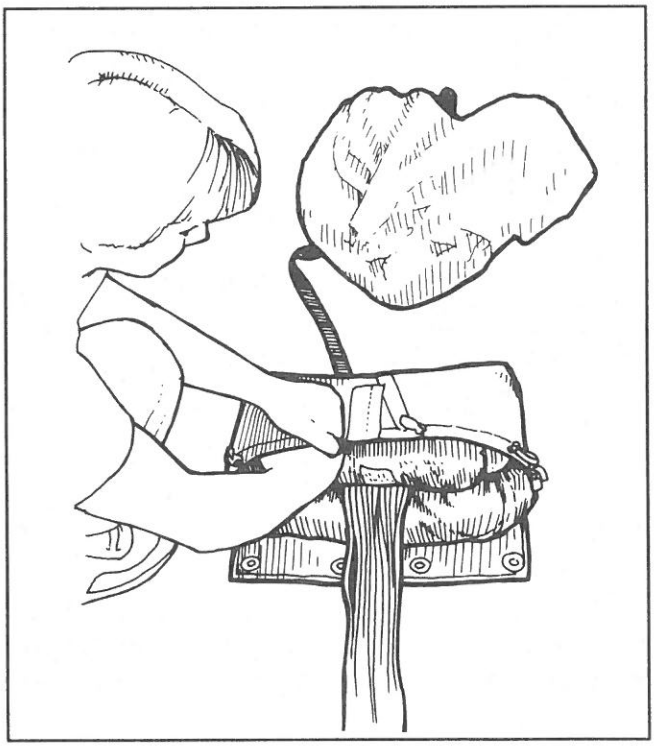
1. Lay out, flake and fold the canopy according to the canopy manufacturer's instructions. Be sure the canopy is folded as wide as possible so that it will fill the corners when put in the bag.

break

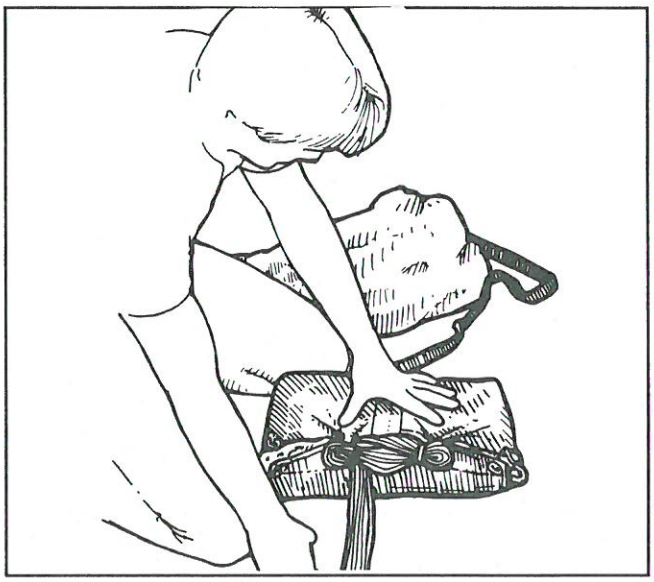
2. Stack the canopy on itself so that it is about the depth of the bag.

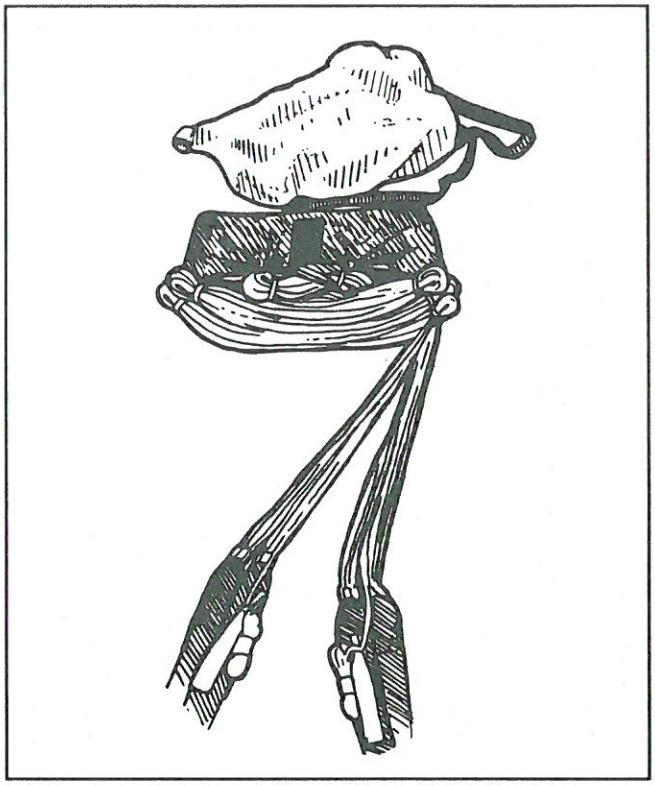


3. Slide the canopy into the deployment bag, being sure to fill the corners completely.



4. The bag is held shut by four rubber bands located across the mouth of the bag; each of these rubber bands pass through a grommet located along the edge of the locking flap. To close the bag, pass one of the center two rubber stow bands through its corresponding grommet and insert a 1- to 2-inch bight of lines through the stow band. Repeat this step with the other center stow band and grommet. Then lock the band and grommet at each corner.



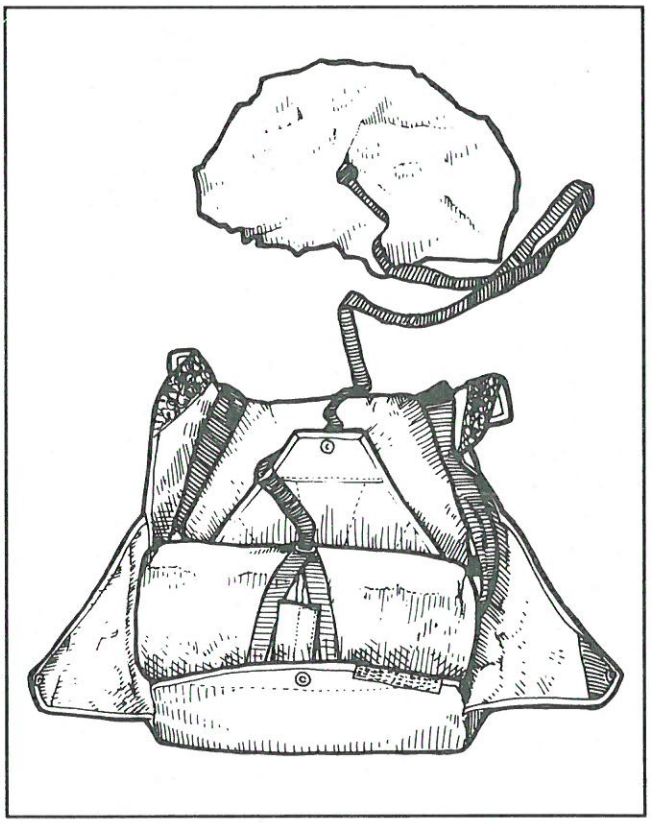


5. Stow the remainder of the lines across the bottom of the bag in the rubber bands. Keep the bights of lines 1 to 2 inches long. Leave no more than 15 inches of lines unstowed between the bag and the connector links.

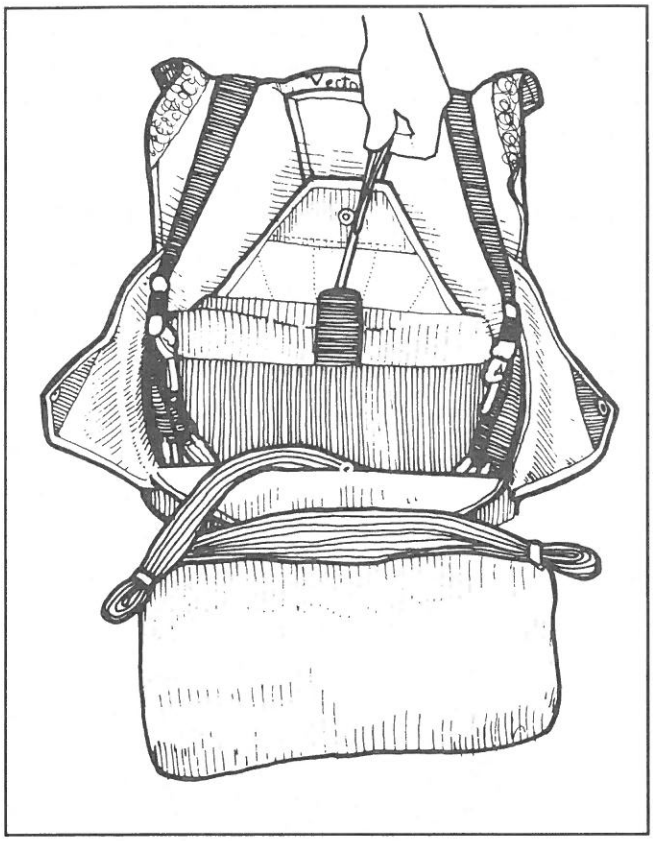
6. Pull the pilot chute bridle out of the top of the bag until you seat the canopy's metal ring against the grommet in the bag. Push any canopy fabric from the ring and grommet back into the bag with your finger; this prevents damage to the canopy fabric.

7. Use your knees or feet to "walk" on the bag, squeezing air out and distributing the bulk until the middle is no fatter than the sides.

8. Pick the bag up by its sides and set it into the container on its line stows.



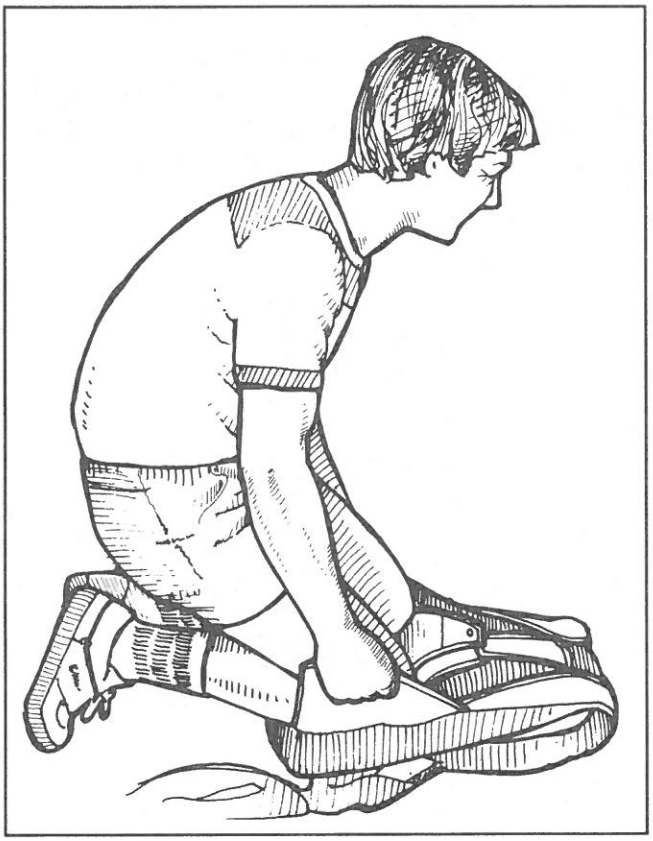
9. Gently roll the bag out of the way. Follow the risers over the shoulders of the rig and down along the sides of the main container. Lay the connector links into the container neatly against the sides making sure that no lines will wrap around them during canopy deployment.



10. Lay the bag down in the container with the line stows against the bottom flap. Push the top corners of the bag into the top of the main container so that the connector links are kept in place between the bag and the sides of the container. Make sure that none of the flaps are under the bag. Pull the bridle to its full length.

break

11. Kneel on the center of the bag and pull up the main container side flaps until the bag fills the container and is flush with the container.

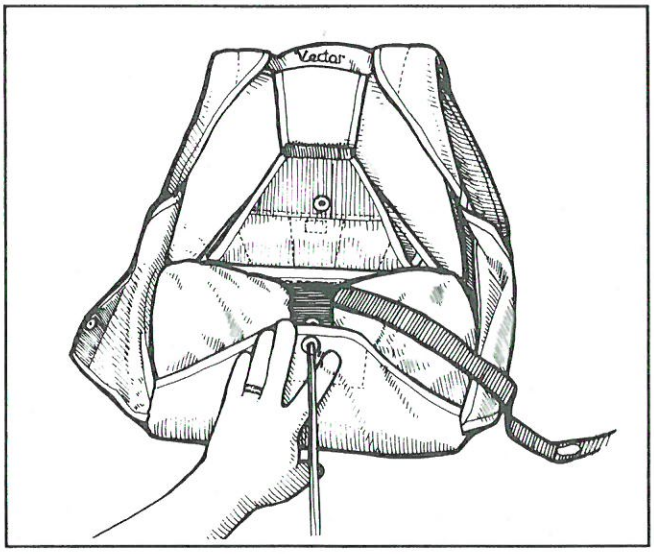


12. Close the riser covers by mating the Velcro.

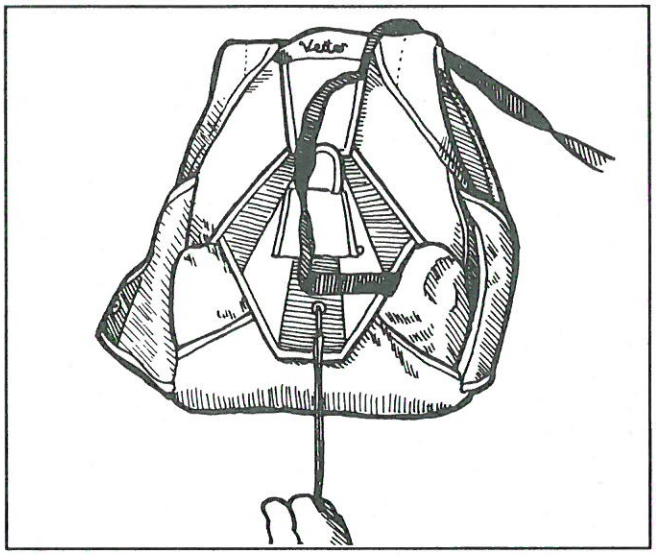
break

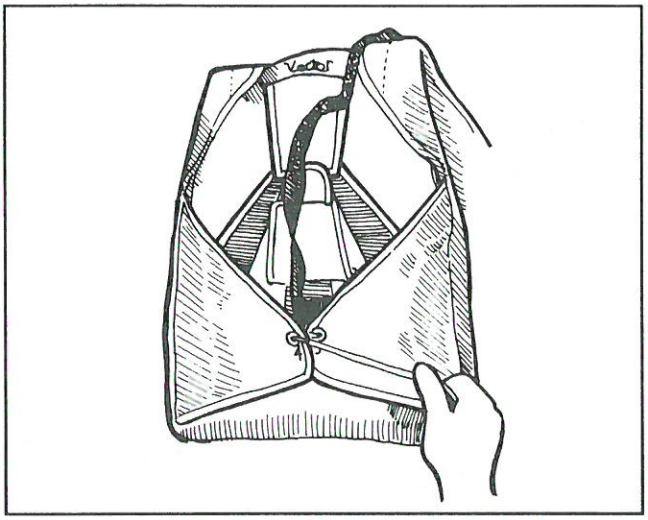
Closing the Container

A. Insert a pull-up cord through the locking loop at the top of the main container. Route the bridle to the right of the pull-up cord and out the top of the container. Thread the pull-up cord through the #1 bottom container flap grommet. Pull the pull-up cord upwards towards the top of the container. Pat the bottom of the container till the locking loop comes through the grommet. Avoid overstressing the grommet. Hold the locking loop in place with your knee.



B. Thread the pull-up cord through the #2 top flap and pull upwards again till the locking loop comes through the grommet. Place the bridle over the #2 top flap from right to left and attach the small piece of the yellow pile Velcro to the yellow hook Velcro on the flap.

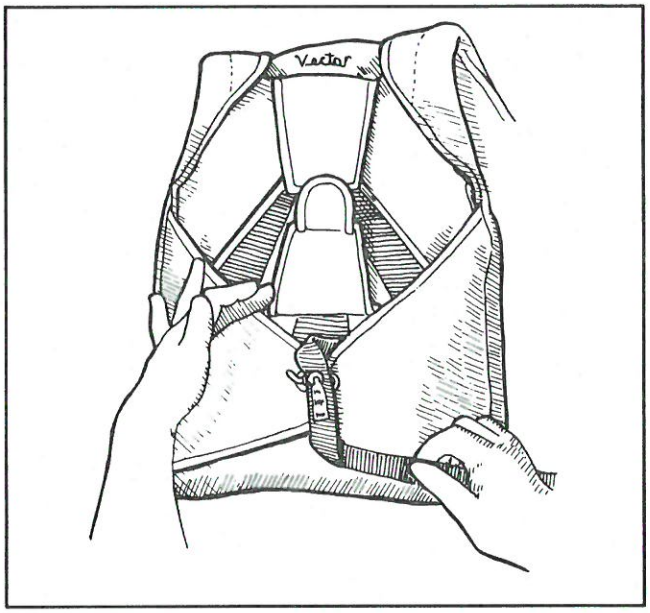




C. Thread the pull-up cord through the #3 right side flap and then through the #4 left side flap using the same patting technique. (The flaps must be closed in this order.) Insert the bridle's curved pin through the locking loop from right to left.

NOTE

Correct bridle-routing is critical if the Vector is to function properly. The position of the pin, whether it is from right to left or vice-versa, is much less critical as it will release from all possible angles.



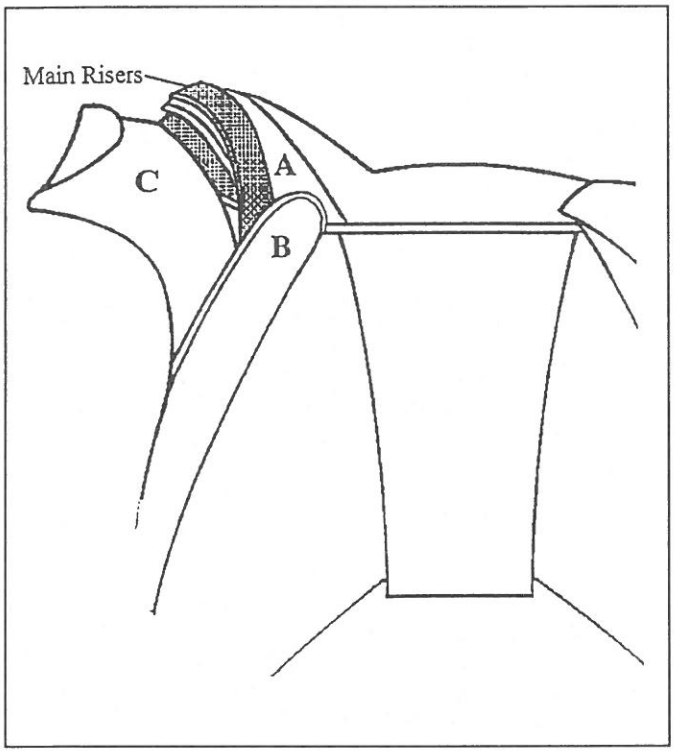
Vector III Riser-Cover Closing Instructions

The riser cover system on the Vector III has three component parts:

A) Tuck-tab pocket

B) Internal riser cover

C) External riser cover (with tuck-tab)



Proper Closing Sequence:

1. Place main risers on top of (not *under*) tuck-tab pocket (A).

2. Continue routing the main risers down along side the reserve container and close the internal riser cover (B) over the main risers.

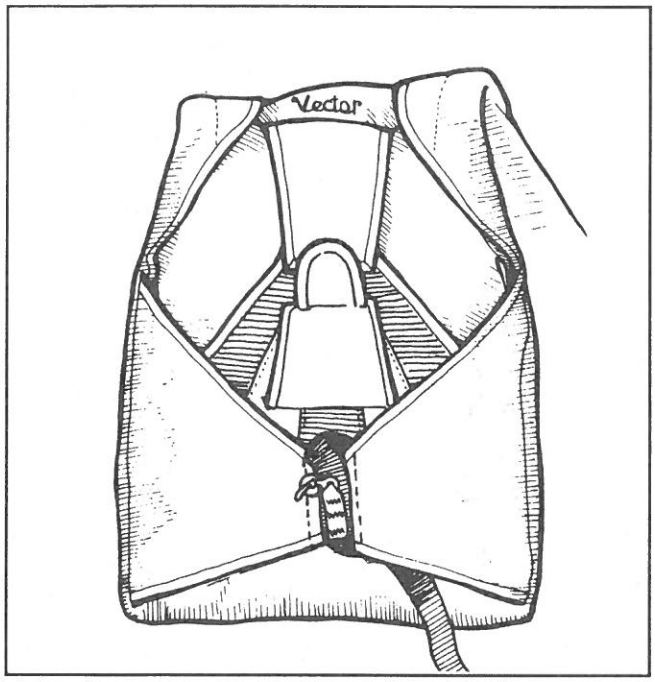
3. Close external riser cover (C) over the risers and insert tuck-tab into pocket (A).

4. Close main container by the numbers.

D. Slowly remove the pull-up cord to prevent excess friction from damaging the locking loop. It's best to pass the pull-up cord under the curved pin while extracting it, as doing so will reduce wear on the loop.

E. Double check the yellow Velcro patches to be sure they are mated properly. If there isn't enough slack in the bridle to allow this, make some by gently pulling the bridle out of the main container.

F. Tuck the excess bridle under the bottom edge of the right side flap. The pile Velcro on the bridle attaches to a strip of hook Velcro located on the bottom flap under the right flap.



Remove the pull-up cord or the container won't open in freefall.

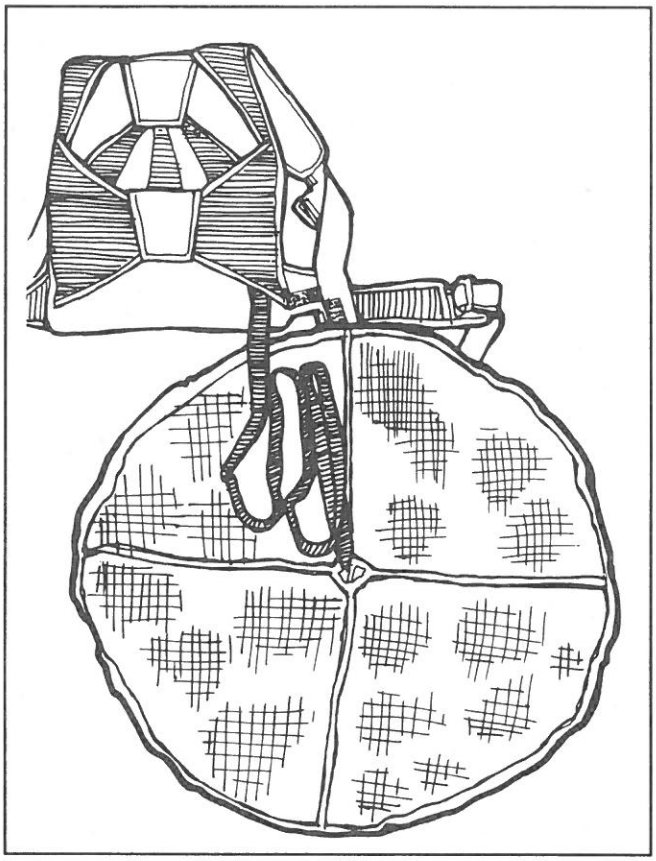
NOTE

It may be necessary to adjust the length of the locking loop to make the flaps align properly. Proper alignment will allow the main pin cover flap (when closed) to barely cover the vertical stitches (which pass through the plastic stiffeners) on side flaps 3 & 4. The curved pin should be held firmly in place, but a force of no more than 12 pounds should extract it and open the container.

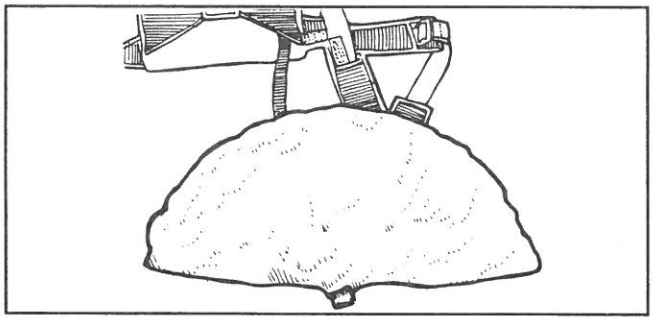
G. Check to be sure the bridle extends from the locking pin to the pilot chute without passing through the harness. Mate the Velcro on the bridle to the velcro on the #1 bottom flap; you'll have to tuck the bridle under the #3 right side flap to do this. Close the main pin cover flap and be sure it completely covers the pin and bridle.

Folding the Pilot Chute

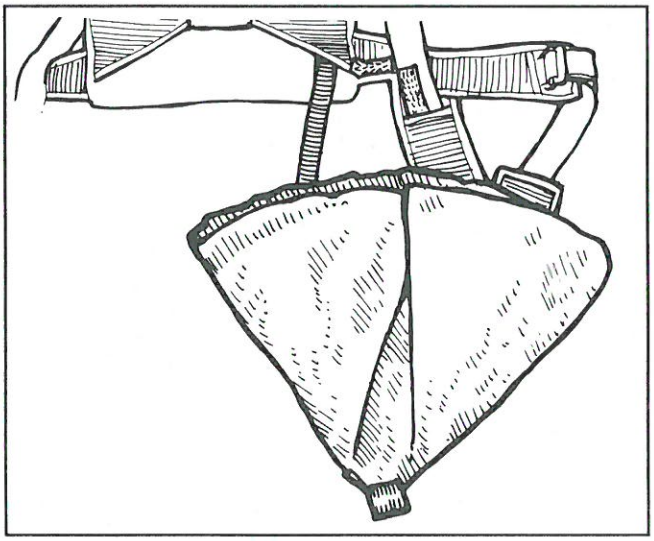
H. Lay the pilot chute out over the leg strap, mesh side up, so the edge of the circle is at the mouth of the Spandex pouch. S-fold the bridle on the half of the pilot chute over the pouch.



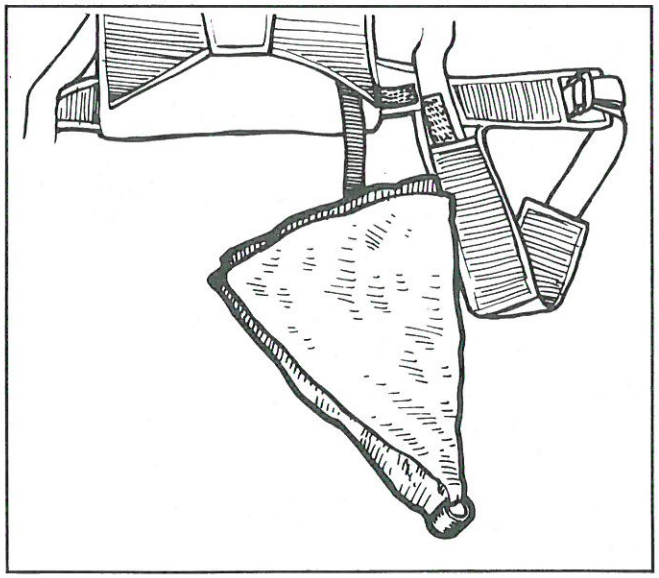
I. Fold the pilot chute in half over the bridle.



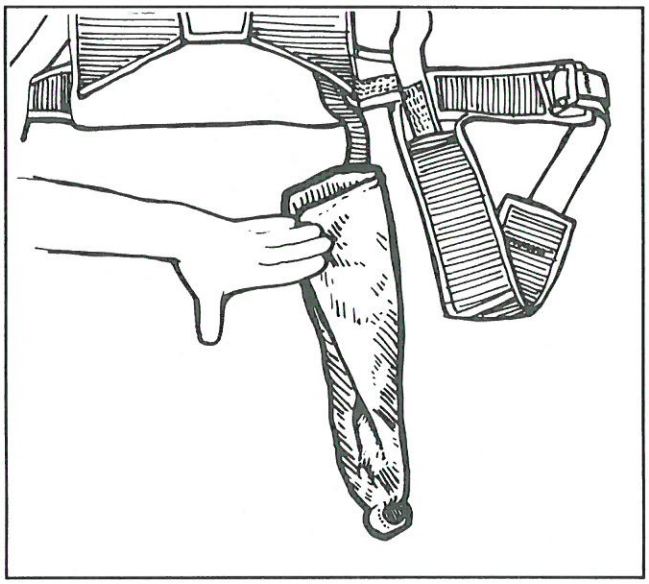
J. Bring the corners up to form a wide triangle.



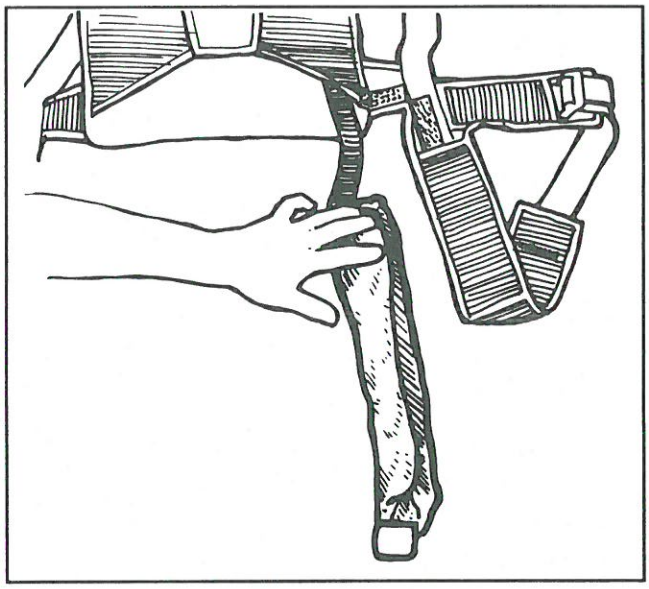
K. Fold the triangle in half, forming a smaller triangle.



L. Fold the triangle into thirds forming a skinny triangle.



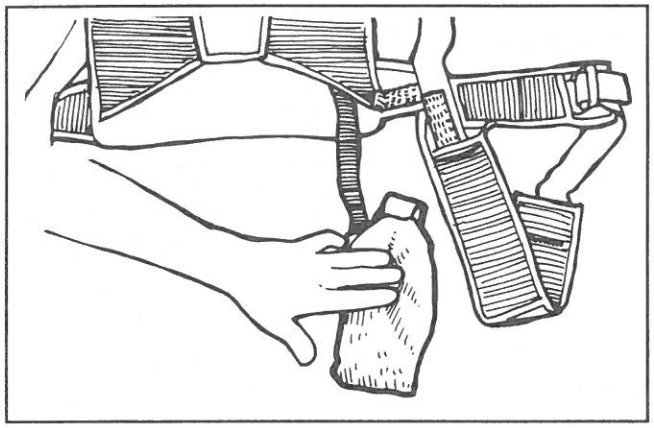
M. Fold once more in half, making a very skinny triangle.



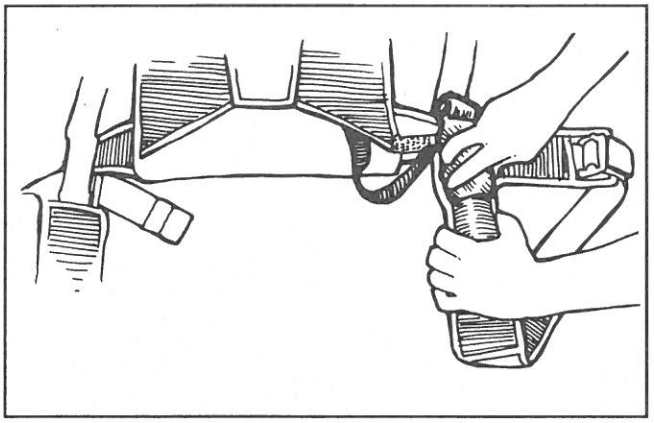
NOTE

If your Vector II is set up for "BOC" (Bottom of Container mounting for hand deploy), see the following section for packing instructions.

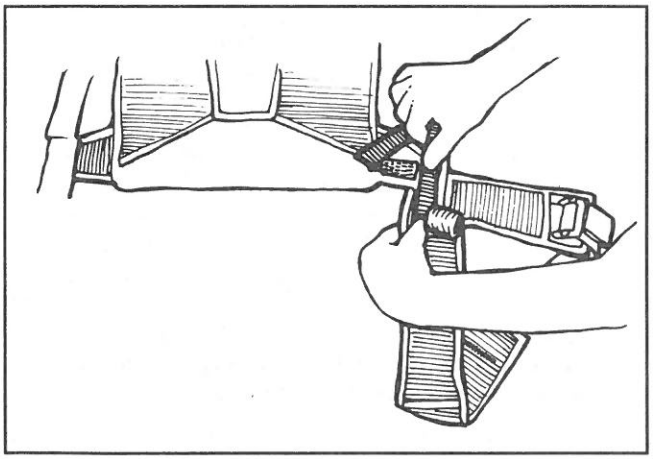
N. Fold the pilot chute in half so that the handle is even with the skirt.



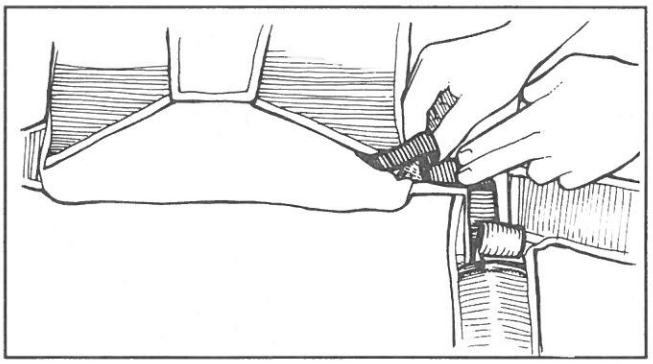
O. Stuff the folded pilot chute into the Spandex pouch, making sure only the handle sticks out.



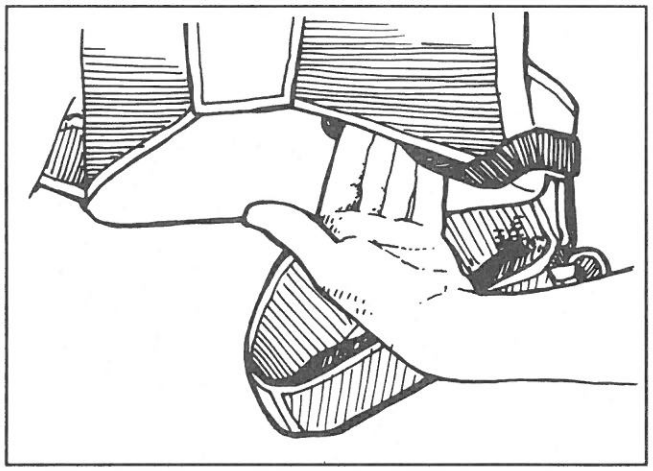
P. Mate the velcro on the bridle to that on the harness, starting at the mouth of the pouch.



Q. Fold the bridle over at a right angle where the leg strap meets the diagonal and continue mating the bridle to the container.



R. If there is any extra bridle (there should be very little), stow it under the right main side flap.



WARNING

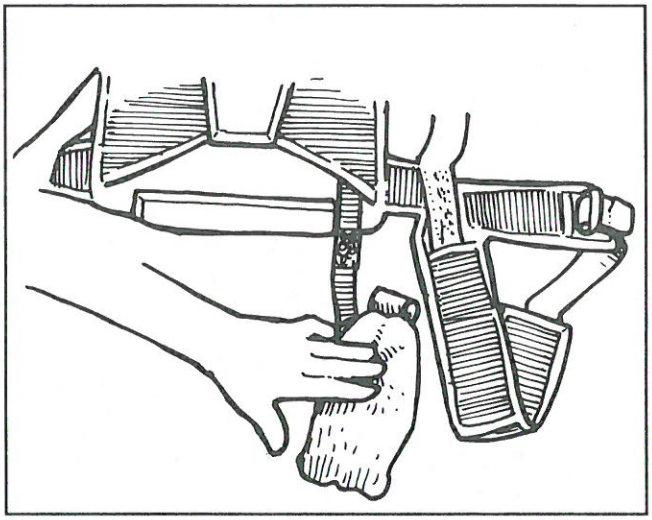
The force needed to extract the curved pin must not exceed 12 lbs. Adjust the length of the locking loop accordingly.

The small patches of yellow Velcro on the bridle and the top container flap must be mated. Failure to do this may result in a pilot-chute-in-tow malfunction.

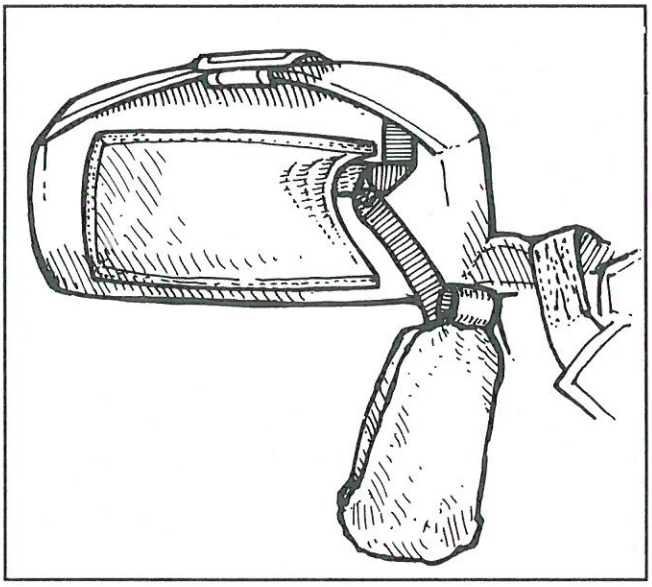
Never open the main container of a packed Vector and reclose it without removing the pilot chute from its pouch and extending the entire bridle. Doing so increases the likelihood of reclosing the Vector incorrectly and causing a pilot-chute-in-tow malfunction.

Bottom of Container Mounting For Hand Deploy Pilot Chutes

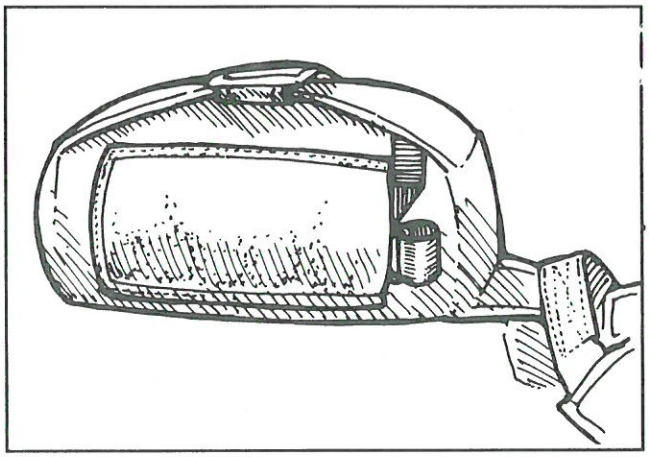
A. Fold the pilot chute following steps H-N on the previous pages. The bridle has two pieces of pile Velcro which are to be mated onto the two pieces of hook Velcro on the bottom main #1 flap. To accomplish this, you will have to make a 90 degree fold in the bridle.



B. Before inserting the pilot chute into the pouch, pat the bottom of the rig to flatten-out the pouch area. Doing so will allow more room to insert the pilot chute and will prevent a difficult extraction.

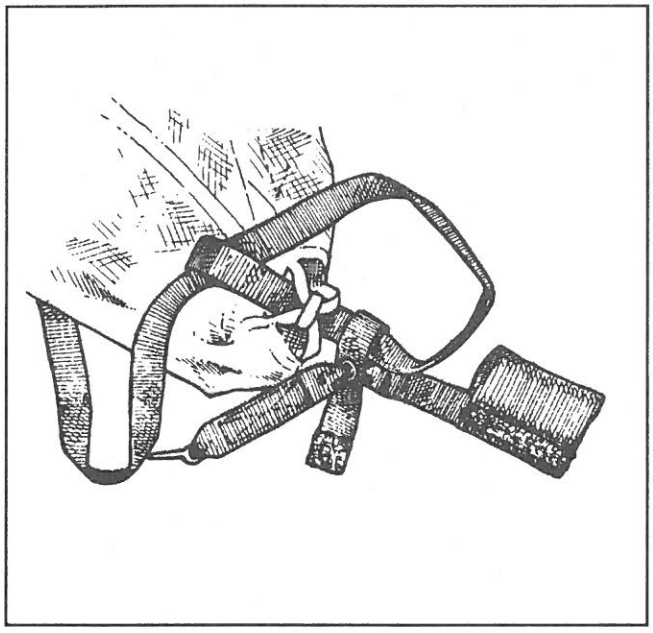


C. Insert the pilot chute into the pouch until only the handle is exposed. Once again, pat the pouch into a flatter shape which will reduce the amount of force necessary to extract the pilot chute.

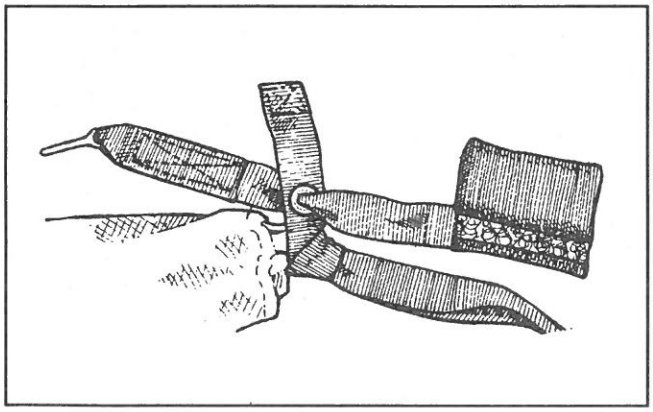


PACKING THE VECTOR II PULL-OUT DEPLOYMENT SYSTEM

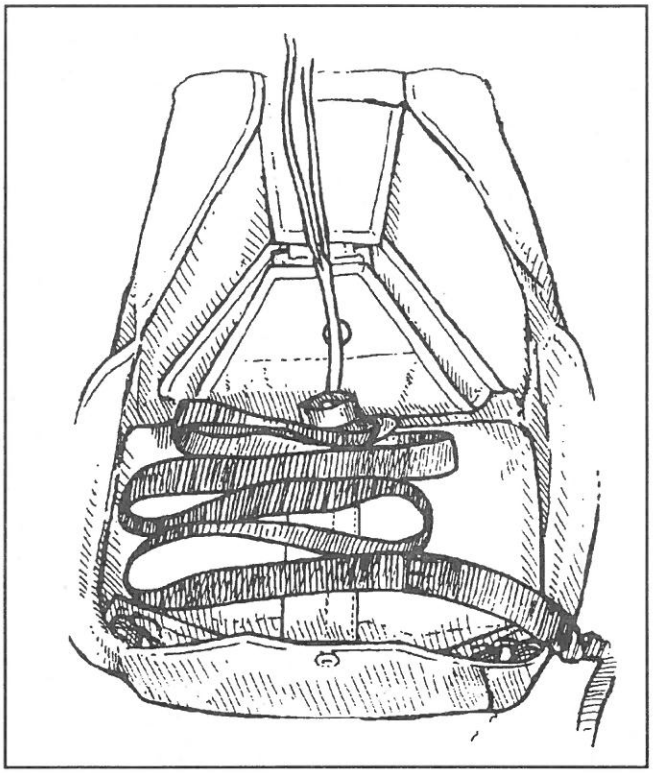
1. When a Vector II is to be set up with the pull-out main deployment system, the bridle/pin and handle setup must first be attached to the pilot chute. To do this, thread the end of the bridle with no Velcro on it through the loop on the handle/pin setup and then through the crossed tape and center line at the base of the pilot chute, and finally, back through the other end of the bridle .



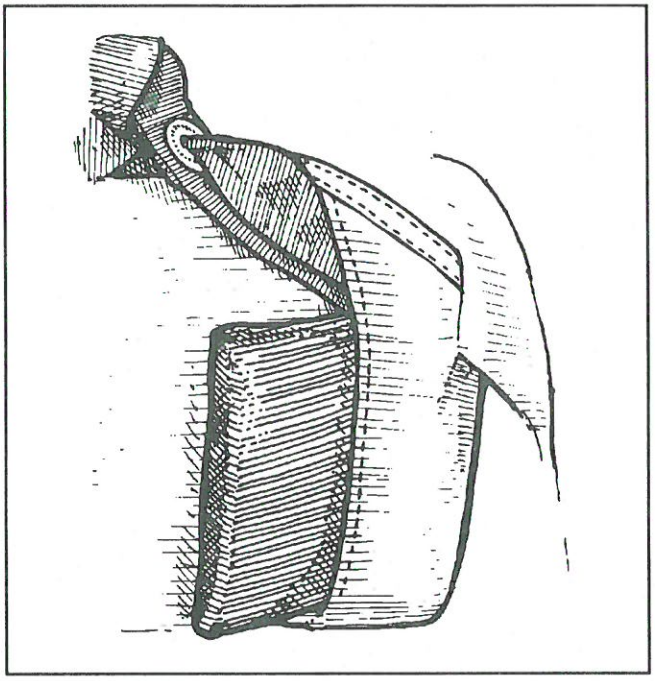
2. When tightened, the pilot chute/handle/pin setup should look like the illustration below.

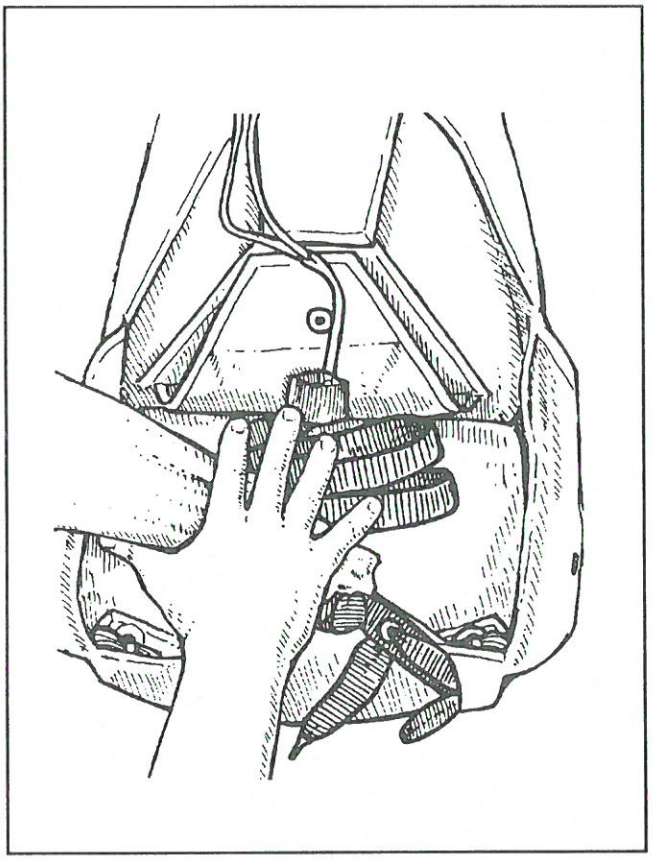


3. When closing the main, place the bag in the pack tray as usual, with the lines at the bottom of the container. S-fold the bridle over the bag as shown below.



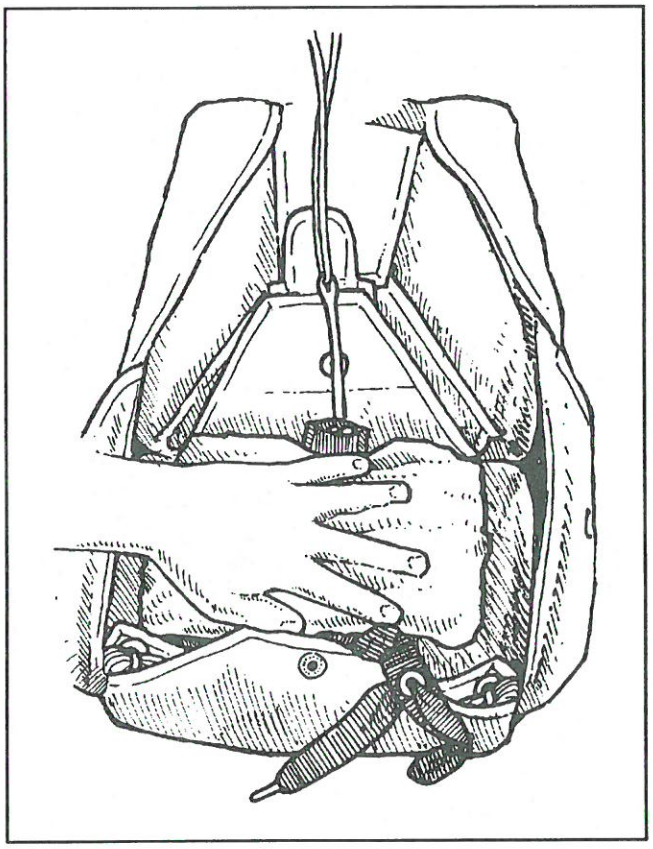
4. At the bottom right outside corner of the container is a flap. Secure the soft deployment handle to the Velcro under this flap, and the Velcro tab opposite the pin just above it as shown below.





5. Extend the pilot chute and lay the mesh section on the main bag as shown above at right.

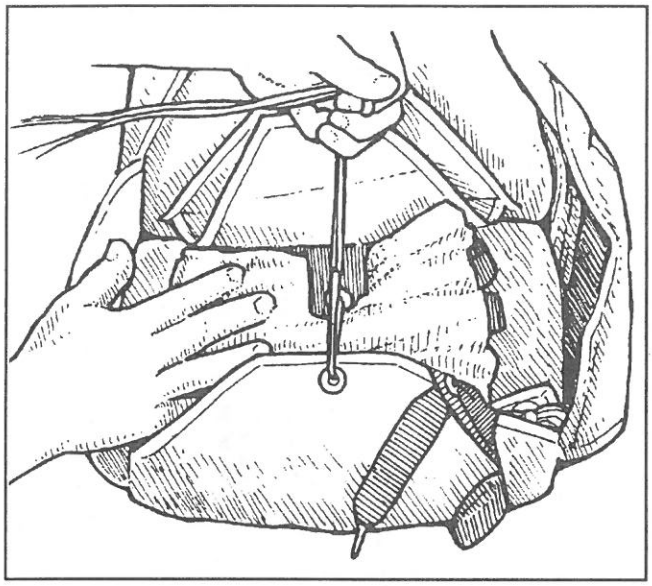
6. S-fold the stretched-out pilot chute on top of the bag so that it fits over the main bag, and is centered as shown at right.



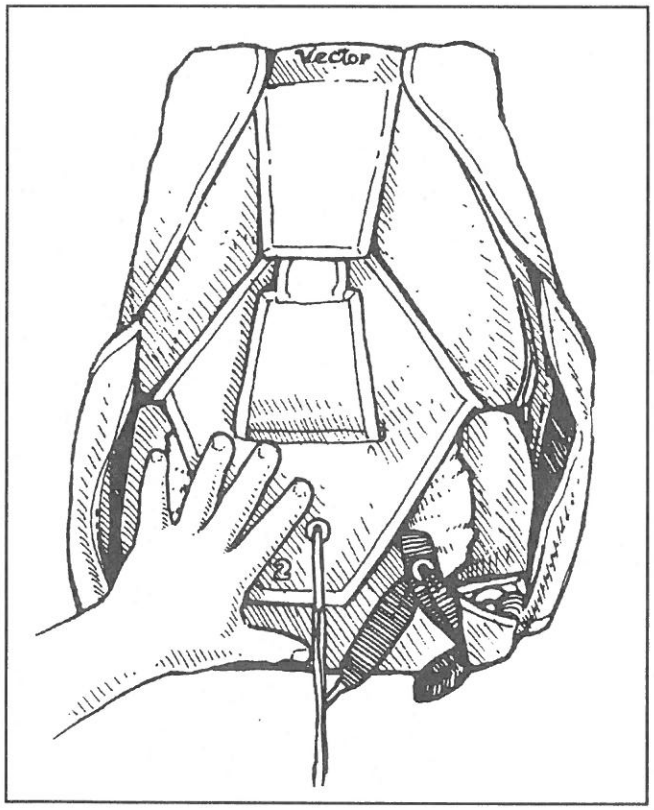
WARNING

DO NOT place pilot chute or grommet with Velcro tab into the extreme right bottom corner of the container. This could cause a hard pull, or impossible pull situation if the grommet becomes lodged in the corner.

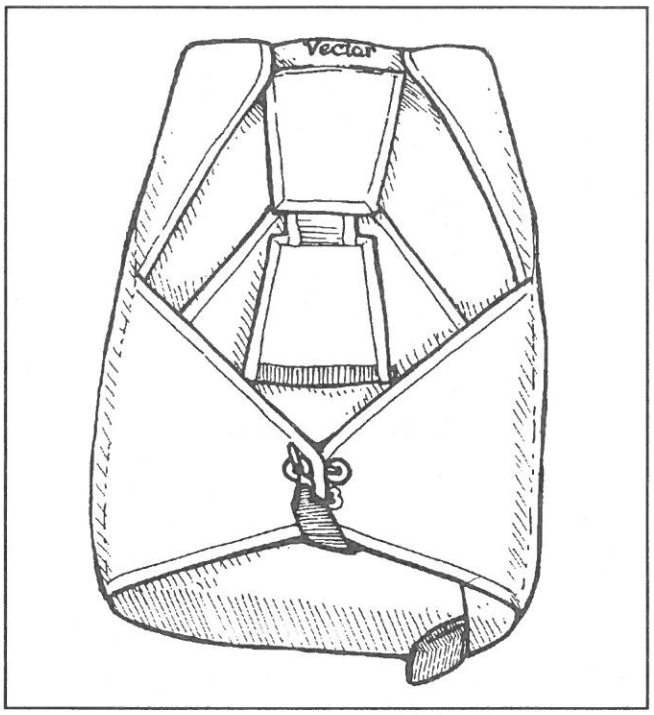
7. Thread a pull-up cord through the loop, and then through the bottom of flap #1 as shown in the illustration below, keeping the pin on the right side of the flap.



8. Close the top flap #2, again keeping the pin to the right and outside the flaps to the bottom, as shown below.



9. Close side flaps #3 and #4 and secure with the main pin as shown in the illustration below. Slowly remove the pull-up cord to prevent excess friction from damaging the locking loop. It's best to pass the pull-up cord under the pin while extracting it, as doing so will reduce wear on the loop. Close the main pin cover flap and be sure it completely covers the pin and bridle. Tuck any excess bridle under the right side flap.

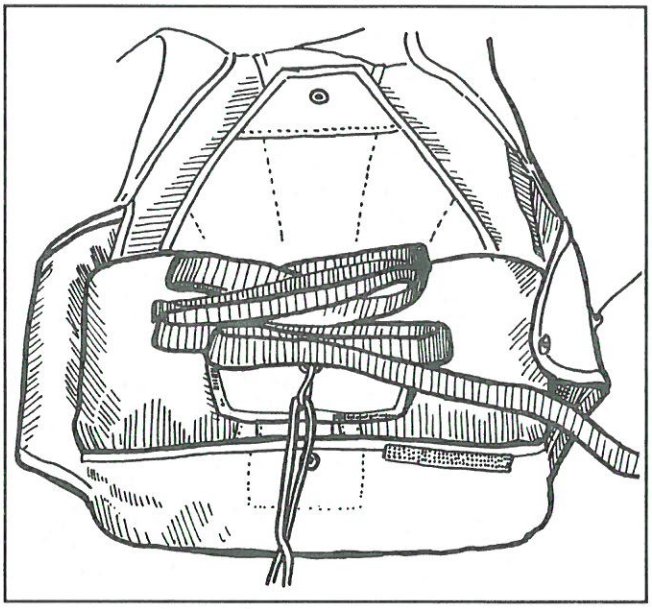


WARNING

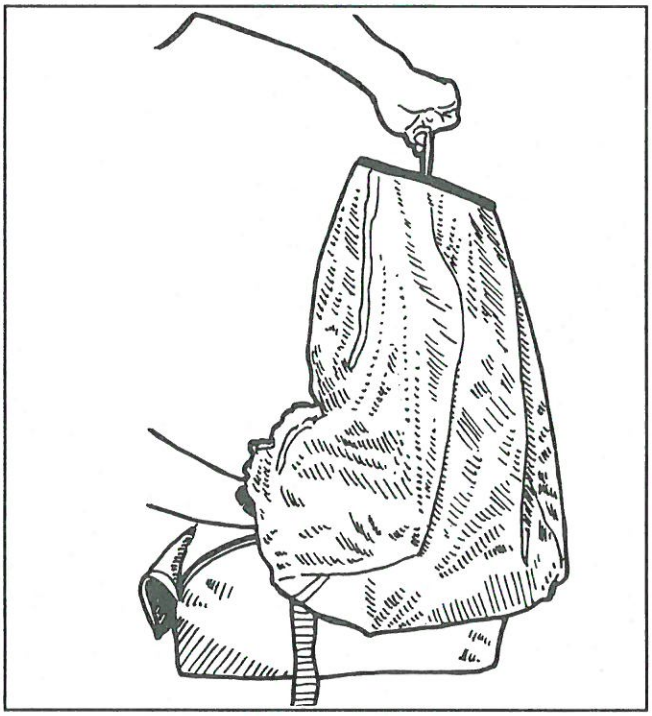
Failure to remove pull-up cord before jumping will result in a hazardous "pilot-chute-in-tow" malfunction.

PACKING THE VECTOR II RIPCORD DEPLOYMENT SYSTEM WITH KICKER FLAP

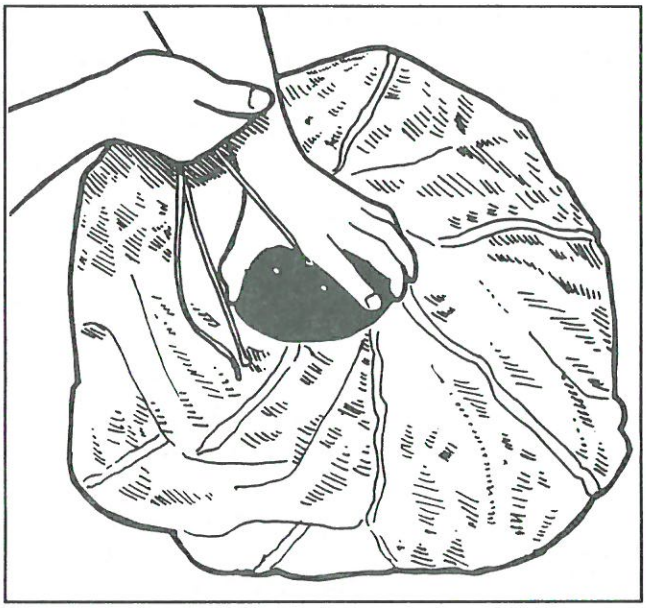
A. S-fold the bridle neatly on the kicker flap, then thread the pull-up cord through the loop on same flap.



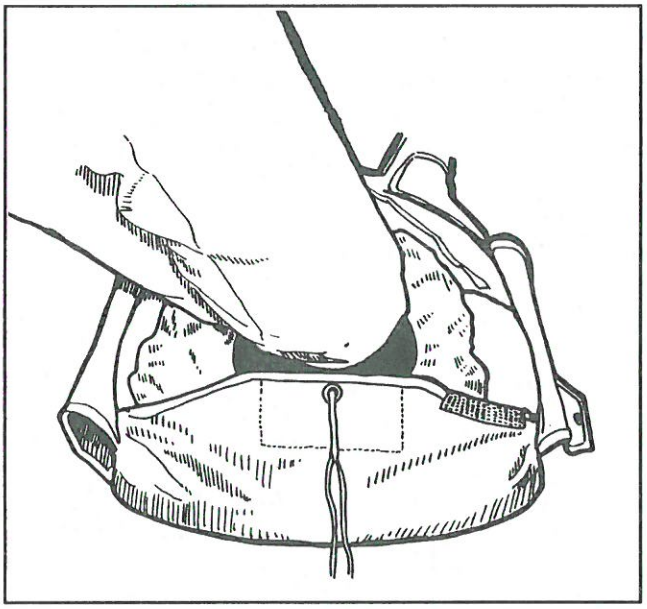
B. Thread the pull-up cord through the pilot chute from the bottom so it comes out of the grommet on the cap (top).



C. Compress the pilot chute on top of the kicker flap.



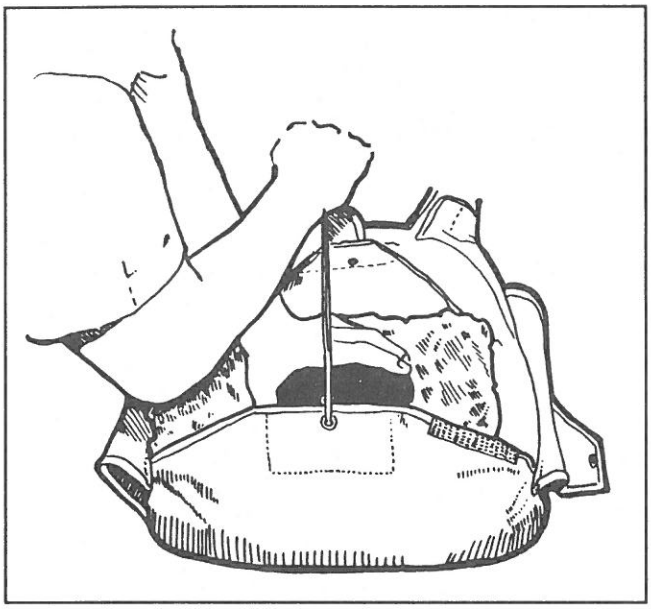
D. Use your knee to hold pilot chute in place and neatly fold the pilot chute material to within 2 inches of the pilot chute cap.



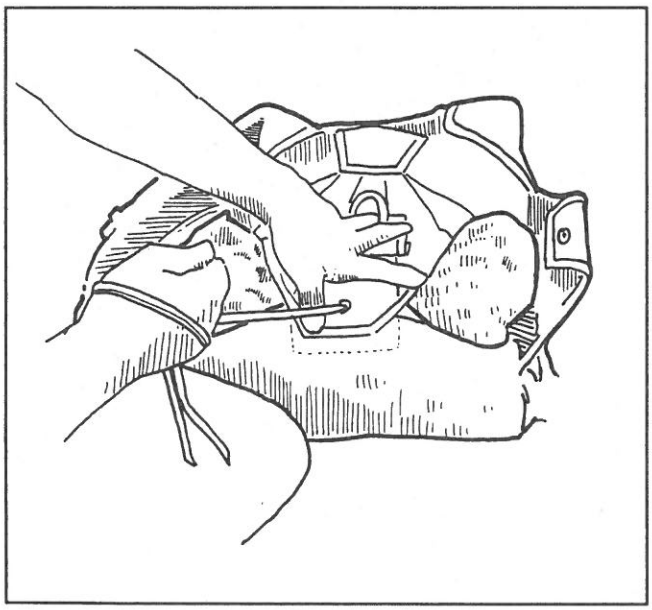
WARNING

Do not tuck pilot chute material around the sides of the bag. Doing this will inhibit pilot chute launch performance and possibly cause a dangerous pilot chute hesitation.

E. Keeping the pilot chute compressed, route the pull-up cord through the grommet on the bottom flap of the container. Pull the pull-up cord upwards, towards the top of the container. Pat the bottom of the container until the locking loop comes through the grommet. Avoid over-stressing the grommet. Hold the locking loop in place with your knee.

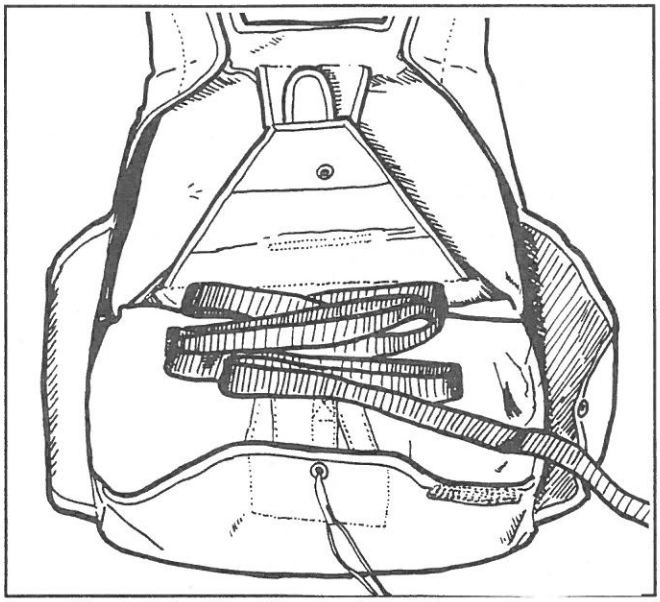


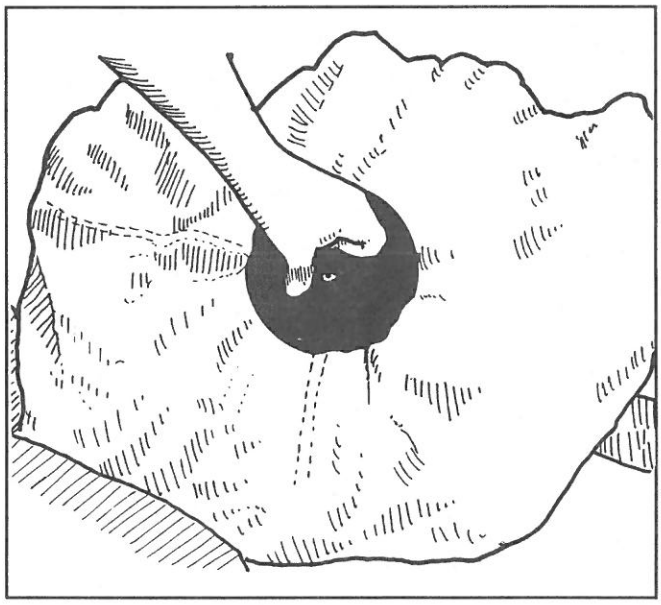
F. Route the pull-up cord through the grommet on the top flap and continue the closing procedure applicable to your system according to the instructions on page 24.



PACKING THE VECTOR II RIPCORD DEPLOYMENT SYSTEM WITHOUT KICKER FLAP

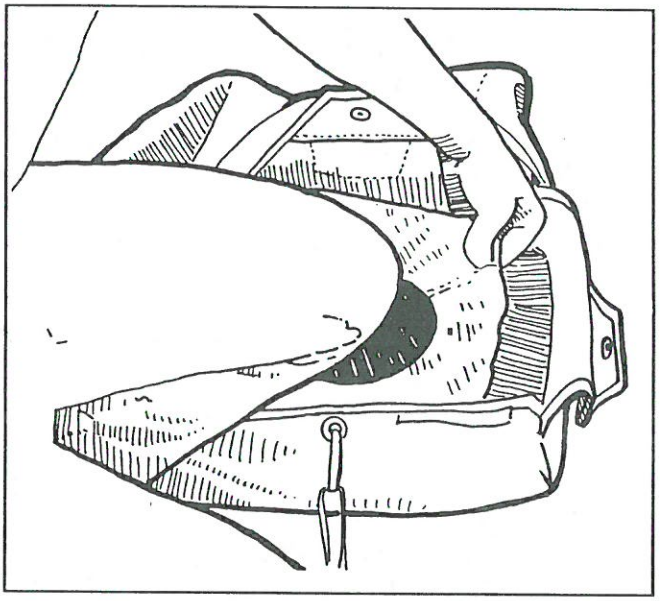
A. Insert the main ripcord into the housing. Place the bag in the pack tray as usual, with the lines at the bottom of the container. Neatly S-fold the bridle over the bag and insert the pull-up cord through the loop on the bottom flap.



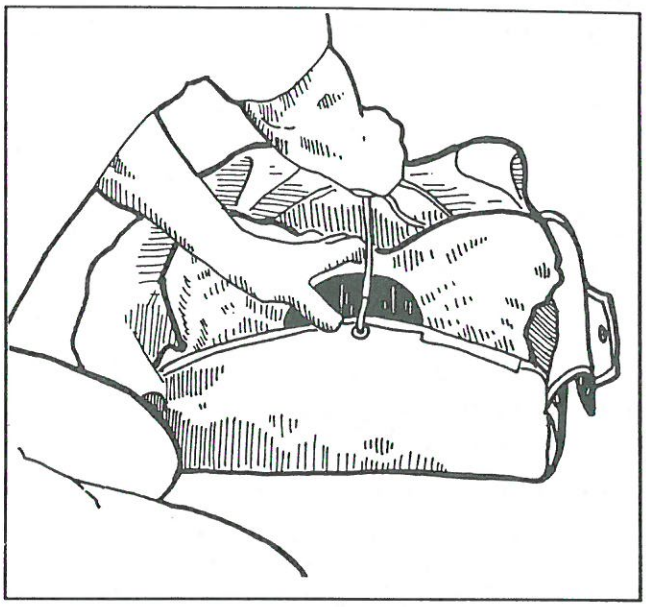


B. Center and compress the pilot chute on top of the bag.

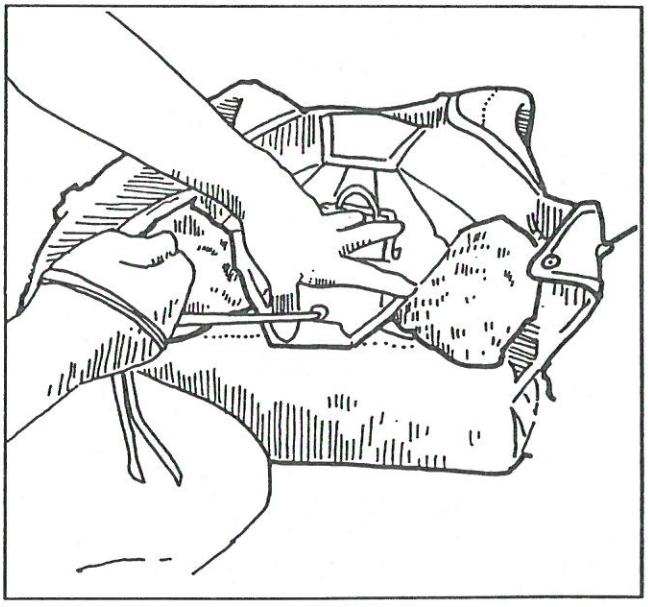
C. Use your knee to hold pilot chute in place and neatly fold the pilot chute material to within 2 inches of the pilot chute cap.



D. Keeping the pilot chute compressed, close the bottom flap over the pilot chute cap.



E. Route the pull-up cord through the grommet on the top flap and continue the closing procedure applicable to your system according to the instructions on page 24.



WARNING

Do not tuck pilot chute material around the sides of the bag. Doing this will inhibit pilot chute launch performance and possibly cause a dangerous pilot chute hesitation.

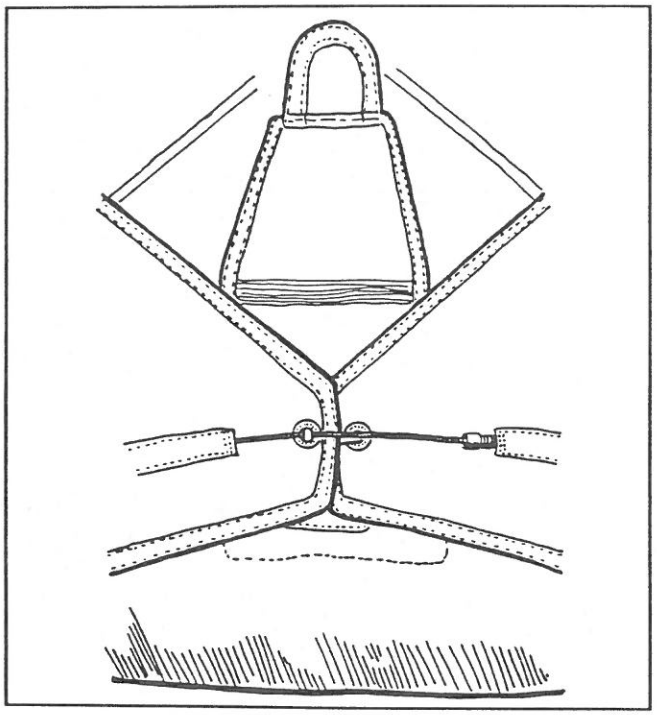
CABLE-TYPE RIPCORD CLOSURE

Close the right side flap, and then the left side flap. Insert the end of the black cable through the locking loop and then into the channel on the left side flap.

NOTE

The angle at which the main ripcord housing lays on the right side flap may vary, but the flap closing order remains the same.

Slowly remove the pull-up cord to avoid burning the cable or locking loop from excess friction. Close the pin cover flap.



WARNING

REMOVE THE PULL-UP CORD OR THE CONTAINER WILL NOT OPEN.

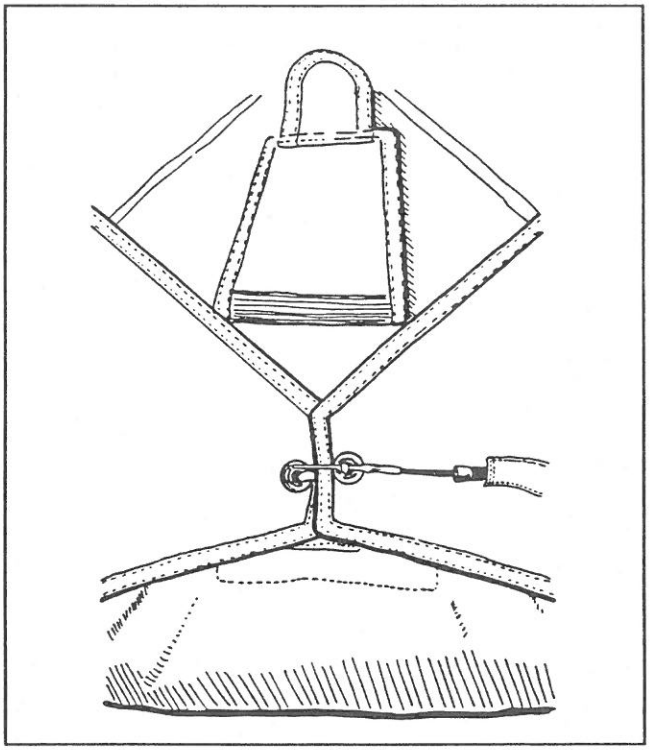
PIN-TYPE RIPCORD CLOSURE

Close the left side flap, and then the right side flap. Insert the end of the pin through the locking loop.

NOTE

The angle at which the main ripcord housing lays on the right side flap may vary, but the flap closing order remains the same.

Slowly remove the pull-up cord to avoid burning the locking loop from excess friction. Close the pin cover flap.



WARNING

REMOVE THE PULL-UP CORD OR THE CONTAINER WILL NOT OPEN.

ATTENTION RIGGERS

Before packing any Vector, be sure all TSO labels are properly in place. Each system is built with two labels; one is located under the yoke area and is attached to the data card pocket next to the reserve top flap. The second label is attached to the backside of the right Type 7 reserve riser.

The information contained on the TSO label is: Type (size), serial number, date of manufacture, and main lift web size (MLW).

Bright orange warning labels (6" x 8") are built into a Vector at the customer's request, consequently not all Vectors have warning labels. The labels are built into the backpad, not sewn on top of the backpad. Removal of the warning label is quite obvious and would invalidate any and all applicable TSO approvals.

DO NOT PACK ANY RESERVE INTO A VECTOR II SYSTEM THAT HAS HAD ITS WARNING LABEL REMOVED. REMOVAL OF THE WARNING LABEL VOIDS ANY AND ALL FAA TSO APPROVALS.

Before installing any reserve canopy into a Vector II harness and container system, check the pack volume of the reserve canopy to be sure it is compatible with the size container that it will be packed into.

Appendix A & B on the following pages define the Vector II container pack volumes and the known pack volumes of many different reserve and main canopies. If you are in doubt regarding the compatibility of the canopies which you are packing, call the Relative Workshop for clarification.

Appendix A
Tips on Sizing Your Vector II

This chart was designed to give you an idea which main and reserve canopies are compatible with one another in the Vector II harness/container system. If you already have a preference for a certain main and reserve canopy, then check the known pack volume in Appendix B and determine if they will fit in the same container. If not, then another main or reserve must be selected.

If you are going to be installing an FXC automatic activation device, you need to add 45 cubic inches to the pack volume of your reserve canopy.

Both Appendix A & B should serve as a reference *only* when determining which Vector II container will best fit your canopies. Many factors influence a canopy's pack volume in the Vector II including humidity, temperature, color of fabric, experience of the packer as well as the date when the parachute was manufactured.

Several years ago the industry was confronted with the "mystery bulk condition." It caused many of the newly manufactured canopies to increase in volume as much as 20% over canopies that were produced only a few years earlier. The industry wasn't prepared for this surprise and consequently many containers were built that were too small for their intended parachutes .

This chart shows the pack volume (in cubic inches) of the various sizes of Vector containers. If a canopy has a packed volume within the given range, it should fit comfortably.

Size Designation	Type	Main Min.	Main Max.	Reserve Min.	Reserve Max.
EST-2	ET	225	260	200	240
EST-3	ET	280	320	250	300
EST-4	ET	300	360	250	300
V1-1	ET	280	350	250	280
V1-2	ET	360	420	270	350
V2-2	ET	400	480	300	390
V3-1/2	S	390	490	300	390
V4	S	390	490	330	430
V4-1/2	S	450	550	350	480
V5	S	425	550	330	430
V5-1/2	S	450	580	350	480
V8	Std.	460	580	350	500
V9	Std.	550	700	425	530
V9-1/2	Std.	550	700	515	645
V10	Std.	610	780	425	530
V10-1/4	Std.	610	780	515	645
V10-1/2	Std.	800	1000	425	680
V11	Tandem	675	960	850	960
V12	Tandem	900	1100	900	1000
V13	Tandem	1050	1300	960	1100
SM STYLE	S/Std.	500	690	270	370
REG STYLE	S/Std.	750	900	350	420

Tips

1) On your order form, give all the information about your canopies: The date of manufacture (or state that it is a new canopy), the type of suspension line, etc.

2) Whenever possible, size the container to fit the mid-range of the stated pack volume.

3) If you are a dealer ordering a Vector II, please let us know the state or country of origin of your customer. This will help us decide if the container fit is borderline.

Example: A V5 has a main pack volume range between 425-550 cubic inches. When choosing canopies, keep in mind that a main canopy with a stated volume of 548ci may not fit. The reason is canopies which are the same model, produced by the same company, but are made of different colored fabrics or manufactured at different times can have a pack volume that varies quite a bit.

We have found that the pack volumes given by the canopy manufacturers are usually 5–20% less than the actual pack volumes that have been determined by the Parachute Industry Association.

If you jump in regions that have low humidity, such as Colorado or Arizona, you may need to go up one container size for the canopies to fit properly.

For this reason the Relative Workshop reserves the right to change the container size when we know your choice will not fit. In most instances, you will be informed of the change.

Also consider that a canopy with a pack volume at the low-end of the scale will pack easier and will be more comfortable than a canopy that is at the high-end of the scale, which will be more difficult to pack and potentially less comfortable to wear.

Note: This information is subject to change at any time without incurring any obligation whatsoever.

Appendix B
Canopy Pack-Volumes

Listed here are the many canopies in use today. After choosing a main and reserve canopy, refer to Appendix A to determine if the two canopies are compatible together in the same container.

Since the discovery of the "Mystery Bulk Condition" several years ago, the Parachute Industry Association has measured pack-volume to determine exactly how much volumes have increased. PIA has found that the pack-volumes of many parachutes have increased from 5% to 20% as a result of the Mystery Bulk Condition. Canopies lined with Spectra or Microline may have a 4-7% decrease in pack volume compared to canopies with conventional lines.

The dates listed after some canopy names are the manufacturing dates. Notice how newer canopies have larger pack-volumes than earlier versions.

Those canopies which are listed without manufacturing dates have pack-volume numbers supplied by the manufacturer.

Note: This information is subject to change at any time without incurring any obligation whatsoever.

Main and Reserve Canopy Sizes and Volumes

MAINS

Aqutron 240 551
Aqutron 260 599
Aqutron 280 588
AR7 151 RW/CRW 287/390
AR7 163 RW/CRW 316/416
AR7 177 RW/CRW 346/452
AR7 191 RW/CRW 375/487
AR7 205 RW/CRW 390/518
AR7 220 RW/CRW 416/548
AR7 235 ..... 434/569
Astrobe 215 417
Atlantis 217 440
Avenger 214 457
Astrobe 215 417
Blue Track-BT 40-125 365
Blue Track-BT 50-150 400
Blue Track-BT 60-175 430
Blue Track-Bt 65-195 460
Blue Track-Bt 80-420 ..... N/A
Bogey 178 (6-87) 378
Bogey 229 (6-87) 474
Bogey 9-193 (6-87) 471
Bogey 9-150 374
Bogey 9-175 457
Bogey 9-200 403
Challenger RW 160 400
Challenger 162 600
Challenger RW 180 450
Challenger 180 625
Challenger 198 660
Challenger RW 200 480
Challenger 208 690
Challenger 218 710
Challenger RW 220 530
Challenger 228 750
Challenger 238 785
Challenger RW 240 600
Challenger 259 825
Challenger RW 260 620
Challenger 281 860
Challenger 304 910
Challenger 310 780
Challenger 328 975
Clipper 187 (3-85) 432
Clipper 187 (4-87) 497
Cloud Delta 240 569
Conquest 130 320
Conquest 150 342
Conquest 170 370
Conquest 190 417
Cricket 147 370
Cricket 147 (6-87) 385
Cruislite 220 476
Cruislite Beta 175 399
Cruislite XL 241 554
DC-5 282 556
Evolution 140 395
Evolution 160 520
Evolution 200 510
Evolution 240 560
Excalibur 120 443
Excalibur 135 474
Excalibur 150 497
Excalibur 170 514
Excalibur 190 550
Excalibur 210 (1-89) 610
Excalibur 230 ..... N/A
Falcon 150 351
Falcon 175 384
Falcon 195 427
Falcon 215 480
Falcon 235 518
Falcon 265 584
Falcon 300 662
Firelite 177 (4-87) 449
Firelite 177 (8-86) 410
Fury 220 496
Fury 220 (5-85) 454
Fury 220 (5-87) 538
Fury CRW 620
Gemini 9-260 537
Hercules V-10
Hummingbird 137 (6-87) ... 381
Interceptor 180 428
Interceptor 200 476
Interceptor 225 535
Interceptor 250 594
Laser 250 (5-87) 526
Laser 5-170 (3-87) 375
Laser 7-228 (4-87) 490
Laser 8-261 (4-87) 582
Laser 9-290 (4-87) 629
Laser 322 674
Lepton 202 465
PD Lightning 143 338
PD Lightning 160 390
PD Lightning 176 416
PD Lightning193 468
PD Lightning 218 520
PD Lightning 235 573
PD Lightning 253 627
Man O-War 319 (8-86) 629
Manta 288 (4-84) 621
Manta 288 (5-87) 701
Marauder 253 547
Maverick 200 452
Maverone 562
Mercury 7-200 411
Merlin 206 475
Meteor 213 492
Nimbus 225 537
Nimbus Beta 185 454
Nimbus XL 270 623
Nova 99 338
Nova 110 338
Nova 135 364
Nova 150 416
Nova 170 442
Para Foil 200 547
Para Foil-232 611
Para Foil-252 677
Para Foil-252 740
Para Foil-272 743
Para Foil-272 792
Para Foil-272 838
Para Foil-282 776
Para Foil-282 836
Para Foil-302 842
Para Foil-302 872
PD 150 375
PD 190 426
PD 260 545
PD-135 312
PD-170 360
PD-170 (5-87) 432
PD-190 (6-86) 436
PD-210 440
PD-210 (11-86) 493
PD-210 PIA 493
PD-230 480
PD-230 (11-86) 589
PD-235 500
PD-260 (11-86) 627
PD-260 (8-86) 545
PD-300 600
PD-340 748
PD-360 960
PD-421 1100
PD-500 1300
Pegasus 220 445
Photon 179 357
Polaris 223 465
Prism 220 451
Pursuit 230 RW 549
Pursuit 230 Std 608
Pursuit 245 620
Quark 260 497
Raider 220 (1986) 484
Raider 220 (pre-86) 535
Ranger 7-268 (12-86) 576
Ranger 9-343 735
Rascal 202 (4-87) 435
Rascal 262 (4-87) 594
Rascal 7-186 (3-87) 397
Rascal 9-236 (5-87) 553
Raven I-181 338
Raven II-222 364
Raven III-249 416
Raven IV-288 468
Robo 165 375
Robo 185 396
Robo 205 425
Robo 225 450
Robo Z 165 394
Robo Z 185 416
Robo Z 205 446
Robo Z 225 473
Sabre 97 240
Sabre 107 260
Sabre 120 286
Sabre 135 312
Sabre 150 338
Sabre 170 377
Sabre 190 416
Sabre 210 455
Sabre 230 494
Sabre 260 552
Scorpion 178 419
Sharpchuter 244 503
Sirocco 178 378
Spirit 211 496
Spitfire 176 402
Startrac I-265 536
Startrac II-290 608
Stingray 142 324
Swift 195 397
Unit 200 (F-111) 546
Vulcan 282 561
X-228 573
X-2Ten 210 424
XL Cloud 277 631
XL Cloud 260 715

RESERVES

Cirrus 230 (2-85) 443
Cirrus 230 (3-87) 503
Cricket 147 350
Cricket 147 (6-87) 385
Eagle 253 560
Firefly 175 (10-83) 384
Firelite (8-86) 368
Firelite 172 353
Firelite 172 390
Firelite 172 (6-87) 426
Fury 220 476
G2-R 2 421
G-228 421
Hawk 225 435
G3R-300 494
Hobbit 162 (1-85) 314
Invader 370 (6-85) 358
Invader 420 (6-85) 400
K-20 (4-81) 321
K-22 (12-84) 376
K-26 (12-84) 426
Laser 250 526
Laser 7-228 490
Laser 9-290 629
Maverick 200 432
Maverick 200 500
Micro Raven 120 221
Micro Raven 150 249
Micro Raven 150 318
Mighty Mak 360 (5-85) 710
NAA 26' Tricon 579
Orion 525
PD-126R 296
PD-143R 338
PD-160R 364
PD-176R 390
PD-176R (6-90) 430
PD-193R 442
PD-218R 481
PD-253R 520
Phantom 145 (3-87) 343
Phantom 180 (1-86) 369
Phantom 22 (4-85) 274
Phantom 220 457
Phantom 24 (3-87) 386
Phantom 24 (4-85) 332
Phantom 26 384
Phantom 26 (11-84) 384
Phantom 26 (4-87) 435
Phantom 265 547
Phantom 28 (1-85) 472
Preserve 3-1 (10-86) 439
Preserve 3-24' 384
Preserve 4-22' (12-82) 343
Prism 175 (10-85) 349
R2-3 (6-85) 321
R2-3 - 23' 394
R4-3 - 26' (6-85) 394
Rascal 202 436
Rascal 9-236 553
Raven 1 (11-84) 361
Raven 1 (5-87) 391
Raven 1 Kevlar (4-87) 401
Raven 2 342
Raven 2 (10-86) 474
Raven 2 (4-87) 457
Raven 2 (5-85) 400
Raven 2 500
Raven 3 (10-86) 512
Raven 3 (3-87) 515
Raven 3 (5-85) 478
Raven 4 (12-86) 570
Raven 4 (3-85) 506
Raven I 338
Raven I-185 351
Raven II 364
Raven II-218 400
Raven III 416
Raven III-249 478
Raven IV-282 468
SAC 22'(1-85) 395
Safety Flyer 152 (6-78) 468
Security Lopo 26' (2-73) 519
Sharpchuter 244 503
Strong 26' Lopo (5-86) 487
Strong 26' Lopo 482
Strong Lopo Lite 26' 444
Strong Lopo Lite 26' 426
Swift (6-87) 413
Swift 177 (4-85) 366
Swift Plus 145 320
Swift Plus 175 (10-88) 410
Swift Plus 225 442
Tricon 26' (2-86) 579
Vector 360 Tandem (11-86) 980
X-210-R 424
X-210-R (4-83) 458
24' T-10a (4-64) 661
26' Navy Conical 573
26' Semi Lite (5-86) 443
26' Tricon (2-86) 579
28' C-9 815
28' C-9 (6-78) 815

July 1992

3. Reserve Assembly Procedures

This chapter contains procedures for:

1. Attaching Vector II steering toggles to ram-air reserves.

2. Installing the Vector reserve lanyard (reserve static line or RSL).

3. Installing automatic activation devices (AADs).

Vector Reserve Freebag Sizes

The Relative Workshop produces seven different reserve freebag sizes.

The "V3" designation is given to all reserve freebags.

Bag Size	Compatible Containers
EST	EST 2, 3, 4
SMALL	ET 1-1, 1-2, 2-2, V3.5, V4, V5
MED	V4.5, V5.5, V8, V9, V10
CUSTOM	V9.5, 10.25, 10.5
TV-II	Tandem V11, V12
TV-12	Tandem V11, V12

Attaching Ram-Air Reserve Steering Toggles

Study the owner's manual for the reserve canopy before attaching the toggles to the steering lines. That manual contains important information pertinent to that particular make and model of canopy.

The Vector II is supplied with steering toggles for the reserve canopy that are compatible with the Vector risers. It is important that the toggles and risers be compatible to prevent malfunctions.

It is also important that the toggles be located along the steering lines so the canopy is in a true no-brake mode when the toggles are resting against the guide ring. If not, the canopy won't glide or land correctly.

Likewise, if the toggles are mounted too far down the steering lines, the canopy will be less responsive and the jumper might not be able to apply full brakes or stall the canopy. This can make it difficult to flare the canopy properly for landing.

These situations are likely to occur when a canopy is hastily switched from one set of risers to another. If the guide rings on both sets of risers are not located the same distance from the connector links, the steering toggles must be moved to another location on the steering line.

NOTE

Guide ring location on the reserve riser: The standard distance from the end of the reserve riser to the center of the guide ring is 4"(+-1/4"). Most rig manufacturers use this distance when constructing their harnesses.

Procedure

If the reserve is equipped with Dacron (polyester) steering lines, use Method A. If it is equipped with small-diameter Spectra (Microline), use Method B.

Attach the canopy to the risers following the canopy manufacturer's instructions. Double-check the orientation of the canopy and the continuity of the lines. Insure the links are tightened correctly.

Method A—Dacron Steering Lines

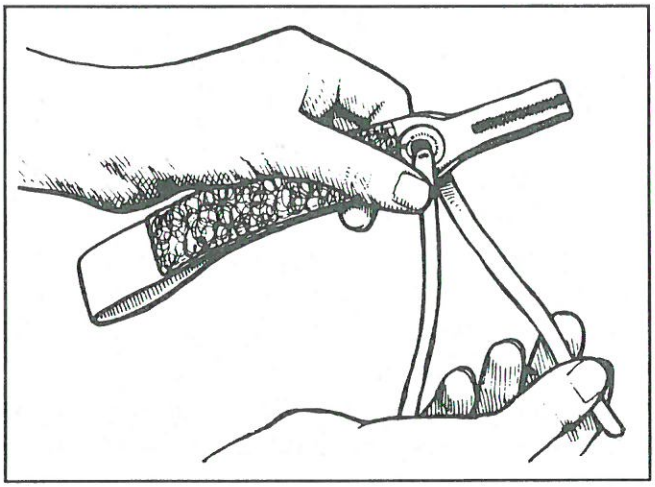
After the canopy has been properly attached to the risers and while it is still laid on its side, attach the toggles to it by following these steps:

1. Starting at the tail of the canopy, trace the upper steering lines down to the lower steering line. The idea is to be sure the steering lines are routed correctly; they should not wrap around any suspension lines. The right-hand steering line must pass through the right-hand rear slider grommet, and the left-hand line must pass through the left-hand rear slider grommet.

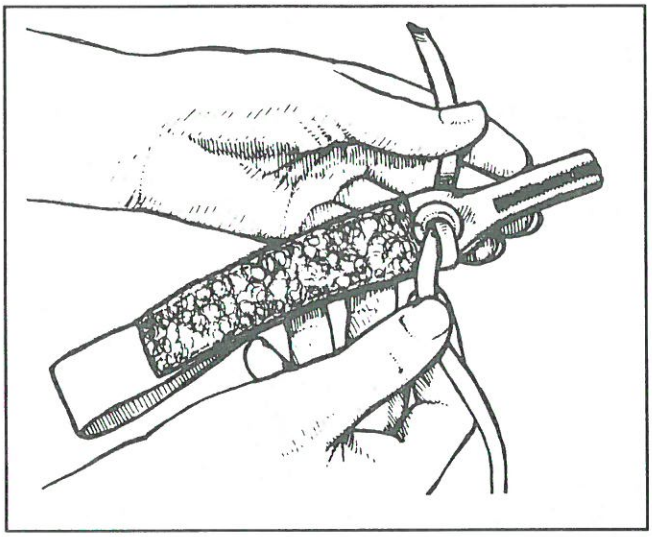
2. Locate the mark on the steering line that indicates the correct toggle location. Note: Verify that this mark is in the correct location by referring to the reserve canopy owner's manual.

3. Pass the steering line through the guide ring on the riser.

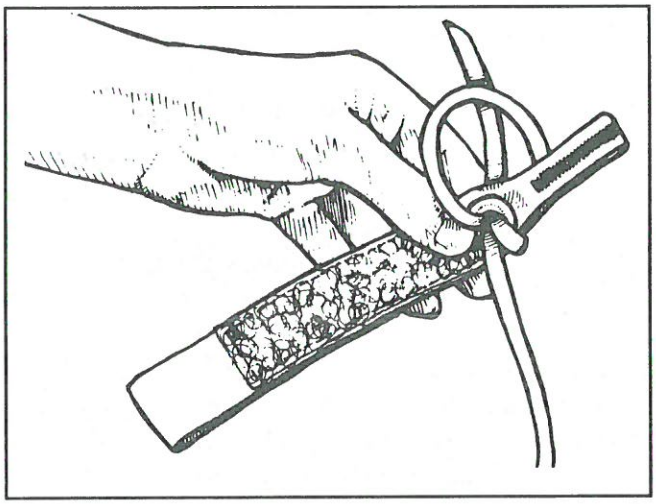
4. Pass the end of the steering line through the grommet in the Vector steering toggle, starting with the side with the Velcro pile. Adjust it so the mark on the steering line is close to the grommet but hasn't passed through it.



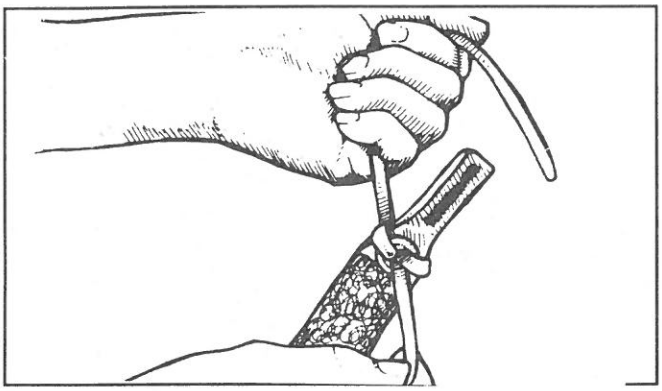
5. Loop the running end around the toggle and thread it through the grommet again and pull it snug. Be sure the mark remains in the correct place.



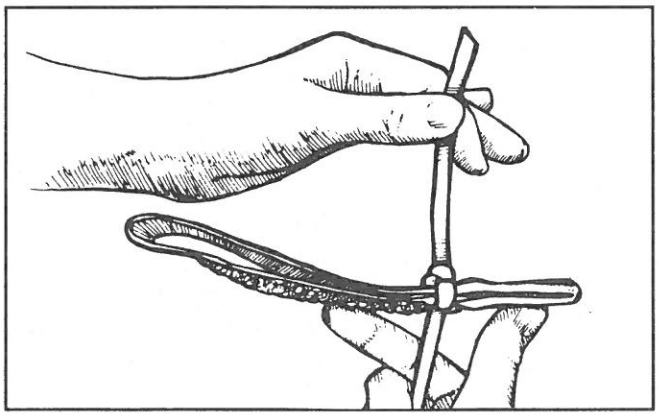
6. Loop the running end around the other side of the toggle and pass it through the grommet once again.



7. Grasp the line on both sides of the toggle and pull it tight. Note that the Velcro side of the toggle faces the canopy. The line does a "figure 8" through the grommet and exits on the other side of the toggle. Again check the mark to be sure it is in the right place.



8. Tie an overhand knot in the free end of the line and tighten it right down to the toggle. Be sure it is snug, or the toggle may slip off the line.



9. Check the canopy with the deployment brakes set and not set to be sure it is correctly configured. The canopy owner's manual contains the proper brake settings and steering line lengths; there are no standardized dimensions. Unless the lines are of proper length, the canopy may not open or fly correctly.

10. Once the measurements have been verified, tighten the overhand knot at the toggle. It is generally not a good idea to cut off the excess steering line, as you might want to adjust the toggles after the canopy has been jumped. Any excess line should be daisy-chained on itself.

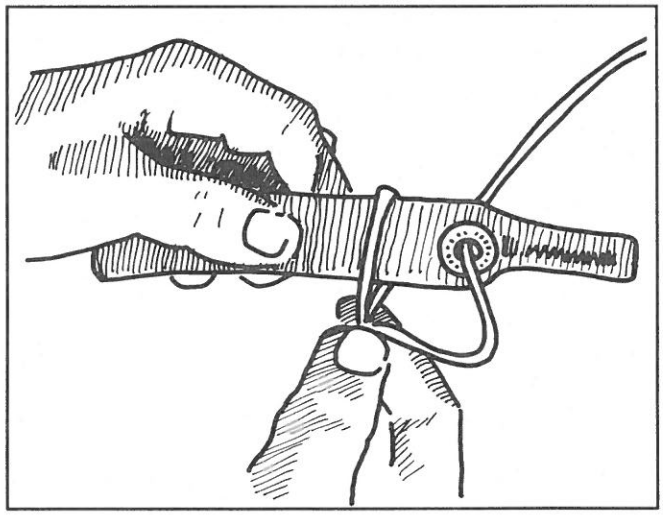
11. Inspect the installation. Check to be sure the steering lines are routed correctly.

Method B—Spectra Steering Lines

1. Starting at the tail of the canopy, trace the upper steering lines down to the lower steering line. The idea is to be sure the steering lines are routed correctly; they should not wrap around any suspension lines. The right-hand steering line must pass through the right-hand rear slider grommet, and the left-hand line must pass through the left-hand rear slider grommet.

2. Locate the mark on the steering line that indicates the correct toggle location. Note: Verify that this mark is in the correct location by referring to the reserve canopy owner's manual.

3. Route the steering lines through the guide ring on the riser. Then route it through the grommet on the toggle, starting with the side with Velcro. Wrap the steering line around the outside of the toggle, over the grommet. The mark on the steering line that indicates correct toggle position should be 1-1/4 in. (3 cm) from the side of the toggle.

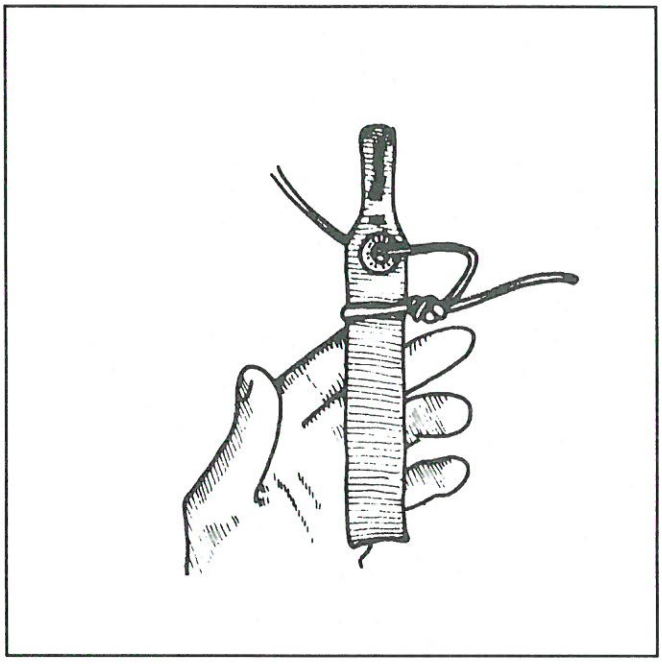


4. Slide the line off the looped end of the toggle and tie a loose overhand knot in the folded line.

5. Now slide the line back over the toggle. Adjust the knot until the mark is just outside of the knot away from the toggle. The loop should fit closely around the toggle. Tighten the knot.

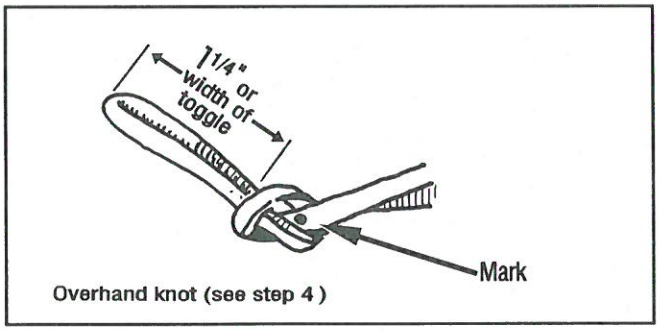
6. Pull on the steering line to draw the knot back up to the grommet. Daisy chain, finger trap or

tack the excess end of the steering line to the toggle. Don't cut the extra off; you may wish to adjust the toggle position later.



7. Repeat the procedure for the other toggle.

8. Inspect the installation. Check to be sure the steering lines are routed correctly.



Overhand knot (see step 4)

Installing a Reserve Lanyard (Reserve Static Line)

Installation without AAD

1. Inspect the RSL: Check that the snap shackle is operating smoothly and that the spring will retain the locking pin. Be sure the Velcro is clean and sufficiently tacky to hold the reserve lanyard. The pin should be curved from the eye to halfway down its length. The rest of the pin should be straight.

2. Route the RSL along its Velcro path from the right-hand riser. Insert the pin-end of the RSL through the guide ring on the #5 top reserve flap. Mate the patch of yellow pile Velcro on the top reserve flap.

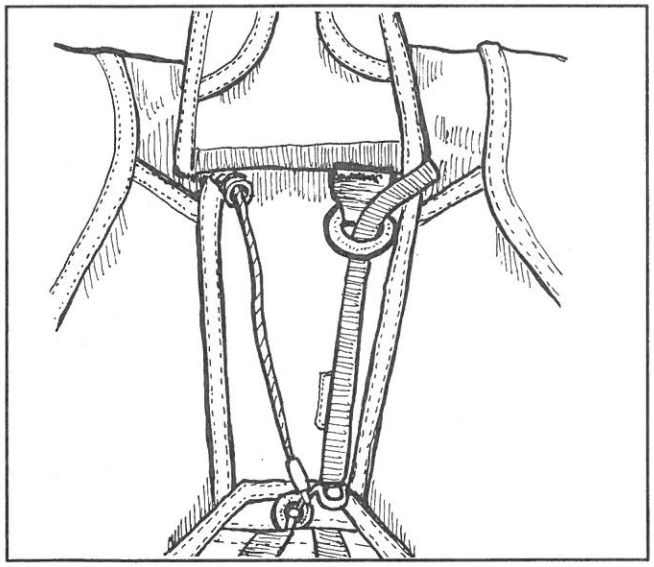
3. After threading the reserve ripcord through the housing and placing the ripcord handle into its pocket, insert the RSL pin through the loop at the end of the reserve ripcord cable.

4. Place the rig on a clean surface with the backpad facing up and walk on it with stocking feet or clean shoes to help expel air from the container and make it flatter.

5. Replace the temporary pin with the reserve pin. Slip the pin under the pin flap protection just below the grommet.

6. Attach the main parachute risers to the harness.

7. Hook up the reserve lanyard shackle to the ring on the right-hand riser and mate the lanyard Velcro to that on the comfort pad.

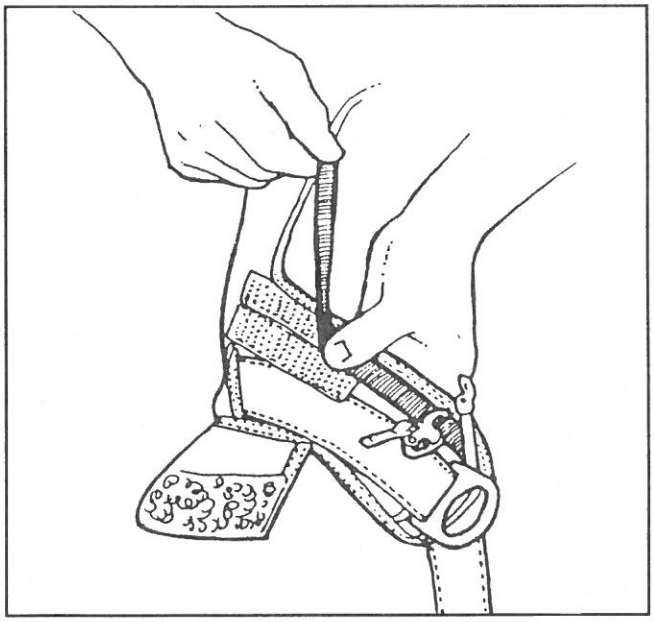


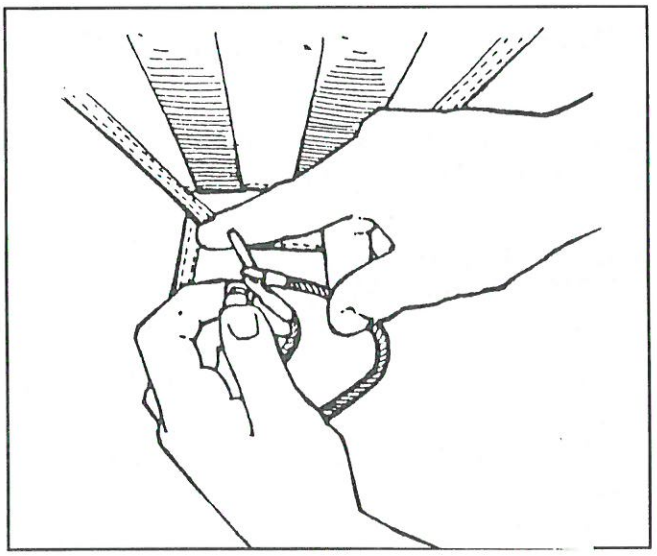
8. Dress the container, seal, sign and log the reserve.

9. Count your tools.

Installation with an AAD

1. Inspect the reserve lanyard. Check that the snap shackle is operating smoothly and that the spring will retain the locking pin. Be sure the Velcro is clean and sufficiently tacky to hold the reserve lanyard. The pin should be curved from the eye to halfway down its length. The rest of the pin should be straight.

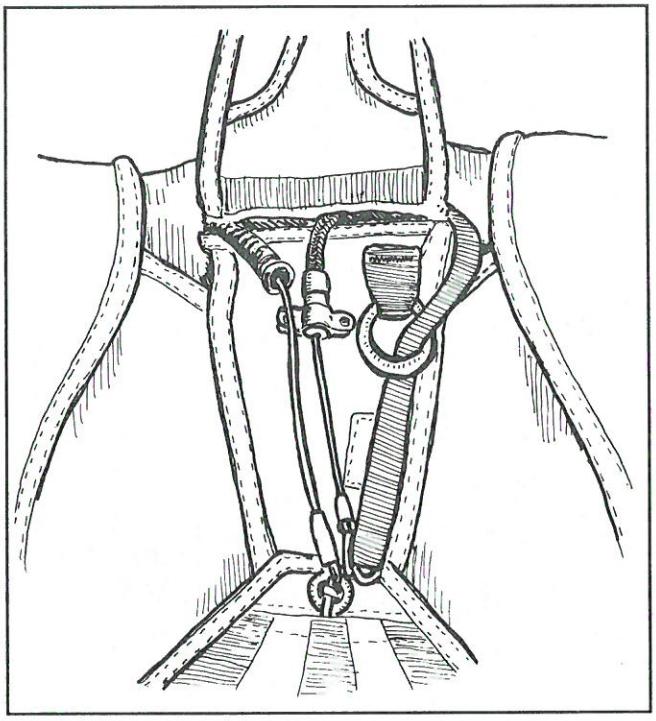




2. Route the reserve lanyard along its Velcro path from the right-hand riser. Insert the pin end of the RSL through the guide ring on the #5 top reserve flap. Mate the patch of yellow pile Velcro to the patch of hook Velcro on the top reserve flap.

3. Referring to the manual for the particular AAD, inspect the device. Make sure it is armed.

4. Thread the curved lanyard pin through the eyelet on the terminal end of the AAD cable. Note the angle of the hole in the terminal end; it must correspond to the angle of the inserted pin.

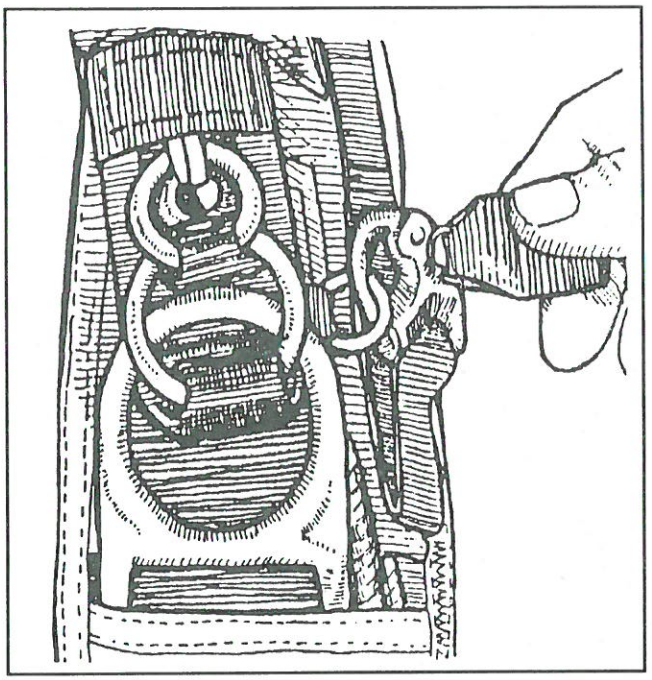


5. After threading the reserve ripcord through the housing, insert the lanyard pin through the loop at the end of the reserve ripcord cable. If the holes are aligned properly, the cables should run straight from the reserve pin to their housings.

6. Replace the temporary pin with the reserve pin. Slip the pin under the pin flap just below the grommet. Insert the ripcord handle into its pouch on the main lift web.

7. Attach the main parachute risers to the harness.

8. Hook up the reserve lanyard shackle to the ring on the right-hand riser and mate the lanyard Velcro to that on the comfort pad.



9. Dress the container, seal, sign and log the reserve.

10. Count your tools.

NOTE

Please read the important safety bulletin on page 72 of this manual. It concerns the use of reserve static lines with certain types of risers.

Installing Automatic Activation Devices

The FAA classifies the installation of an AAD as a major alteration. Therefore, it must be done by a Master Rigger. A Master Rigger rating is still required even if the system is already prepared by the Relative Workshop to accept the AAD.

The following AADs are approved for installation on the Vector II's reserve container: All models manufactured by FXC Corporation, SSE Inc. and Airtec (Germany).

The following AADs are approved for installation on the Vector II's main container: All models manufactured by FXC Corporation and SSE Inc., the Irving Height Finder FF-2 and the KAP 3.

Because these AADs are manufactured and serviced by companies not associated with the Relative Workshop, the owner must direct questions on calibration, use, maintenance, testing and upgrades to the AAD manufacturer. Nothing in this manual is meant to contradict any instructions or advice from the manufacturers of these devices.

An AAD is a backup emergency device that, like any complex mechanical device, is subject to failure or malfunction. It is not a substitute for proper training and supervision.

Both the Sentinel Mk 2000 and the FXC 12000 are delivered with installation kits that contain various brackets, screws, mounting plates and terminal ends to accommodate various types of parachutes.

CAUTION

While the unique closing order of the outer top and bottom reserve flaps provide superior protection of the reserve ripcord pin, it does create a potential problem if the reserve locking loop is too long. An excessively long loop will allow the reserve pin to be partially exposed. This condition can exist for two reasons; either the loop is too long or the reserve canopy is too large for that particular container size. When automatic activation devices are installed, the loop length is very critical. Because the last flap which closes is not the flap upon which the AAD mounting plate is installed, an exceptionally long loop will not allow enough of the ripcord pin to secure the locking loop reliably, which could cause a possible premature opening of the reserve container.

These components must be used to correctly install these devices on the Vector II.

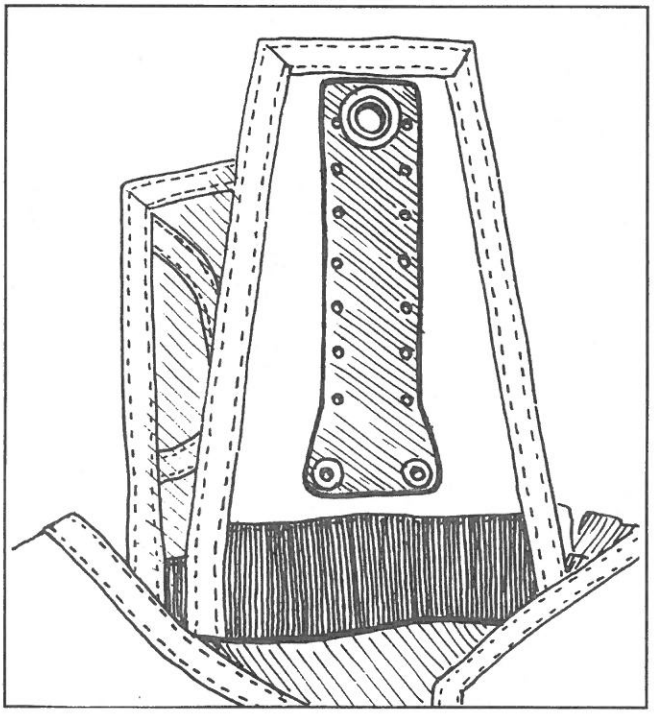
Installing the Pin Puller Version of the SSE Sentinel Mk 2000.

1. Inspect the entire AAD assembly. Perform a calibration check to insure the pyrotechnic charge is in good shape.

2. Remove the grommet from the top reserve flap (Flap #5).

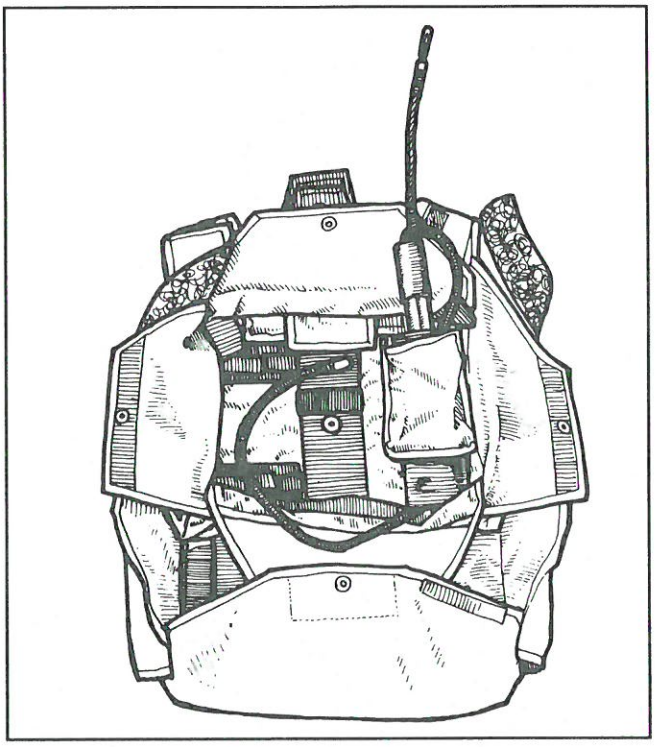
3. Position the mounting plate on the top of the top reserve flap (Flap #5) so that its larger hole is centered over the flap's grommet hole and the plate is along the center line of the flap. Use a pen or pencil to mark the two bolt holes at the other end of the plate. Use a 1/16-inch drill to drill the holes for the bolts.

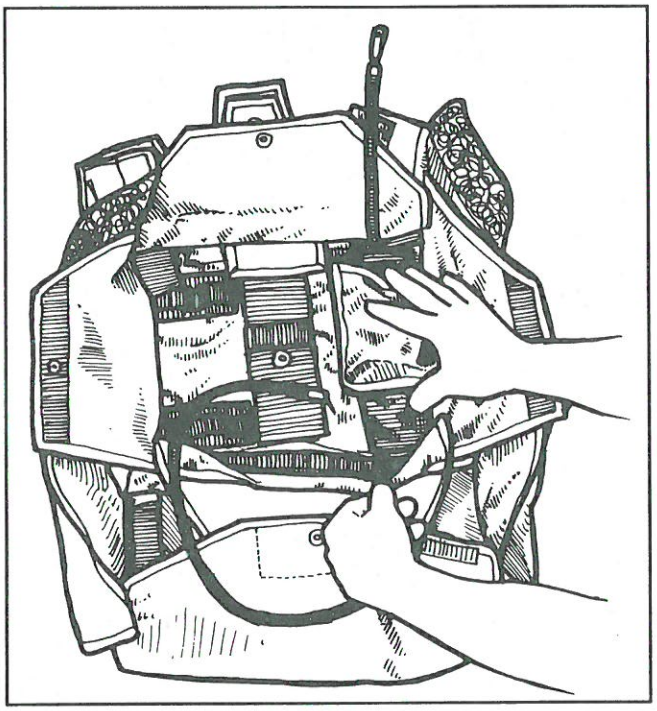
4. Position the mounting plate on the underside of the top reserve flap (Flap #5) and attach with a size 0 spur grommet. (Be sure the grommet is correctly seated and there are no sharp edges that could damage the nylon locking loop.) Insert two 6-32 x 3/8 inch screws down through the cable bracket, through the flap and through the plate.



Tighten the screws to secure the cable housing to the bracket. If the screws protrude from the nuts, file flush.

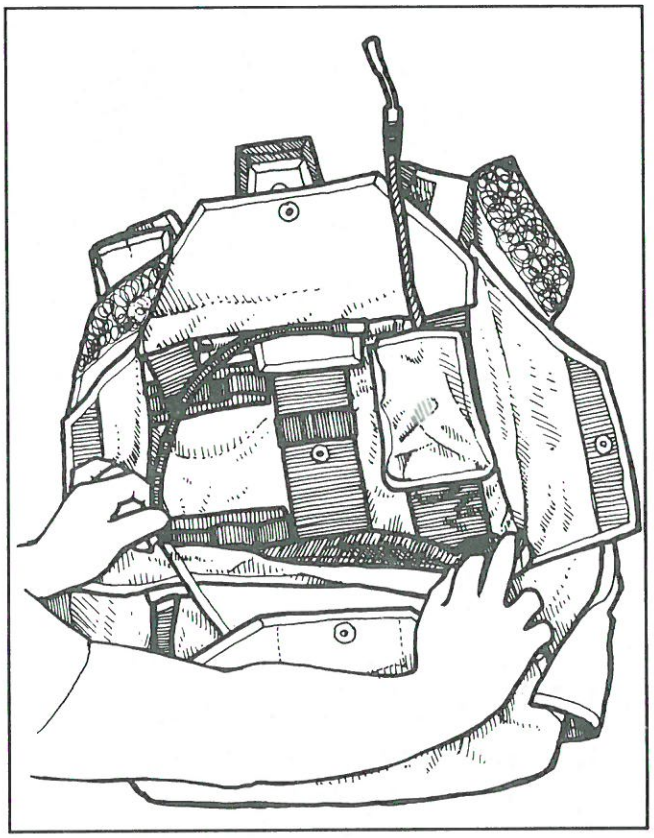
5. Thread the activation unit cable through the long thin Pin Puller pouch on the right-hand side of the reserve pack tray and out the bottom. Slide the activation unit into the pouch.



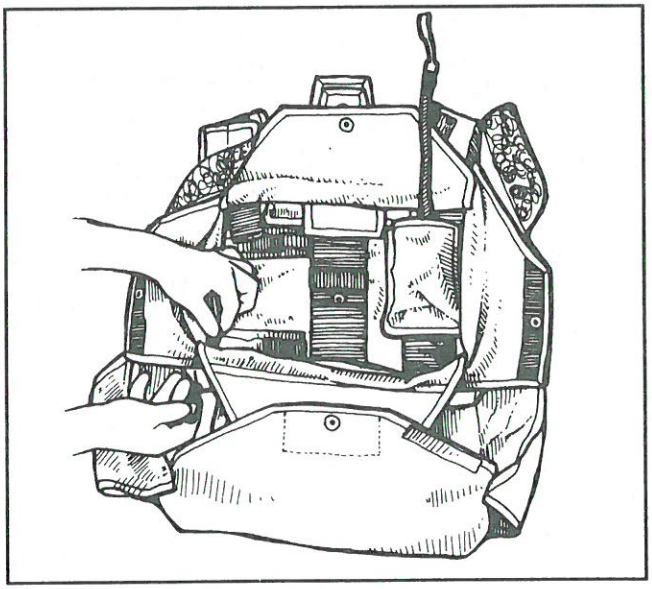


6. Pull the cable gently to seat the unit in its pouch and remove any slack in the cable.

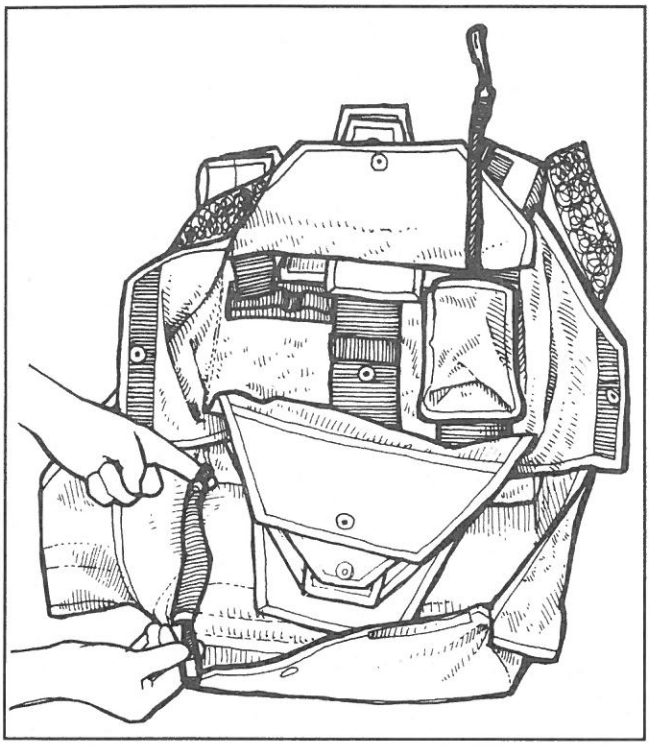
7. Thread the activation unit carefully from right to left through the channel that runs along the bottom of the reserve pack tray.



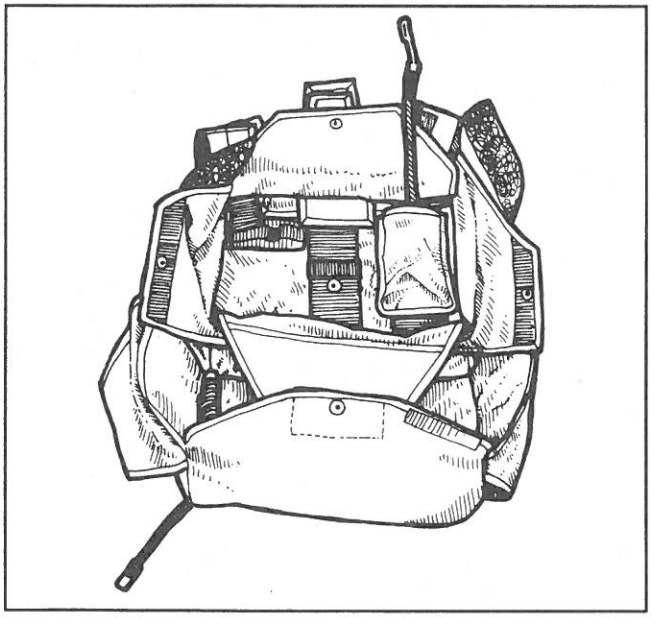
8. Route the activation unit cable through the small hole in the bottom left-hand corner of the reserve pack tray.



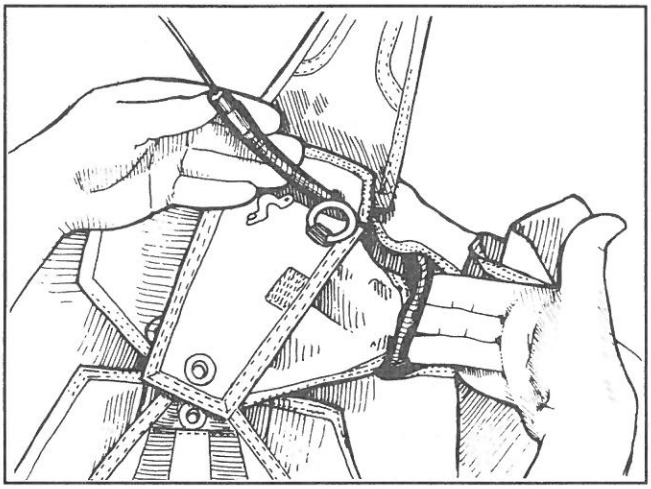
9. Thread the activation unit cable through the channel that runs along the left-hand side of the main pack tray.



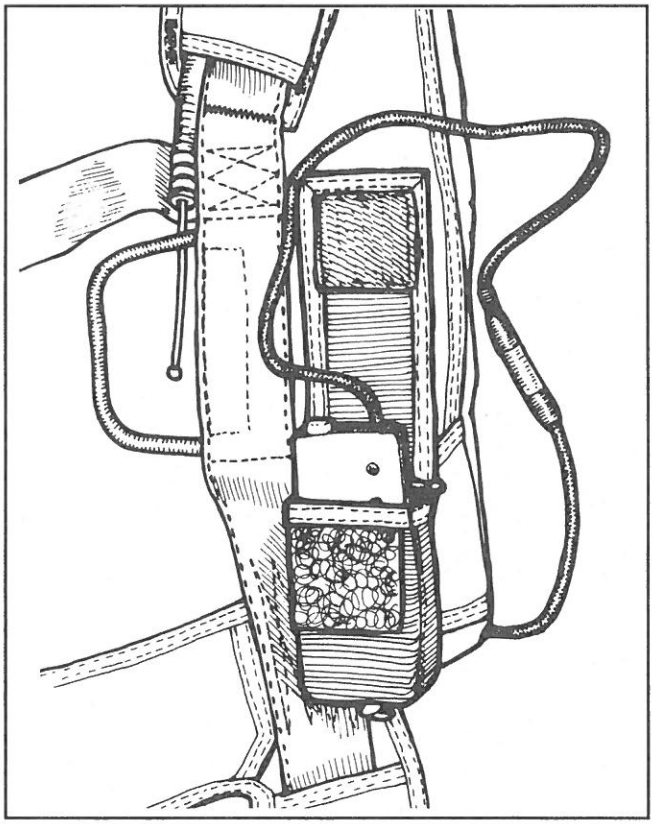
10. Route the activation unit cable through the hole in the lower left-hand corner of the main container. Attach the activation unit cable you have just threaded to the sensing unit cable.

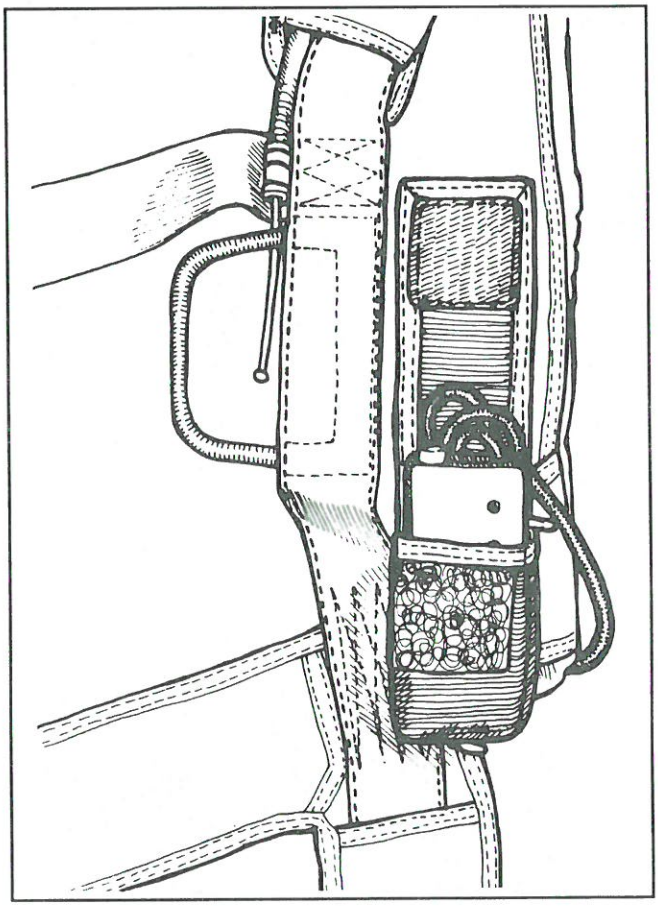


11. Thread the cable housing at the top of the activation unit from right to left through the small slot in the container yoke near the upper corner of the reserve pin protector flap.

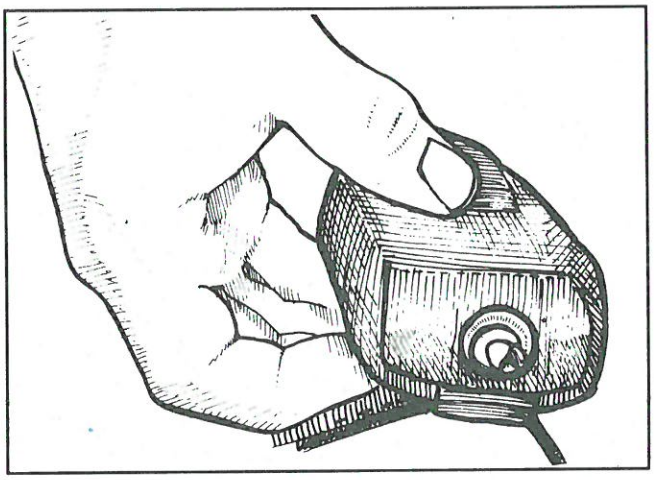


12. Using the pouch provided, mount the sensing unit to the diagonal strap. Coil the extra cable and tuck it into the pouch.

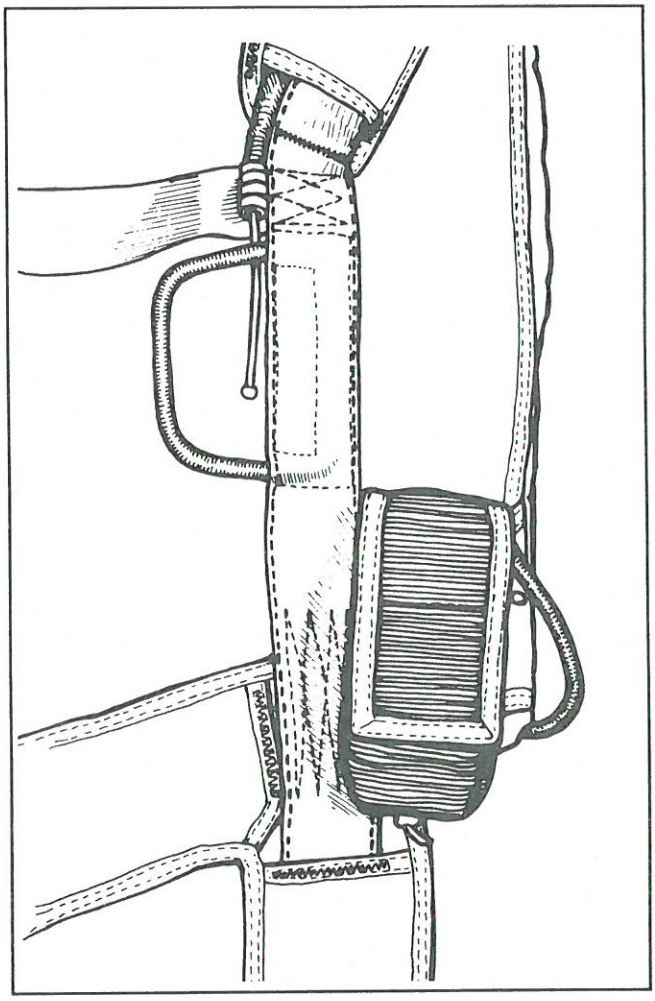




13. Secure the sensing unit into the pouch with a piece of Type 3 sheathing by passing one end through the grommet in the bottom of the pouch, through the hole in the bottom of the unit and back out the grommet. Then pass a small metal washer over both ends of the Type 3, snug it up and tie an overhand knot. Cut off the excess Type 3 and sear the ends.



14. Close the Velcro flap on the pouch.



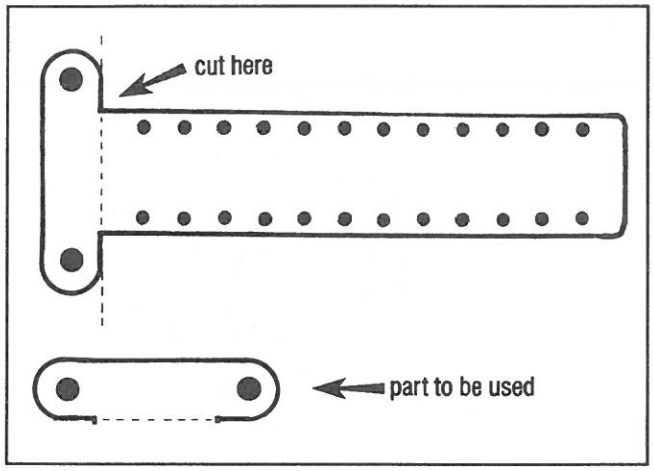
15. Inspect the entire assembly. Log the installation on the packing data card and in your logbook.

Installing the FXC Model 12000 AAD

1. Installation of the FXC Model 12000 on the Vector II requires a small-hole terminal fitting on the activation cable. This fitting is available from either FXC or the Relative Workshop; it is not routinely provided with each Model 12000 sold.

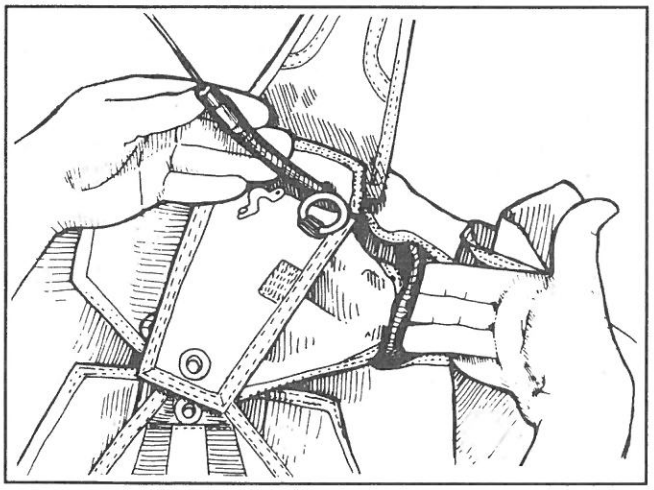
2. Inspect entire AAD assembly. Cock unit.

3. Modify the mounting plate by using a hacksaw to cut the "tail" off the T-shaped plate. (Only the crossbar of the plate will be used.) Smooth any rough edges with a file.



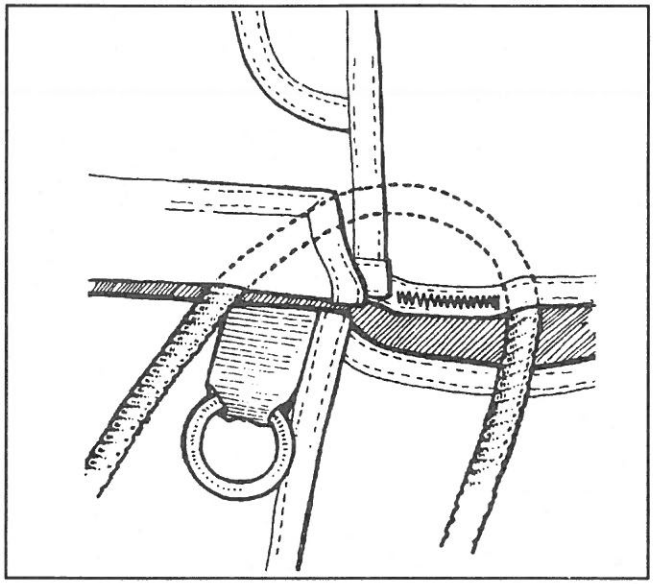
4. Insert activation unit into pouch on the wearer's right-hand side of the reserve container. The activation cable should extend towards the right and the sensing cable to the left.

5. Route the activation cable along the right side of the pack tray. The cable end is threaded from right to left through a small slot in the container yoke near the upper corner of the reserve pin protector flap.



NOTE

If the bracket is mounted too closely to the grommet, the ripcord pin may not be completely withdrawn from the locking loop when the AAD fires and the container will stay shut. Conversely, if the bracket is mounted too far away from the grommet, it might be impossible to seat the pin far enough into the locking loop to keep the container securely closed.



NOTE

When threading the cable housing, make sure it goes UNDER the yoke as shown in this detail. Some Vectors have been found in the field with the housing simply curved over the reserve flap.

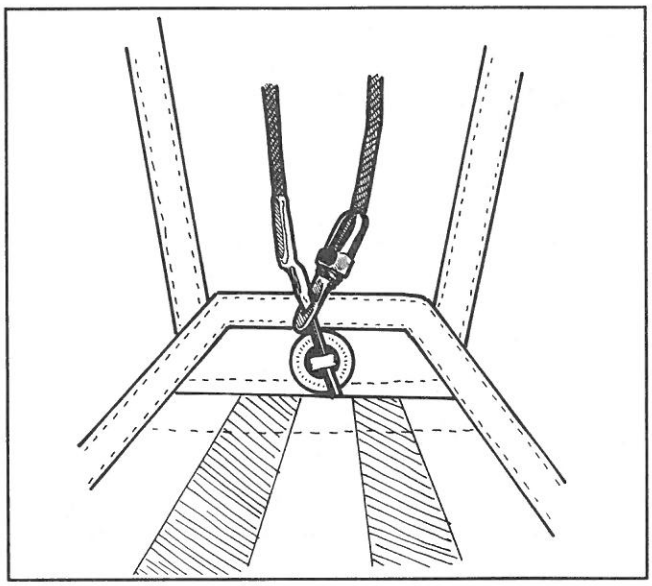
Each FXC 12000 has a unique activation cable length; no two units are exactly the same. The rigger must take that into account when he positions the bracket on the #5 flap for installation.

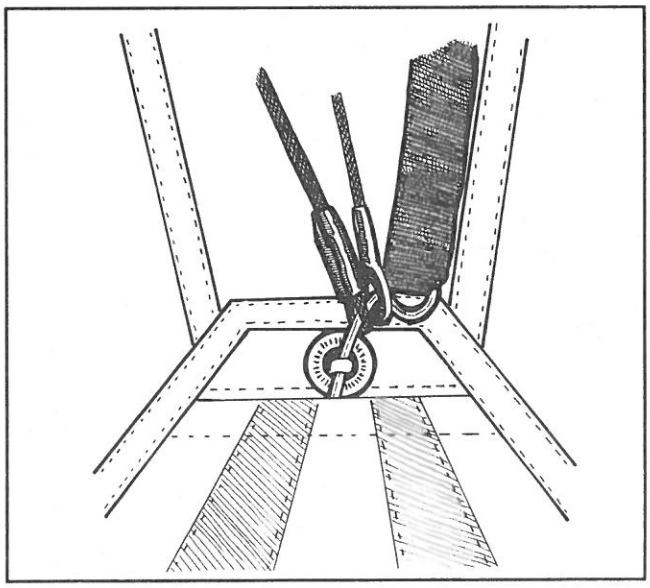
6. To determine the correct location for the FXC bracket, follow these steps:

A. Measuring along the center line of the reserve top flap (Flap #5), measure up 4 inches from the center of the grommet and make a mark. The lower edge of the FXC bracket will normally be mounted at this mark.

B. To determine if this particular unit can be mounted at this location, perform the following check several times and adjust the mark on the top reserve flap accordingly: Temporarily close the last two flaps by inserting the reserve closing loop through both the #5 and #6 flaps and securing with the reserve ripcord pin. Be sure the FXC terminal end fitting has first been slipped over the ripcord pin.

C. Insert the pin as far as it will go into the lock-





ing loop, but not so far that the terminal end fitting is drawn into the grommet center. This is the best position to mount the FXC bracket.

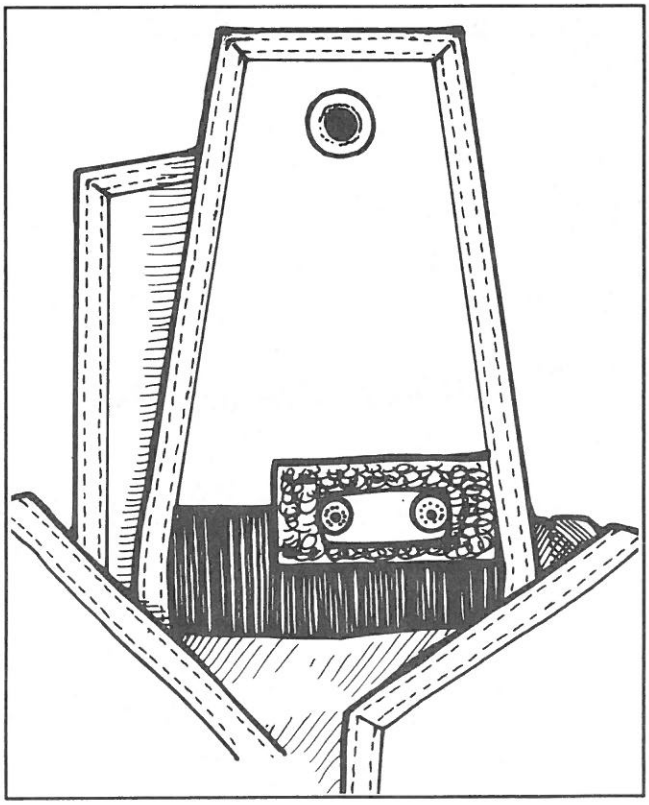
D. When a reserve static line is also used, be sure the loop-end of the reserve ripcord and the FXC terminal end are not drawn into the grommet center.

7. Place the bracket on the center line at the correct position. Use a pencil or pen to carefully mark the holes. Remove the bracket and use a 1/16-in. drill to make the holes in the top flap.

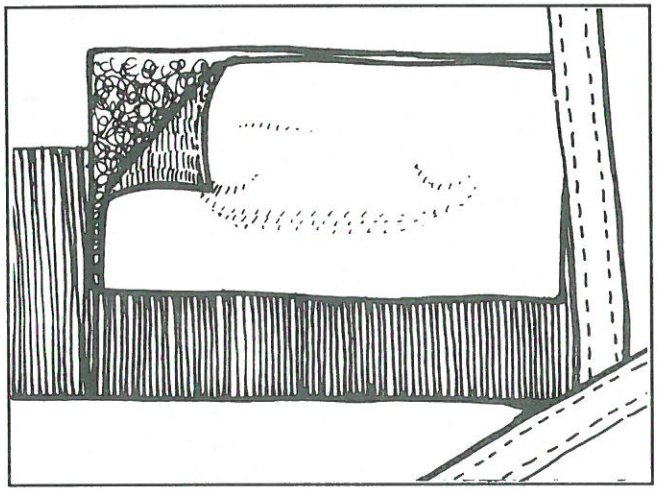
8. Position the bracket on the outside of the top

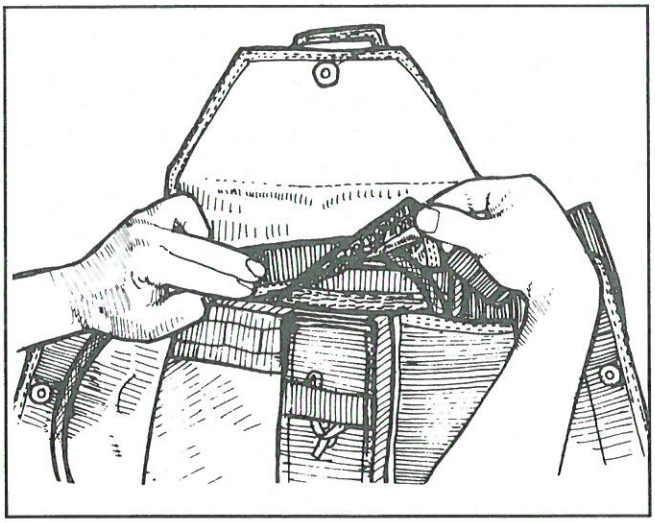
> **NOTE**
>
> The Relative Workshop has provided two pieces of Velcro, one hook, and one pile. These are used to cover the exposed screws on the bottom of the reserve top flap. See installation instructions that follow.

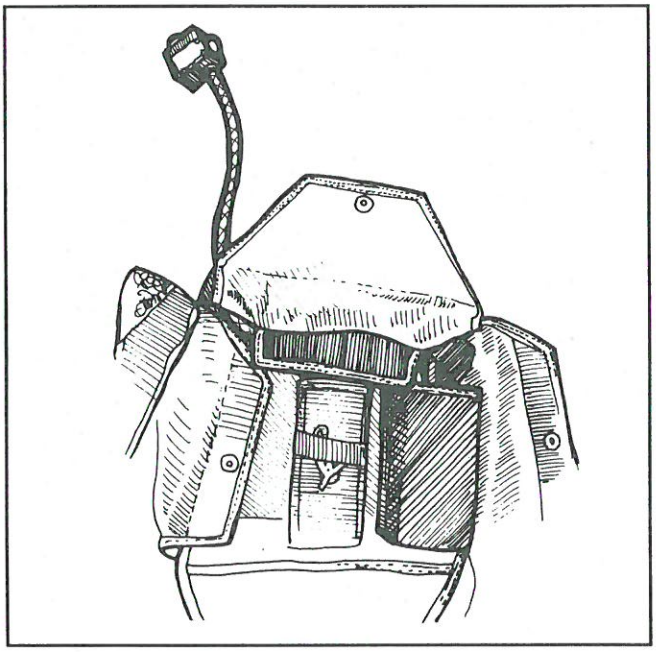
reserve flap and the mounting plate on the underside. Using the longer of the screws provided, insert each through the bracket, through the flap, through the pile velcro patch, and through the plate. Slip the end of the cable housing into the bracket. Snug the screws down to firmly hold the housing. File the ends of the screws flush if necessary. Cover the



screws with the hook Velcro patch as seen in the diagram.

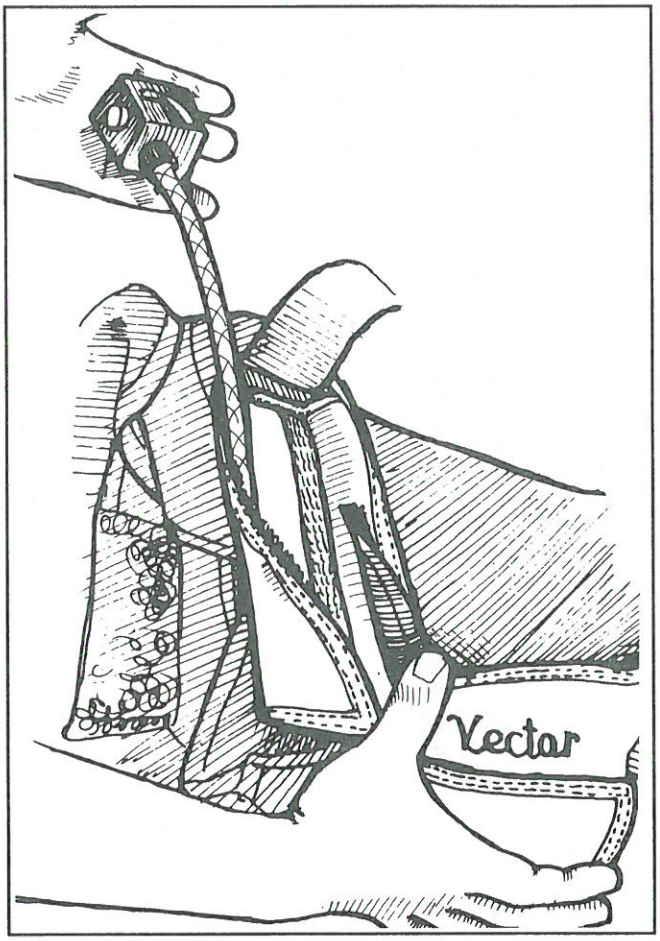




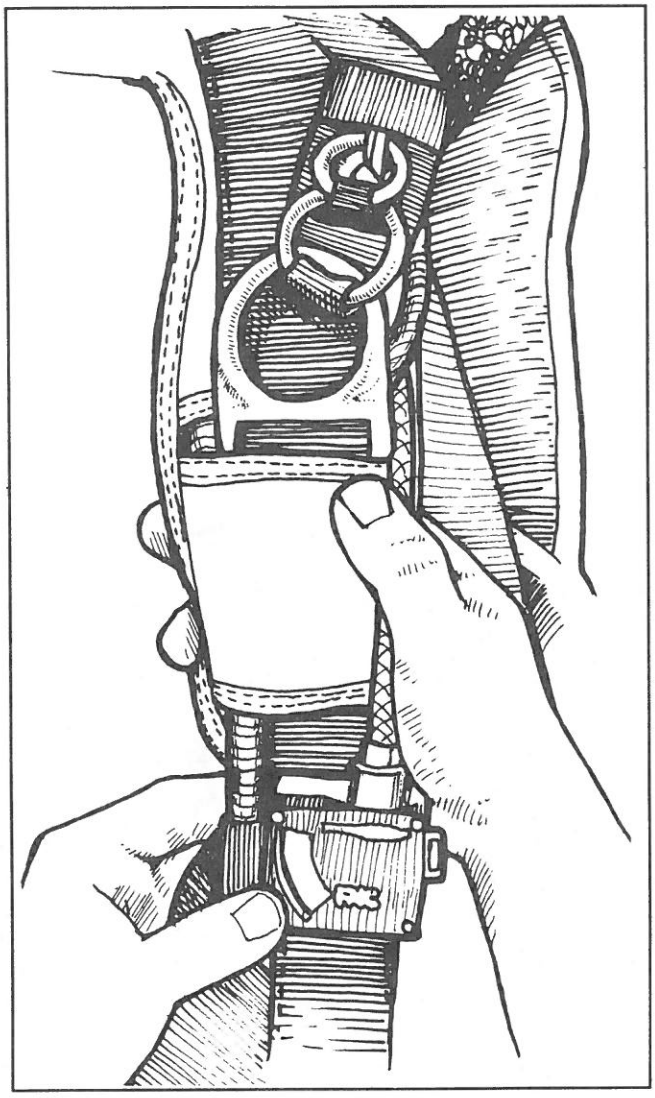


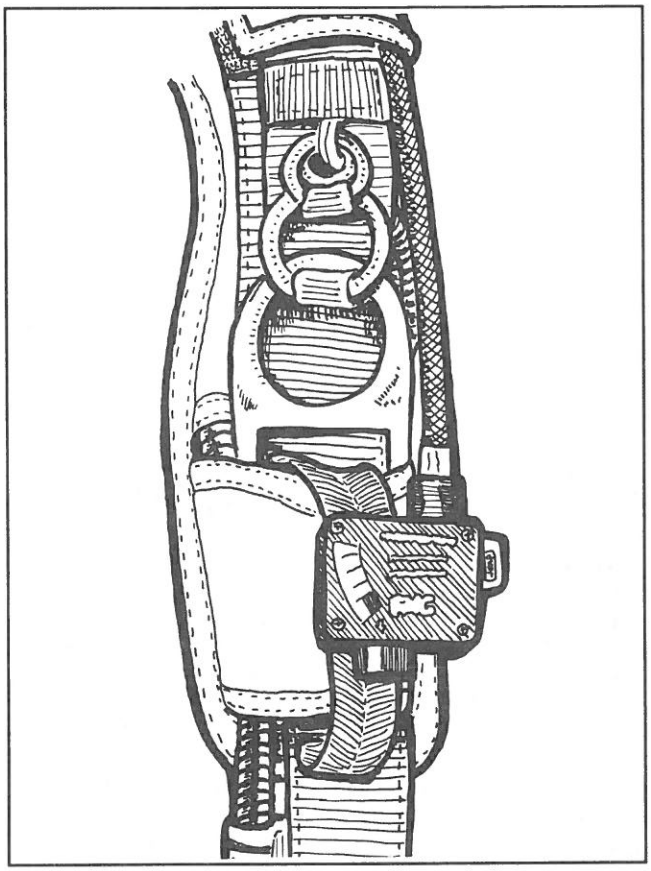
9. Route the sensing unit cable under the Velcro flap across the top of the reserve container and under the Velcro flap on the left side (where the reserve risers will be placed.)*(Shown bottom, left)*

10. Route the sensing unit cable under the Velcro flap on the left-hand shoulder yoke.



11. Attach the sensing unit to the Type 17 loop provided on the fabric panel below the large harness ring. Diagram shows sensing unit location on "ET" and "S" size Vectors IIs.





12. Inspect the entire assembly. Log the installation on the packing data card and in your logbook.

CYPRES AAD by Airtec (Germany)

Consult the CYPRES owner's manual for instructions on installing the Airtec CYPRES AAD in a Vector. This manual is provided with each CYPRES device.

The CYPRES installation was devised and tested by Airtec and then retested and approved by the Relative Workshop.

TESTING AADs

Because AADs are reliable only if they are properly installed and maintained, anyone who purchases a Vector with an AAD must have the unit tested by the manufacturer or an accredited testing facility at specified time intervals as outlined by the manufacturer.

4. Reserve Packing Instructions

INTRODUCTION

This chapter contains procedures for packing an already-assembled reserve into a Vector II.

If the reserve has not yet been assembled, see the appropriate chapter of this manual. It contains procedures for installing toggles, automatic activation devices and reserve static lines.

An FAA Senior or Master rigger certificate is required to pack any reserve parachute that will be carried for use in the U.S.

The reserve flaps are numbered 1-6 for reference. Close them in proper sequence.

It's mandatory to read all of these instructions before starting to pack the reserve.

The first part of this chapter describes procedures for packing round reserve canopies into the Vector II while the second part covers ram-air reserves.

Packing Instructions for Round Reserves

(Procedures for ram-air reserves begin on page 50.)

Because of the wide variety of reserve canopies on the market, this manual does not contain instructions on inspecting, assembling and folding the reserve canopy. The rigger must refer to the packing instructions provided by the canopy manufacturer for this information.

PARTS LIST FOR ROUND RESERVES

Vector II container-reserve risers compatible with the type of reserve connector link to be used. (L-bar or Rapide link.)

Reserve canopy

Vector II spring-loaded pilot chute.

Reserve bridle 60 in. long, + -1 in.

Locking loop for reserve container.

Vector reserve ripcord.
27 in. long for all Vector sizes (except)
30 in. long for Vectors with shoulder extentions

REQUIRED TOOLS

One temporary pin with flag

One pull-up cord (48 in. of 550 cord sheathing)

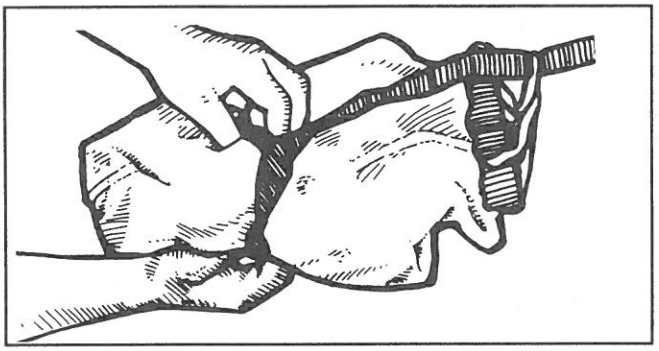
One packing paddle

INSPECTION

Thoughly inspect the ripcord, pilot chute, bridle, canopy, lines, links, risers, harness, container and locking loop.

ASSEMBLY

1. Attach the canopy to the risers with the steering vents facing to the wearer's rear. If using L-bar links, make sure the reserve risers are properly set up and sewn with a horizontal stitch near the top to stabilize the L-bar. If using Rapide links, snug the barrel down till hand-tight, plus a quarter turn with the proper sized wrench. It's highly recommended to use Locktite to secure the screws or barrel.



2. Follow the canopy manufacturer's instructions to set up the steering system.

3. Attach the bridle to the Vector II reserve pilot chute. The larger end loop on the bridle is used, and it must pass through all three pilot chute attachment loops using a lark's head knot.

4. Attach the Vector II reserve pilot chute to the apex of the canopy using the bridle provided. The smaller loop of the bridle wraps around the apex lines and the larger attaches to the pilot chute. Do not substitute other bridles because the length of this bridle is important for fast deployment. Do not substitute another pilot chute for the Vector II reserve pilot chute.

5. Inspect the entire reserve assembly carefully, beginning with the pilot chute and ending with the harness.

6. Flake the reserve canopy according to the manufacturer's instructions.

7. If your reserve canopy does not have a diaper or other deployment device, fold the skirt up parallel to the radial seams, then long fold the canopy into fifths.

8. If your canopy is equipped with a diaper or similar device, close it according to the manufacturer's instructions.

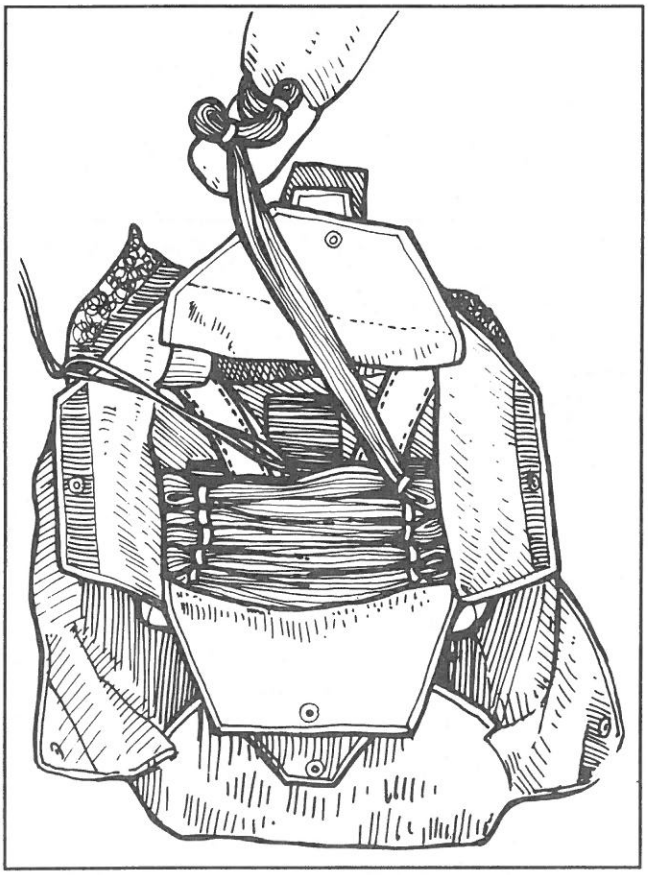
9. Now place the canopy in the pack tray, following one of the procedures below. Different procedures are used for different canopies, depending on what type of diaper is installed on the reserve.

Also, a different packing procedure is used if the Vector II is equipped with an FXC 12000 AAD. Follow the instructions under (A) or (B) on the next page, then continue.

A. Placing the canopy in pack trays without an FXC AAD

Place the reserve risers into the reserve container with the links lying between the line-stow loops and the grommet stiffener plate. Fan the riser ends out rather than stacking them on top of each other.

Make the first stow of suspension lines at the bottom and stow the lines from left to right, working toward the top of the container. Be sure to stow the lines the full width of the container.

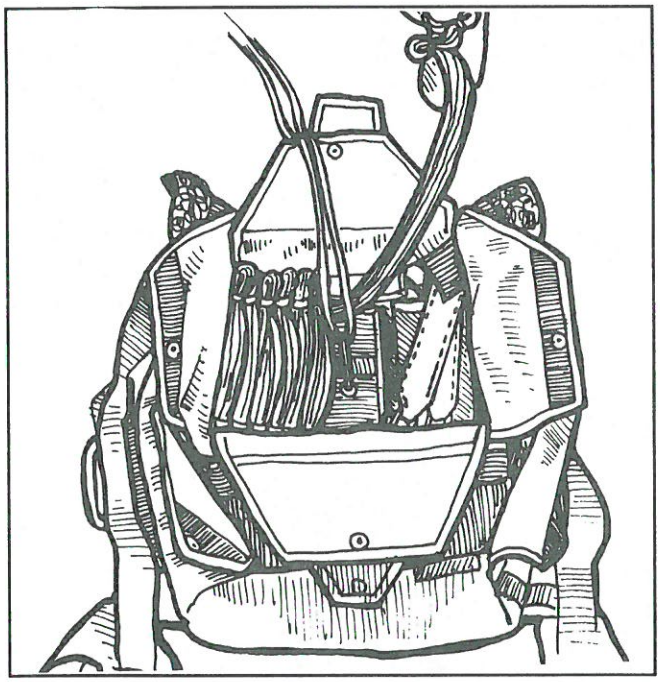


(Skip Section B and continue with Step 10.)

B. Placing the canopy in pack trays with an FXC AAD

Place the reserve risers into the reserve container with the left riser links lying between the line-stow loops and the grommet stiffener plate. The right riser links must be laid on top of the FXC activation unit. Fan the riser ends out rather than stacking them on top of each other.

Stow the lines vertically on the opposite side of the FXC power unit, starting from the outside and working toward the middle of the container.



Note: If the canopy has a diaper with all the lines stowed on it (a "full-stowage" diaper), then stow the lines on the diaper instead of stowing them in the pack tray. Then lay the diaper and lines on the opposite side of the container from the power unit.

10. Check the length of the reserve closing loop. The length from the stiffener plate to the end of the loop should measure approximately 2 to 2 1/4 inches for small canopies like the Pioneer K-XX and the National Phantom 22 canopies. For other canopies, the loop will have to be lengthened accordingly.

Two factors determine the correct loop length. First, it should not take an excessive amount of effort to close the last flap (Flap #6).

And when the container is closed, you should not be able to compress the pack more than 1/4 inch when you push down on the top of the pilot chute.

If excessive play in the spring has developed after the reserve has been packed for a while, unpack the reserve and shorten the loop.

CAUTION

While the unique closing order of the outer top and bottom reserve flaps provide superior protection of the reserve ripcord pin, it does create a potential problem if the reserve locking loop is too long. An excessively long loop will allow the reserve pin to be partially exposed. This condition can exist for two reasons; either the loop is too long or the reserve canopy is too large for that particular container size. When automatic activation devices are installed, the loop length is very critical. Because the last flap which closes is not the flap upon which the AAD mounting plate is installed, an exceptionally long loop will not allow enough of the ripcord pin to secure the locking loop reliably, which could cause a possible premature opening of the reserve container.

11. Insert the pull-up cord through the reserve locking loop.

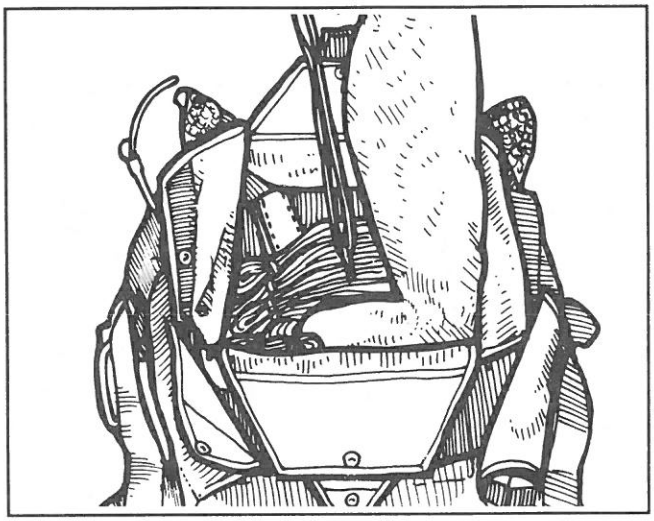
12. Fold the canopy into the container. The location and configuration of the folds depends on what type of round reserve is being packed:

A. The First Fold:

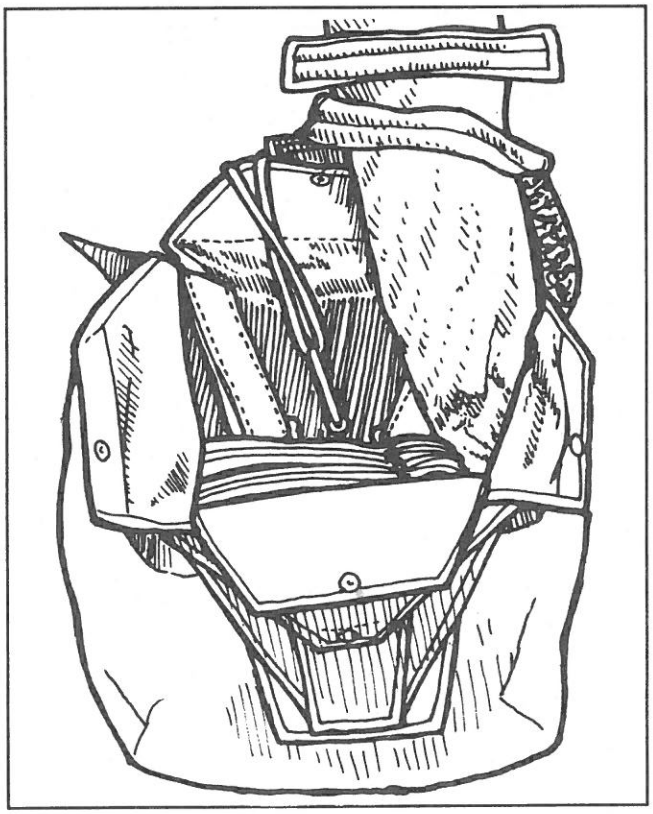
The first fold into the pack tray is determined by the type of diaper (if any) on the canopy. Follow one of the four procedures listed here:

For a canopy without a diaper, place the canopy skirt into the bottom left-hand corner of the container and lay the first fold of canopy from left to right across the bottom of the container.

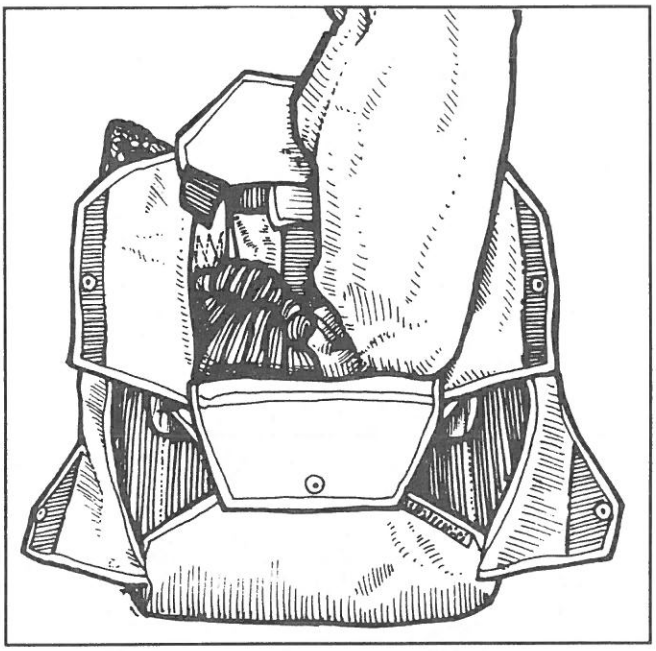
For a canopy with a two-bight diaper (such as those built by Strong Enterprises and Pioneer), place the diaper-enclosed skirt in the bottom left-hand side of the container with the line stows facing towards the top (wearer's head end) of the container. Lay the first fold of the canopy from left to right across the bottom of the container.



For a canopy with a full diaper on which the lines stow vertically (such as the Strong Enterprises Lopo Lite), lay the diaper-enclosed skirt in the bottom left-hand corner of the container against the dividing wall between the reserve and main containers. The stows should face up (towards the wearer's head). Lay the first fold of canopy from left to right across the bottom of the container. *(See illustration below, left)*



For a canopy with a Piglet-style diaper (full diaper with the lines stowed horizontally), fold the diaper-enclosed skirt lengthwise for about 1/3 of its length, and place it in the bottom left-hand corner of the container against the wall that divides the reserve and main containers. Lay the first fold of canopy from left to right across the bottom of the container.



B. The Remaining Folds:

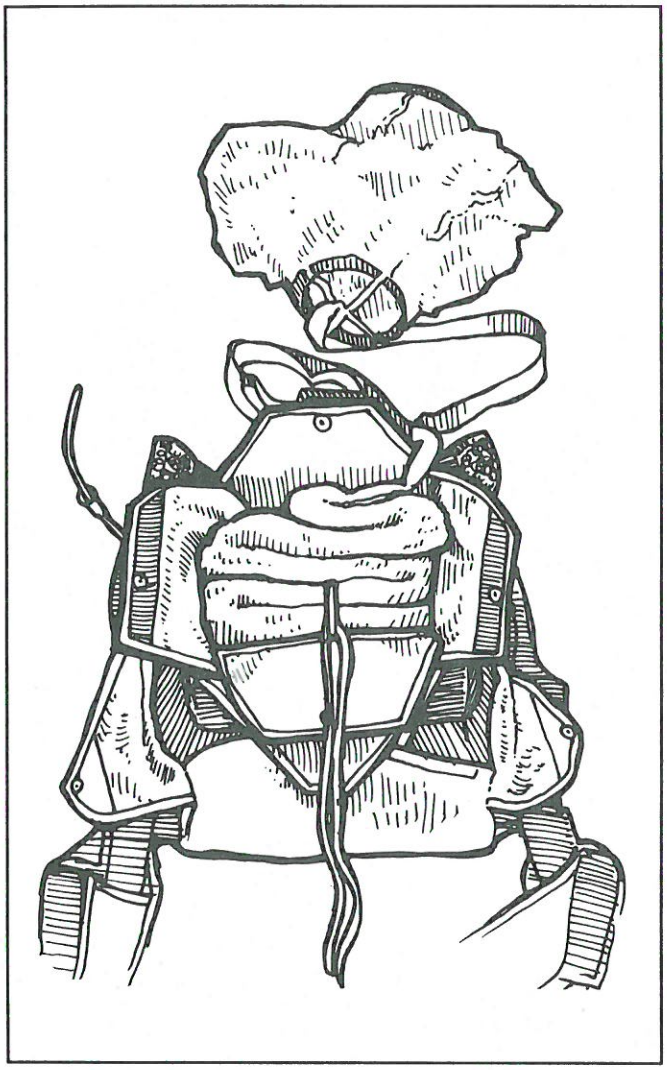
For a canopy with no diaper or a two-bight diaper, the canopy can now be S-folded into the container. Make the folds below the loop about 1 inch wider than the container. This will help fill out the sides better.

For a canopy with full diapers such as the Preserve 3 and the Featherlite, a short fold or two must be made in the container corner opposite from the skirt to even out the bulk. The next fold can then be spread out on top of the diaper to give the container its proper thickness. Then S-fold the rest of the canopy toward the top of the container, keeping each fold about two inches wider than the container.

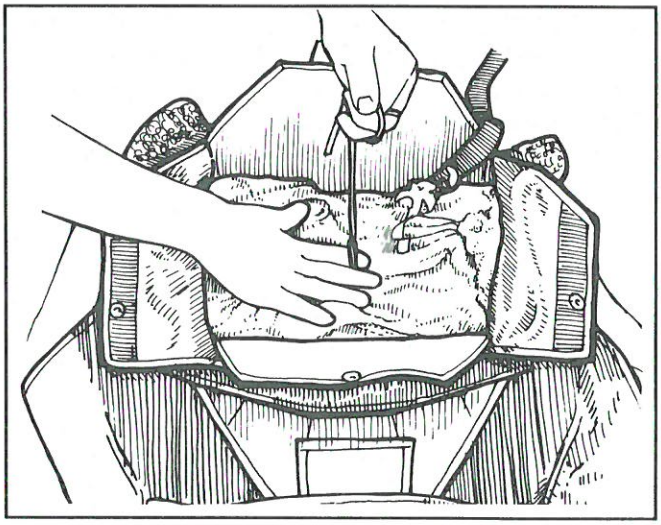
With small canopies such as the National Phantom 22 and the Pioneer K-XX, the best appearance results from having no more than two folds above the loop.

With larger canopies, it may be necessary to fold extra canopy above the loop, as well as to lengthen the loop.

Make the folds above the closing loop two inches wider than the container to fill the space under the side flaps. *(See illustration below)*

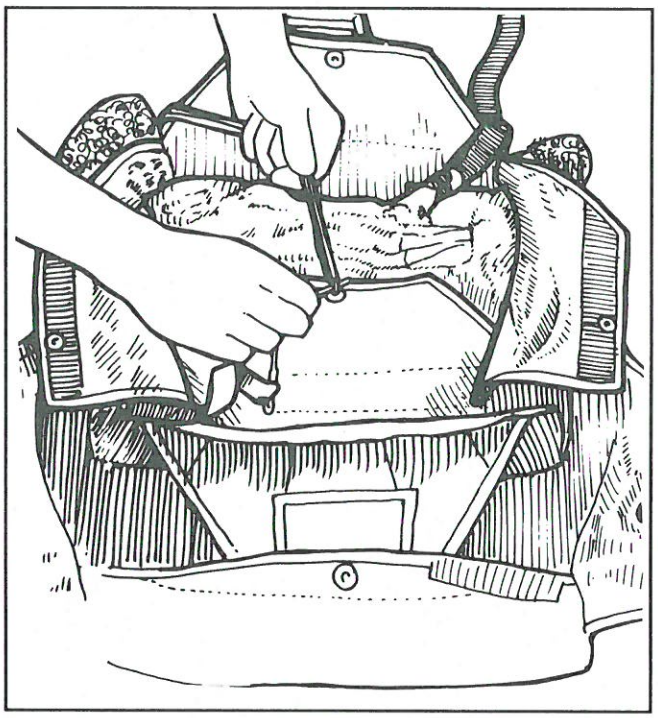


13. Route the pull-up cord and locking loop straight up through the folds in the canopy.

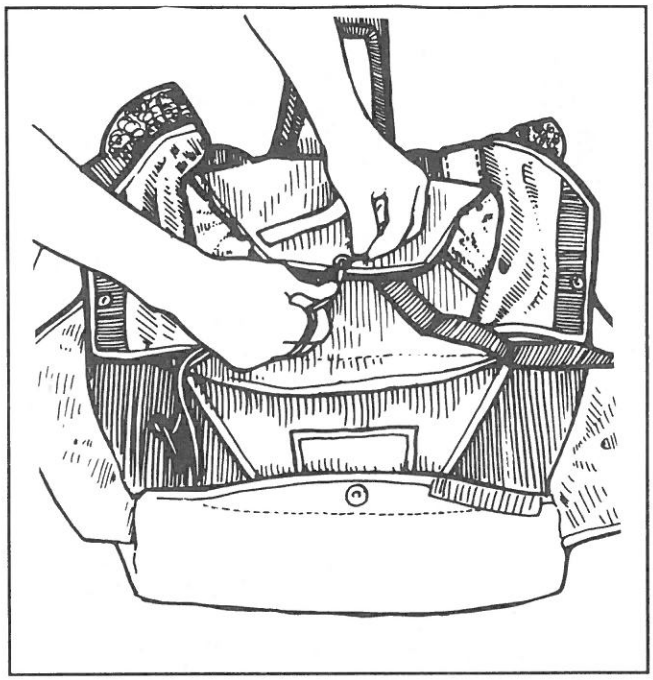


14. Close the container flaps by following this procedure:

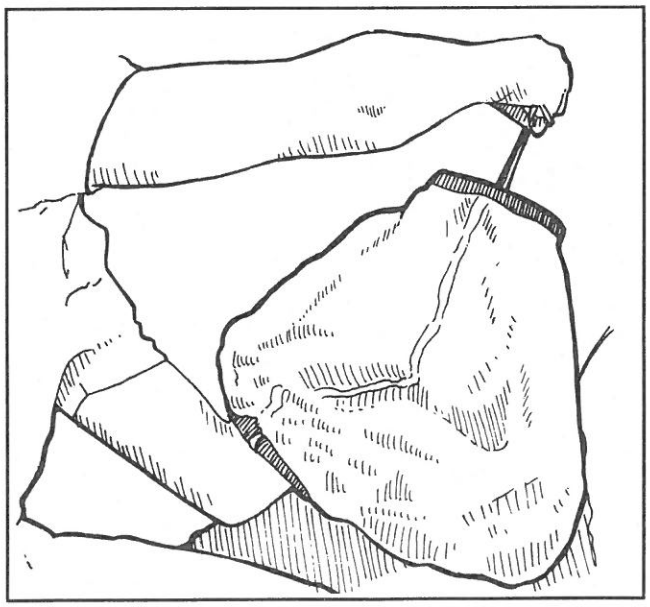
A. Close the inside bottom kicker flap first (Flap #1) and secure it with the temporary pin.



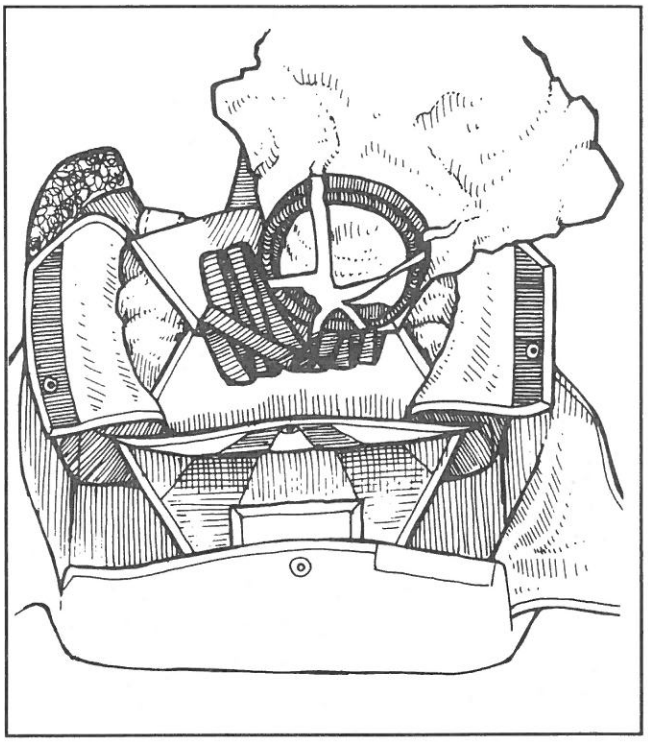
B. Route the reserve bridle toward the bottom right-hand side of the container and close the top kicker flap (Flap #2), securing it with the temporary pin.



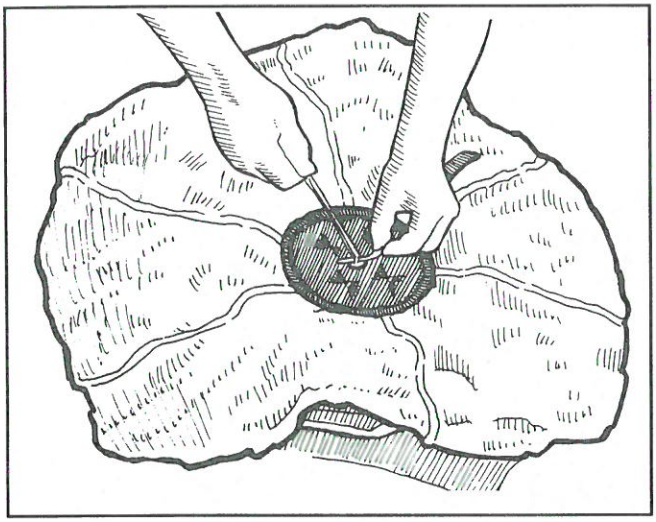
C. Thread the pull-up cord up through the bottom of the pilot chute and out the top.



D. S-fold the bridle up and down on top of the two kicker flaps, so that it will be under the base of the pilot chute without fouling the closing loop.



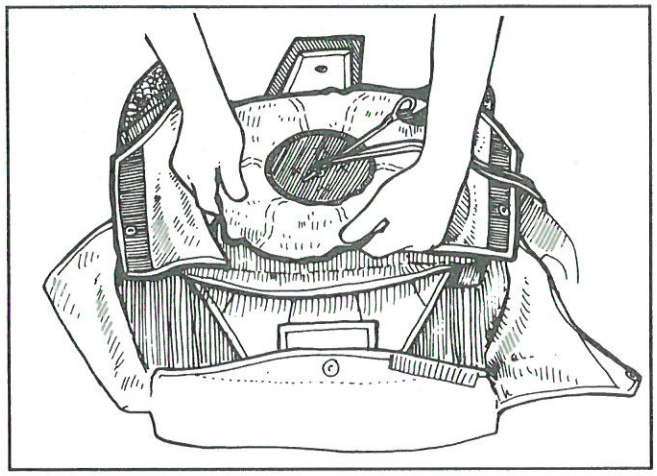
E. Make sure the base of the pilot chute is centered over the loop. Then collapse the pilot chute and lock it with the temporary pin



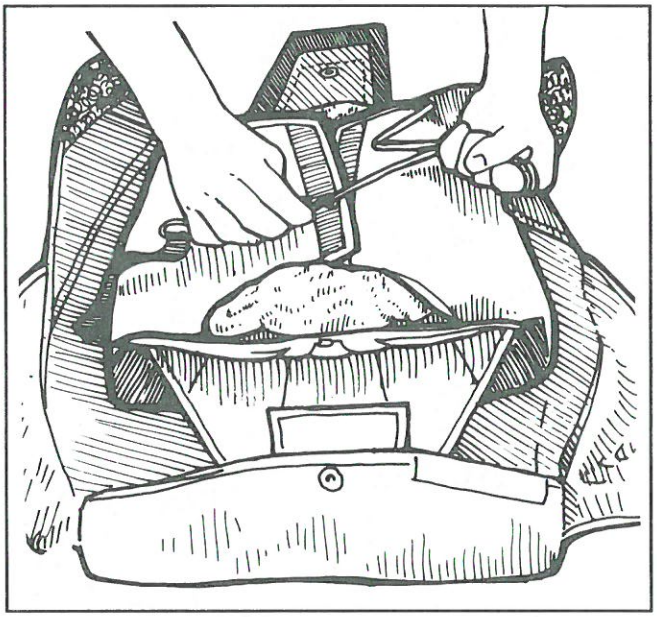
F. Pull all the canopy fabric out, away from the spring. Folding the fabric, rather than stuffing it between the coils, increases pilot chute launch performance and reduces the bulk of the packed container. After pulling the fabric away from the spring, check to make sure the pilot chute base is centered under the crown.

Now fully collapse the spring to see how much loop can be pulled through the top of the pilot chute. If you can pull more than 1/2 to 3/4 inch through, the loop is too long. If it is, open the container and shorten the loop.

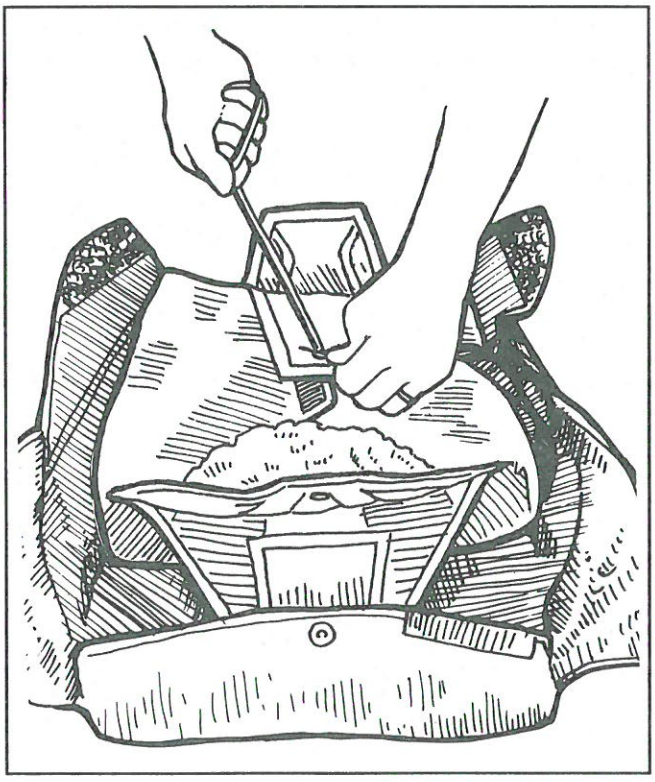
G. Lay the fabric flat all around the pilot chute and fold it under in wide folds to the center. Fold the top and bottom under first, then the sides. Keep the fabric folds of the pilot chute out from under the open reserve flaps.



H. Thread the pull-up cord through the side flaps (Flaps #3 right and #4 left) and close and secure with the temporary pin. Make sure that the folds in the pilot chute stay flat and neat.

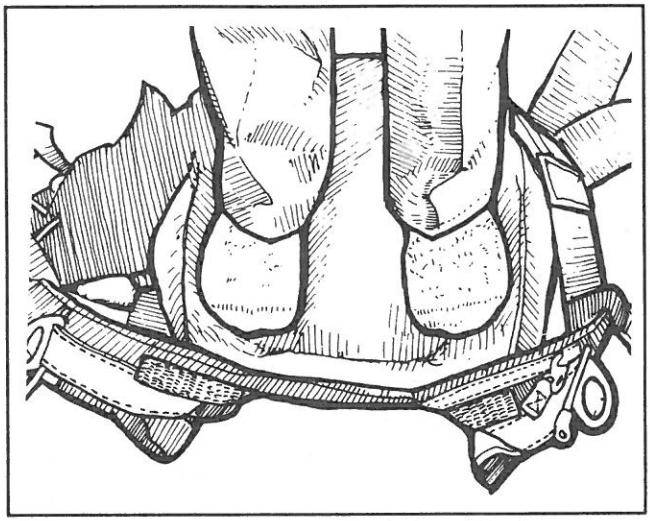


I. Thread the pull-up cord through the reserve top flap (Flap #5) and insert the temporary pin.



J. Thread the pull-up cord through the bottom center flap (Flap #6) and insert the temporary pin. If the force necessary to close the last flaps seems excessive, your loop may be too short. Use a scale to check the force required to extract the pin. With the canopy packed properly and the right-sized loop, 8 to 12 lbs. of force should extract the pin.

15. Place the rig on a clean surface with the backpad facing up and walk on it with stocking feet or clean shoes to help expel air from the container and make it flatter.



16. Replace the temporary pin with the reserve pin. The end of the pin slides into the channel built into the lower flap. Remove pull-up cord.

17. Insert the ripcord handle into its pouch on the main lift web.

18. Dress the container, seal, sign and log the reserve. Close the reserve pin protector flap.

19. Count your tools.

PACKING INSTRUCTIONS FOR RAM-AIR RESERVES

Because of the wide variety of ram-air reserve canopies available today, this manual does not contain instructions on inspecting, assembling and flaking. For these steps, the rigger must follow the instructions provided by the canopy manufacturer.

Two packing methods are shown here. The first is preferred, although the second will also yield satisfactory results.

The procedures described here are approved by the following canopy manufacturers for use with their reserves in the Vector II: FTS, Glide Path International, National Parachute Industries, Para-Flite, Performance Designs, Precision Aerodynamics and Strong Enterprises.

See the instructions elsewhere in this manual for installing the FXC 12000 and SSE Sentinel Mk 2000.

REQUIRED TOOLS

One temporary pin with flag

Two pull-up cords (About 6 ft. long)

One packing paddle

Two 6" x 1" pile Velcro strips with flags

INITIAL ASSEMBLY

(See Reserve Assembly Chapter)

PARTS LIST

Vector II container, with reserve risers compatible with the type of connector link, steering, and brake system.

Ram-Air reserve canopy. (If toggles are supplied with the reserve canopy, *do not use them.* Replace them with Vector toggles.)

Vector II spring-loaded pilot chute, with bridle and Vector II free bag. Two bridle lengths are acceptable, depending on canopy size: Small: 15.5 ft., +- 0.25 ft or Medium: 18.5 ft., +- 0.25 ft.

Safety stow loop for reserve bag. Small: 6 in., Medium: 7.5 in. +- 0.25 in.

Locking loop for reserve container.

Reserve ripcord.
27 in. long: All Vector sizes except those with shoulder extensions (30 in. long).

Reserve steering toggles.

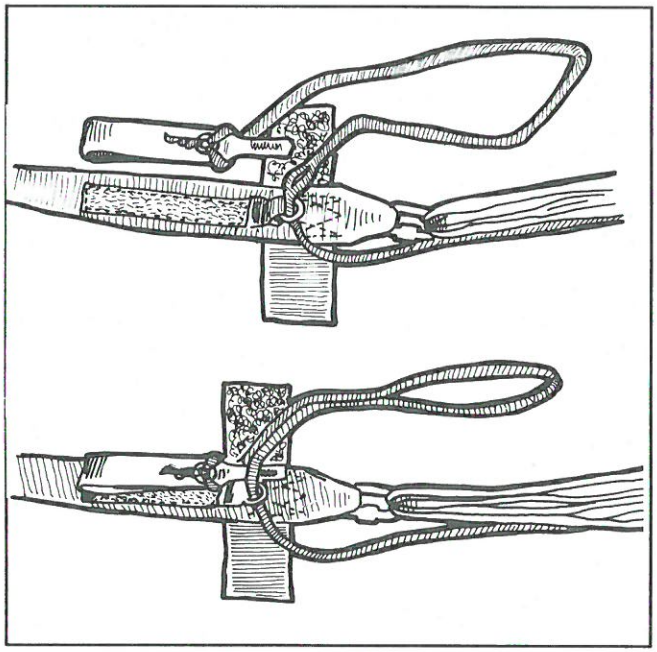
INSPECTION

Thoroughly inspect the ripcord, pilot chute, bridle, deployment bag, canopy, lines, links, risers, harness, container and locking loop.

SETTING THE BRAKES

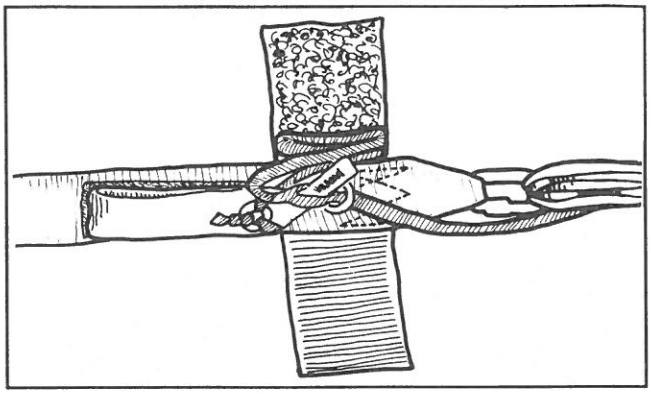
1. Open the Velcro cover on the riser. Use the toggle to pull the right-hand steering line down until the brake loop just passes through the guide ring.

2. Insert the tapered end of the toggle all the way into the loop. Pull on the steering line above the guide ring to seat the toggle against the ring.



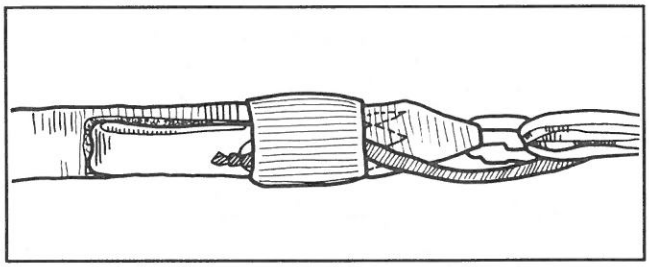
3. Mate the Velcro on the toggle with that on the riser. Check to be sure the tapered end of the toggle is completely seated in the loop. (It shouldn't be inserted past the end of the taper, or it may be difficult to extract in the air.)

4. Fold the bight of line between the toggle and the loop into 3-in. folds and lay it neatly next to the toggle.



5. Carefully close the Velcro cover to encase the stowed toggle and folded line. Be sure none of the steering line is caught between the layers of Velcro.

6. Repeat the process for the left-hand toggle.



FLAKING AND FOLDING

Follow the canopy manufacturer's instructions for:

A. Flaking the canopy.

B. Folding the nose and canopy.

C. Splitting the tail

D. Stowing the slider.

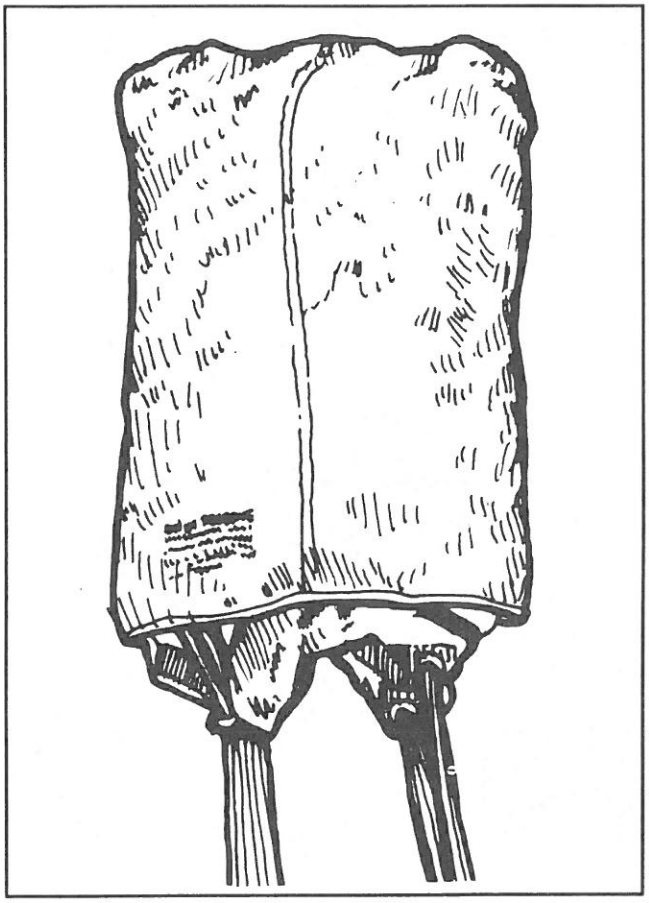
E. Dressing the canopy.

Preferred Ram-Air Packing Method

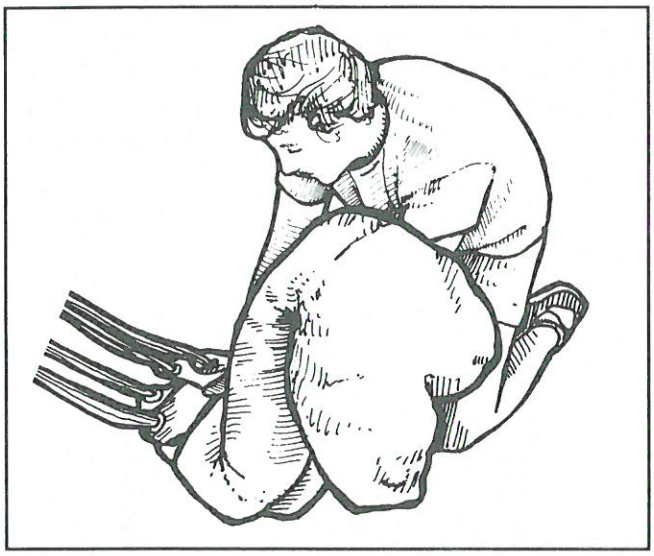
(As explained previously, there are two approved methods of packing a ram-air reserve into a Vector free bag. See page 53 for the alternate method.)

1. Prepare the free bag so it is ready for the canopy. To do this, insert one end of a pull-up cord through the grommets in the top and bottom of the bag. Tie both ends of the pull-up cord together so the cord won't slip out of the grommets during the packing procedure. *(Note: Some riggers prefer to use a T-bar or a locking pull-up cord in place of a regular pull-up cord. All of these will work fine if used properly.)* The T-bar or pull-up cord will be used later to pull the locking loop up through the bagged canopy. Also at this time, attach the two 6" pile Velcro strips to the hook Velcro on the bag. This will prevent damage to the suspension lines as they are inserted into the pouch.

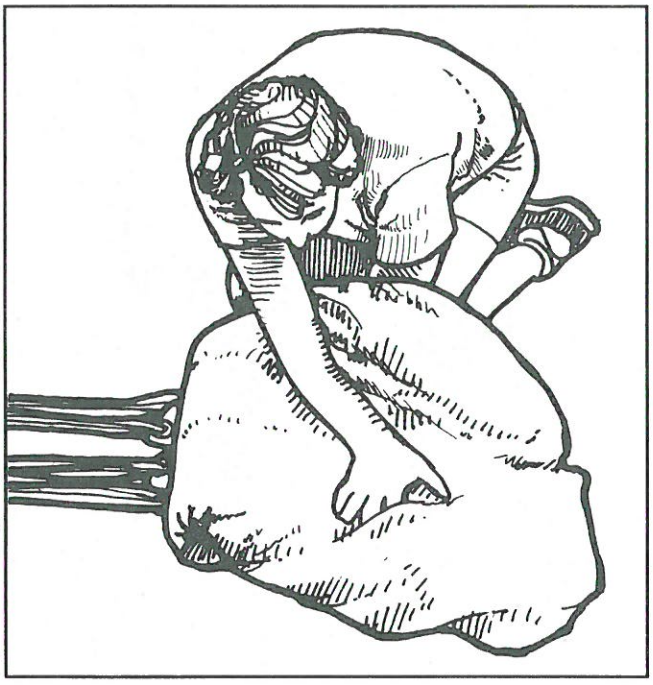
2. Dress the canopy to a width 4 inches wider than the bag (2 inches on each side).



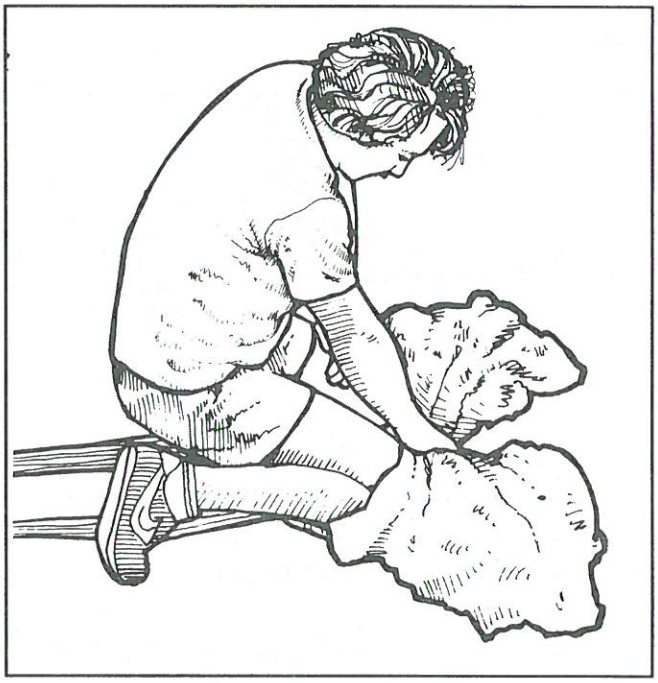
3. Stack the canopy on top of itself, making each fold no longer than the distance from the mouth of the bag to the grommets in the center of the bag.

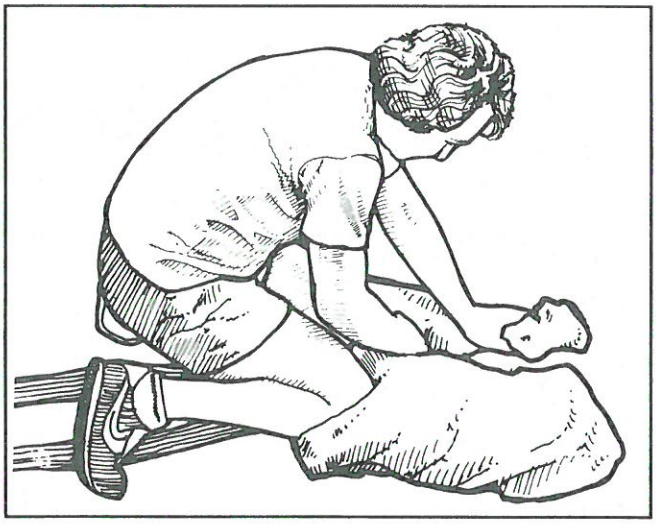


4. After the canopy is stacked on itself, unfold the top portion into two sections or "ears."



5. Dress each section neatly.

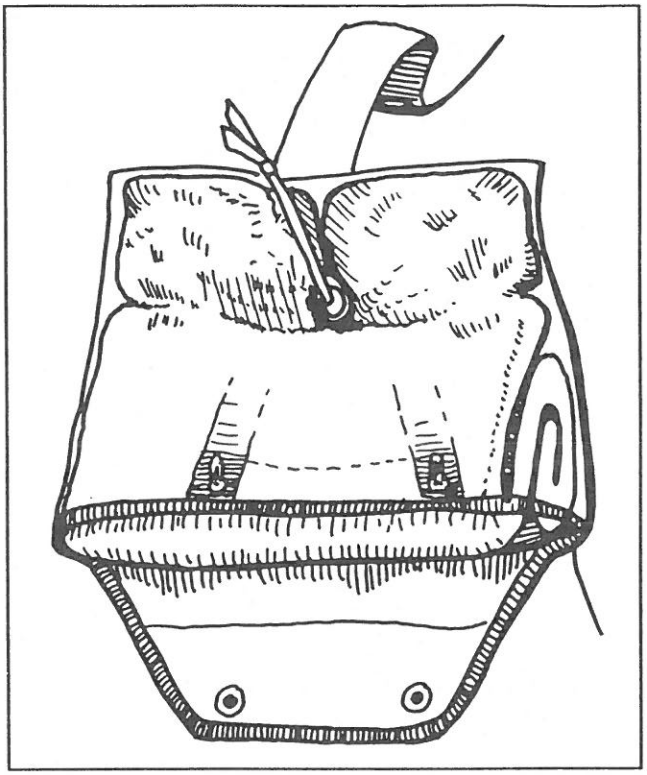




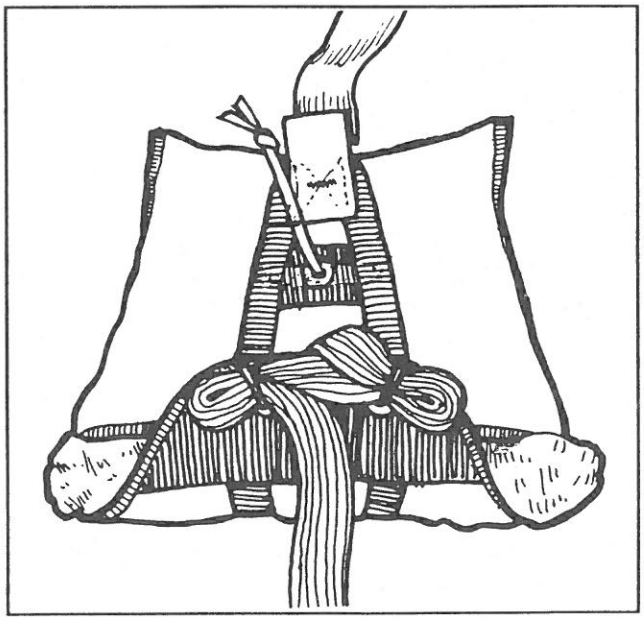
WARNING

If a Molar Strap is used during this section of packing, it **must be removed** after the canopy is placed into the bag.

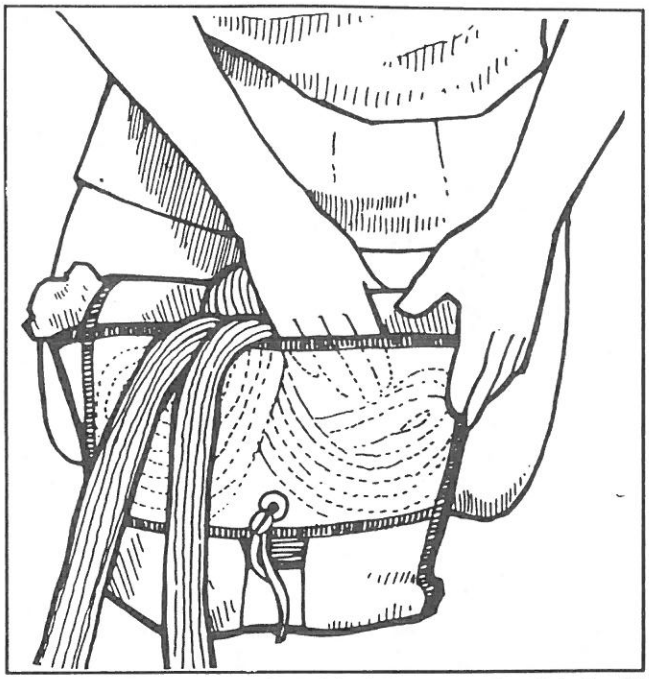
6. Carefully slide the bag over the canopy, pushing each "ear" into the top corners of the bag, filling the corners evenly and leaving a tapered shape.



7. Lock the bag closed with two bights of suspension line. A shock cord "Safety Stow" is used, not rubber bands.



8. Stow the remainder of the suspension lines into the pouch on the underside of the bag using S-folds that extend from one side of the pouch to the other. Be sure none of the lines are trapped between the Velcro at the mouth of the pouch. Another acceptable method of stowing the lines which some riggers prefer: Stow all the lines on top of the pouch first, either S-folding or Figure-8 folding, and insert the entire line group into the pouch. Remove the two Velcro strips from the bag.



Skip the next section titled "Anternative Method" and continue with "Part 2: Placing the bag into the Container."

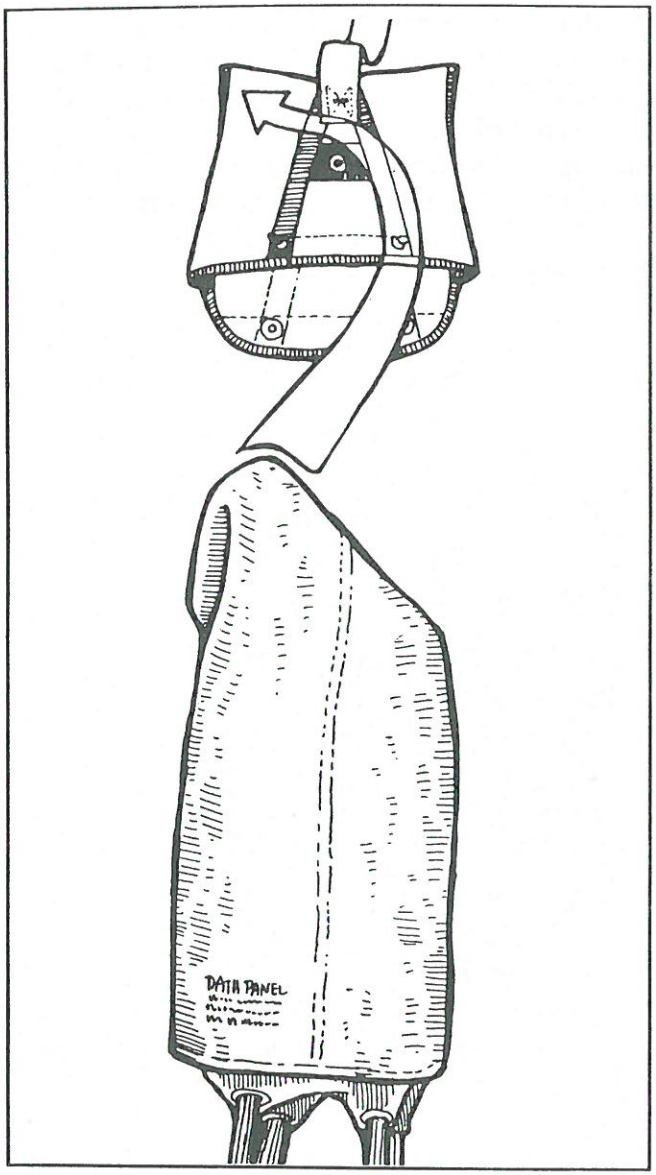
Alternative Ram-Air Packing Method

(Some riggers prefer this method over the previous when packing smaller ram-air canopies into the Vector.)

Assemble, inspect and flake the canopy according to the instructions at the beginning of this section.

1. Facing the top of the canopy and straddling the lines, kneel on the edge of the tail at the bottom of the canopy.

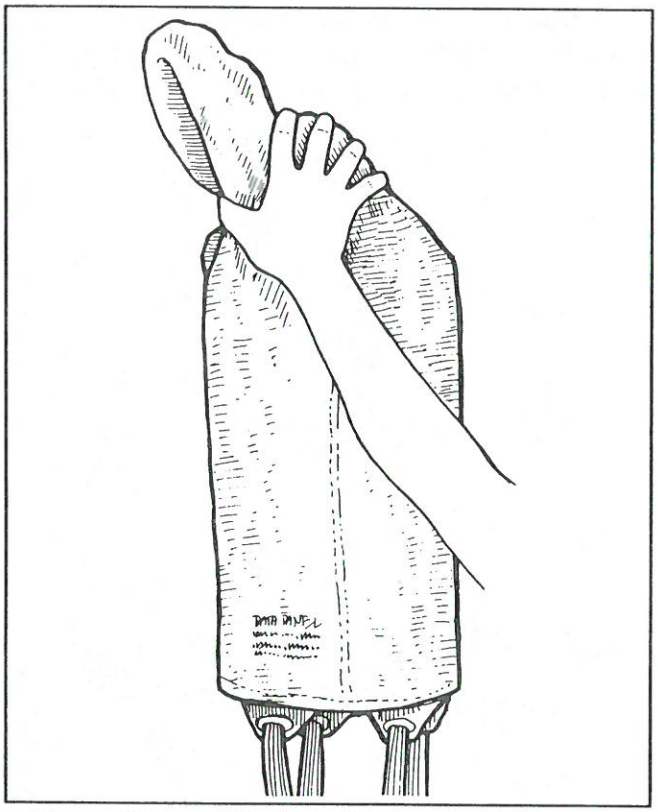
2. Reach underneath the canopy and fold it all back into your lap, exposing the folded nose. Spread the nose of each cell across the front, so it will be the first part of the canopy to take air. Lay the canopy back on the floor.



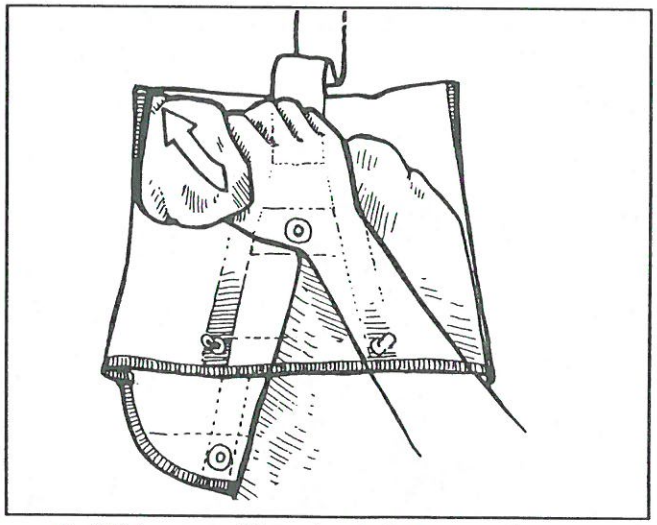
3. Grasp the top right corner of the flaked canopy and fold it across and under the left side in a 45-degree angle. Be sure not to cover the exposed nose. Lay the canopy back on the table.

4. Insert one end of the pull-up cord through the grommets in the top and bottom of the bag. Tie it to the other end so it won't slip out during the rest of the packing procedure. *(Note: Some riggers prefer to use a T-bar or a locking pull-up cord in place of a regular pull-up cord. All of these will work fine if used properly.)* The T-bar or pull-up cord will be used later to pull the locking loop up through the packed canopy.

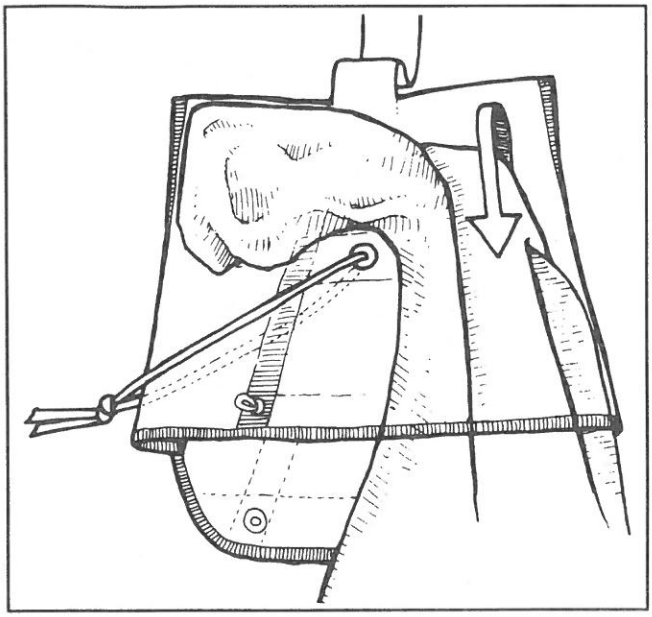
5. Kneeling as before, grasp the top left corner of the flaked canopy and going around to the right

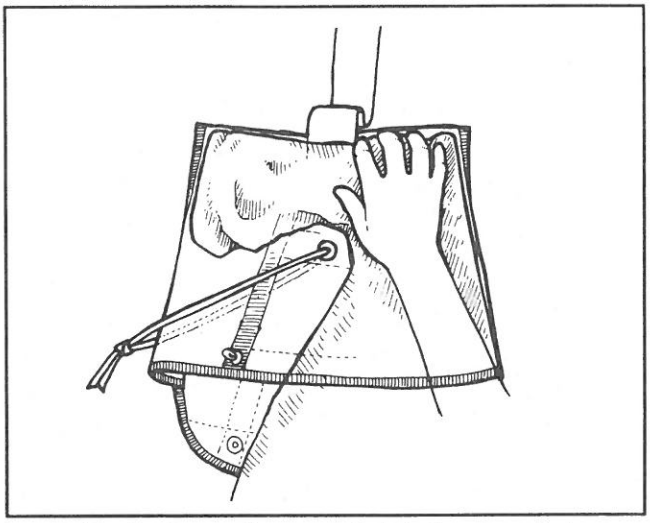


of the pull-up cord, place the corner of the canopy into the top left corner of the bag. Be sure to fill the corner.

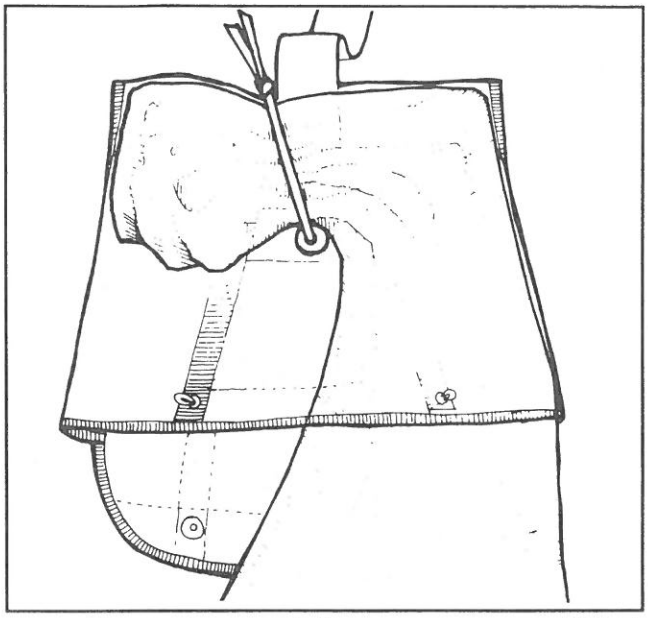


6. Without pulling the left corner free, reach into the bag and over the canopy to grasp the previously folded right corner under the canopy. Maneuver this corner of the canopy into the top right corner of the bag. Be sure to fill the corner.





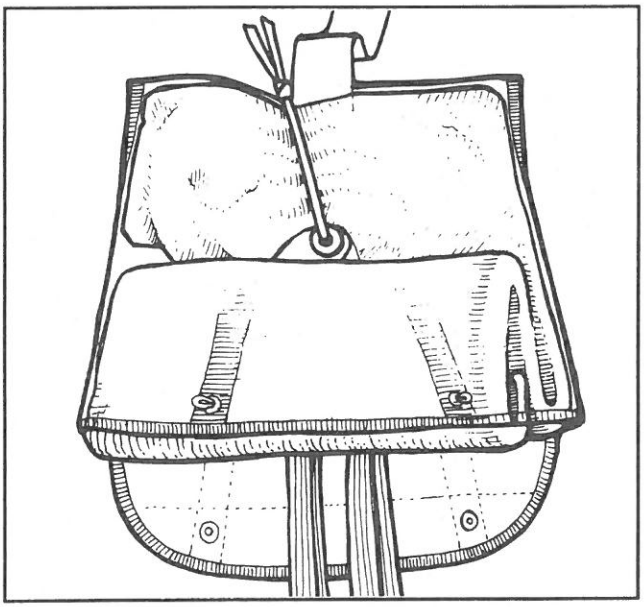
7. Retie the pull-up cord tightly around the top S-fold until the top and bottom grommets are no more than 1 inch apart. This retains the S-fold in the top of the bag throughout the rest of the packing procedures.



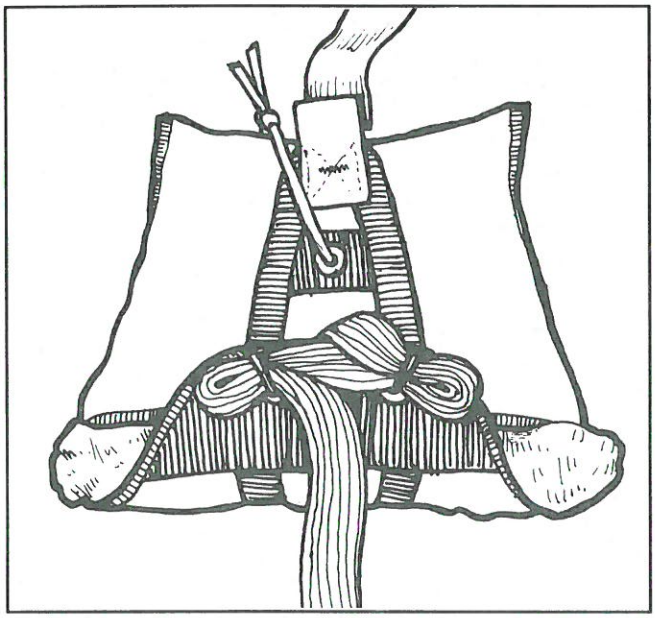
8. Dress the remaining canopy to a width 2 inches greater than the bag on each side.

9. Fold the slider and 4 inches of the bottom of the canopy toward the top of the canopy and under the tail.

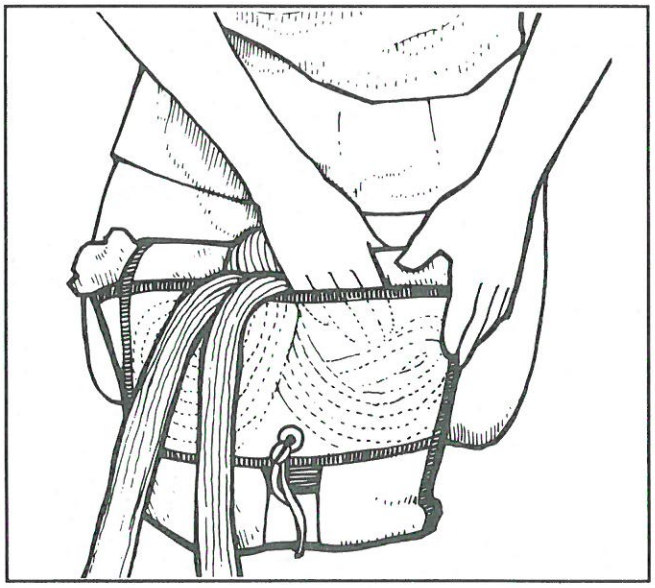
10. Making very short folds—no longer than the distance from the mouth of the bag to the pull-up cord—stack the canopy on top of itself. Be sure the top (first) fold of the canopy stays in the bag.



11. Carefully place the stacked canopy into the bag. Close the bag with the two locking stows with a bight length of 1 1/2 – 2 inches. (A shock cord "Safety Stow" is used, not rubber bands.)

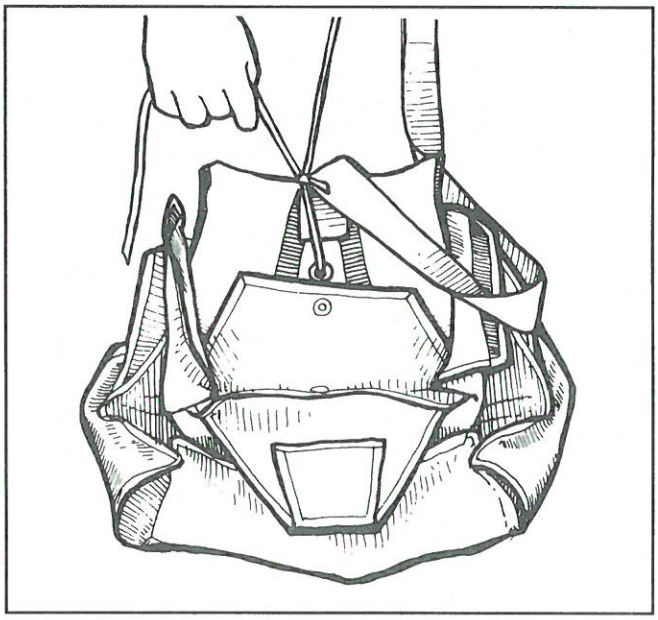


12. Stow the remainder of the suspension lines into the pouch on the underside of the bag using S-folds that extend from one side of the pouch to the other. Remove the two Velcro strips from the bag. Be sure none of the lines are trapped between the Velcro at the mouth of the pouch.



PLACING THE BAG IN THE CONTAINER

Regardless of the procedure used to pack the canopy into the free bag, use the following procedures to put the bag into the container and close the container.



1. Set the bagged canopy on the main container and position the reserve risers in the reserve pack tray. Fan the links rather than stacking them on each other, placing the rear links to the outside. Be sure to place the reserve risers far enough in the pack tray so they will lie flat over the shoulders.

2. Pass the other pull-up cord through the reserve locking loop.

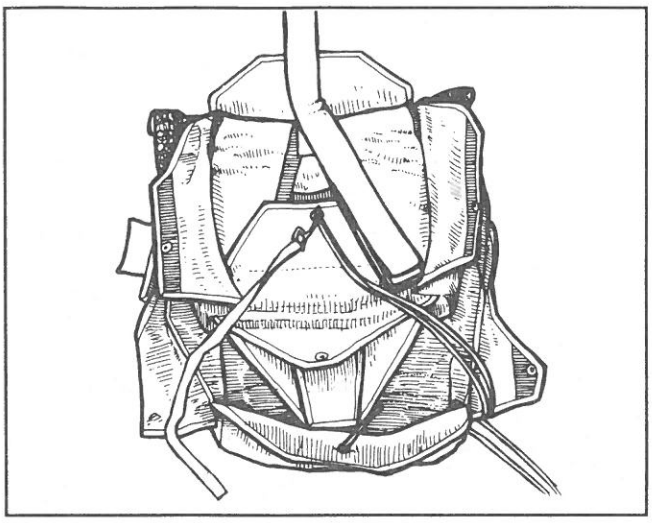
If a T-bar was passed through the bag, thread the ends of the pull-up cord through the hole in the end of the T-bar. Remove the T-bar from the bagged canopy, pulling the locking loop and pull-up cord through it.

If the pull-up cord was passed through the bag, untie it and tie the end protruding from the underside of the bag around both ends of the pull-up cord that was passed through the locking loop. Carefully pull on the other end to pull the locking loop and pull-up cord through the packed canopy. Untie the other pull-up cord and set it aside.

3. Place the bagged canopy in the pack tray, taking extra care to fill the lower corners. Then use the pull-up cord to pull the locking loop up through the bagged canopy. Secure it with a temporary locking pin.

CLOSING THE RESERVE CONTAINER

Regardless of which procedure was used to place the canopy in the bag, the same procedure is

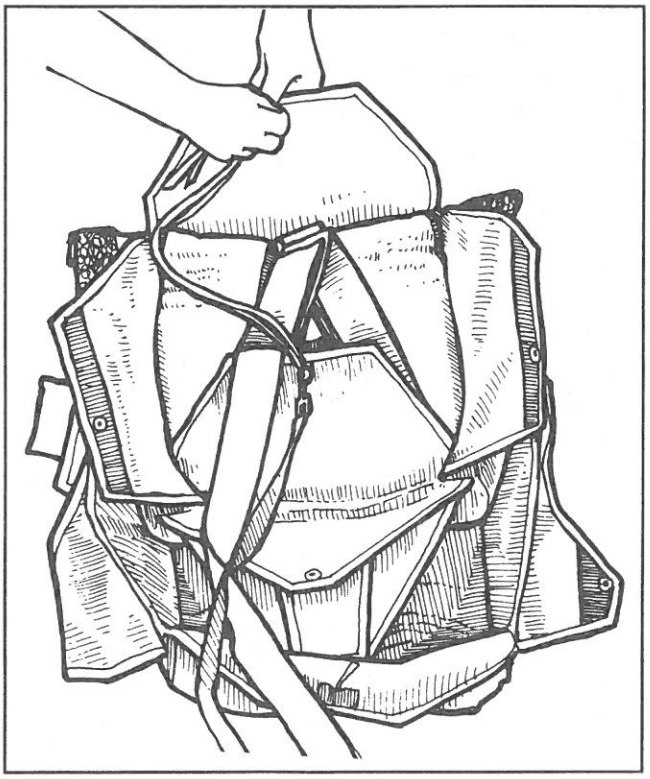


used to close the container.

1. Close the inside bottom kicker flap (Flap #1) and secure it with a temporary locking pin.

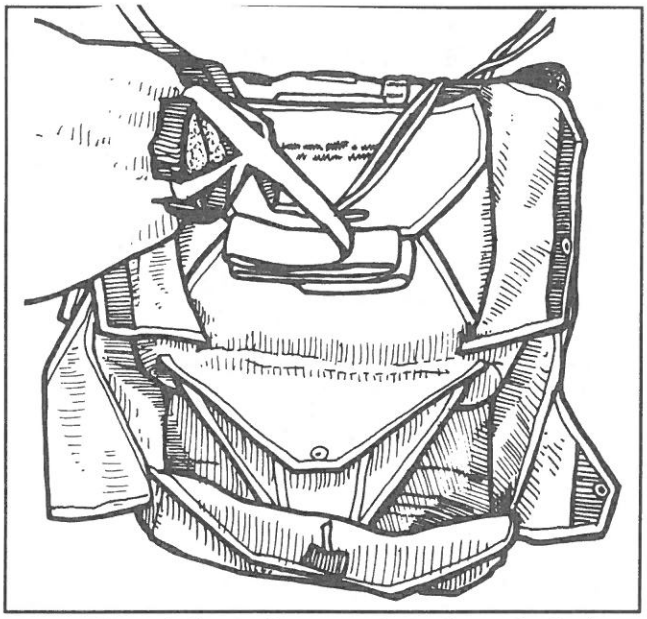
2. Pack the first third of the bridle in the container by making long S-folds in the bridle from the top of the bag to the bottom right-hand corner of the reserve container as shown. Carefully tuck the bottom of the S-folded section under the inside bottom kicker flap (Flap #1).

3. Repeat the above process on the left side with the second third of the bridle, making the S-folds from the top of the bag to the lower left-hand corner of the container and tucking the bottom sections under the inside bottom kicker flap (Flap #1).

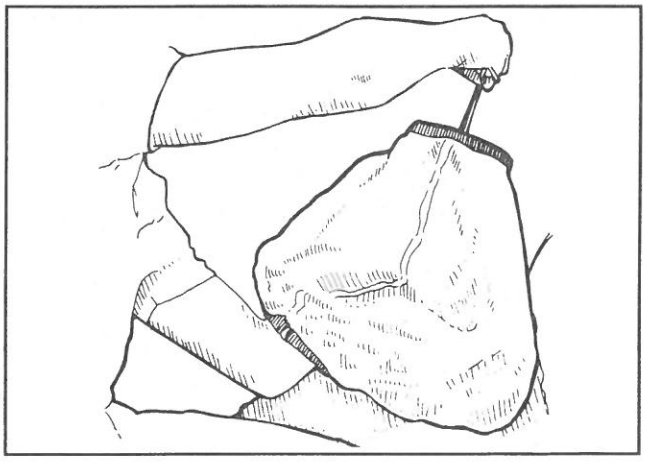


4. Close the inside top kicker flap (Flap #2) and secure it with a temporary pin. The bridle should come out between Flap #1 and Flap #2. Check the amount of free bridle extending from the closed flaps to the base of the pilot chute; there must be at least 5 feet. If there is less than 5 feet, reopen the flaps and restow the S-folded bridle to make the length of free bridle at least 5 feet, maximum 6 feet long.

5. S-fold the length of free bridle on top of #1 and #2 kicker flaps from right to left up to the base of the pilot chute.

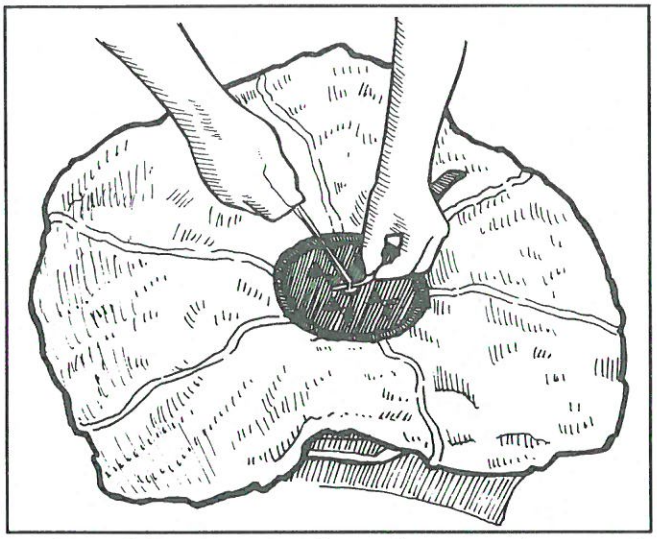


6. Thread the pull-up cord up through the bottom of the pilot chute and out the top.



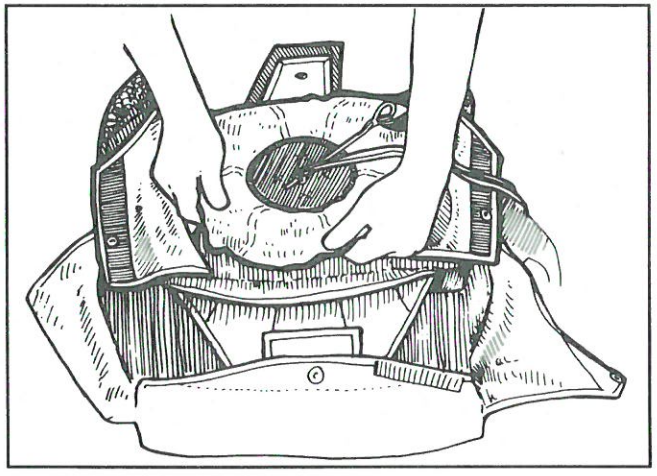
7. Make sure the pilot chute is centered over the loop, then compress it straight down and lock it with the temporary pin.

8. Pull all the canopy fabric out, away from the spring. Folding the fabric, rather than stuffing it between the coils, increases pilot chute launch performance and reduces the bulk of the packed container. After pulling the fabric away from the spring, check to make sure the pilot chute base is centered under the crown.

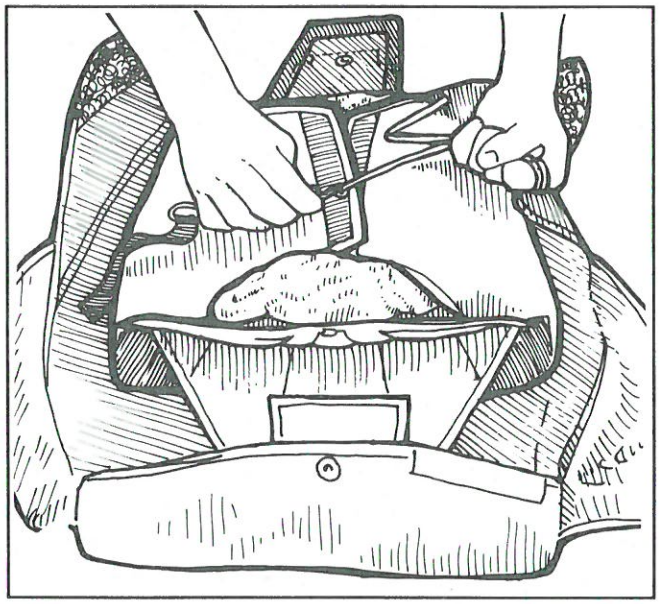


Now fully compress the spring to see how much loop can be pulled through the top of the pilot chute. If you can pull more than 1/2 to 3/4 inches through, the loop is too long. Now would be the best time to open the container and shorten the loop.

9. Lay the fabric flat all around the pilot chute and fold it under in wide folds to the center. Fold the top and bottom first, then the sides. Keep the fabric folds of the pilot chute out from under the open flaps.

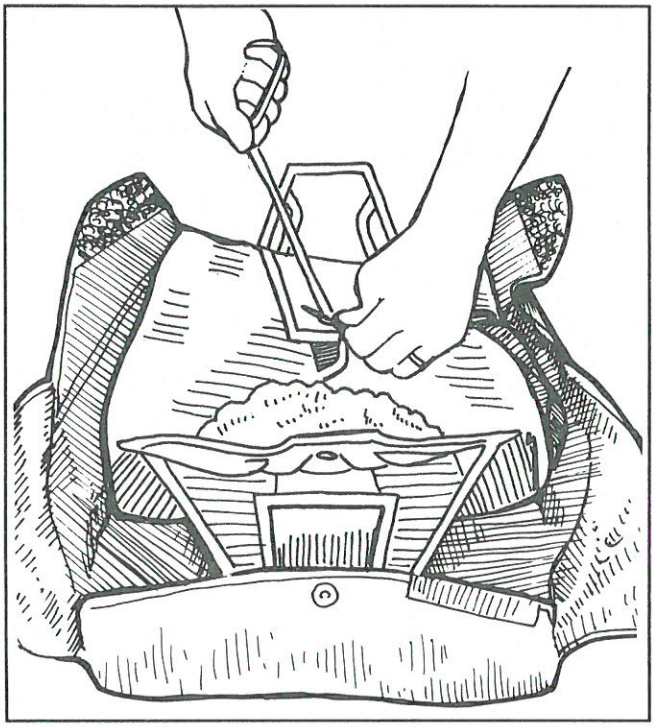


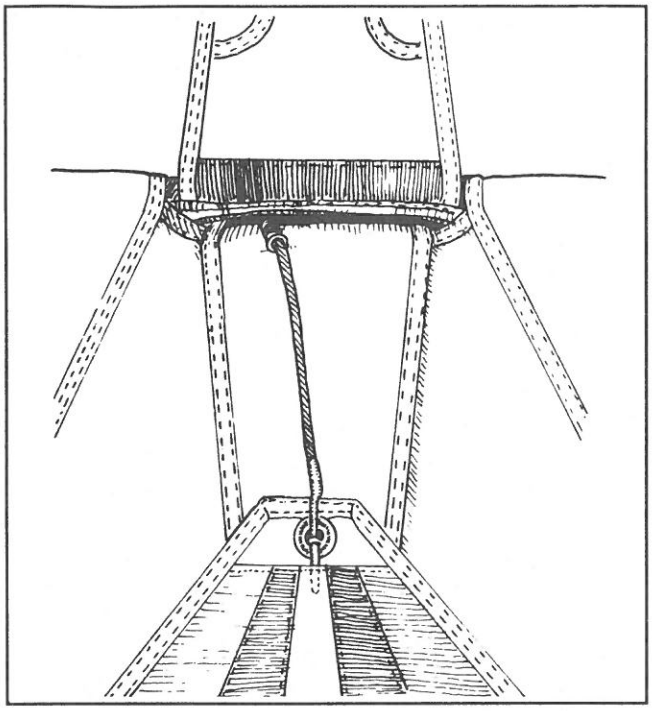
10. Thread the pull-up cord through the side flaps (Flaps #3 right and #4 left) and close and secure with a temporary pin. Make sure that the folds in the pilot chute stay flat and neat.



11. Thread the pull-up cord through the reserve top flap (Flap #5) and insert the temporary pin.

12. Thread the pull-up cord through the bottom center flap (Flap #6) and secure it with the temporary locking pin.





13. Place the rig on a clean surface with the backpad facing up and walk on it with stocking feet or clean shoes to help expel air from the container and make it flatter.

14. Replace the temporary pin with the reserve pin. The end of the pin slides into the channel in the bottom flap.

15. Insert the ripcord handle into its pouch on the main lift web.

16. Dress the container, seal, sign and log the reserve. Close the reserve pin protector flap.

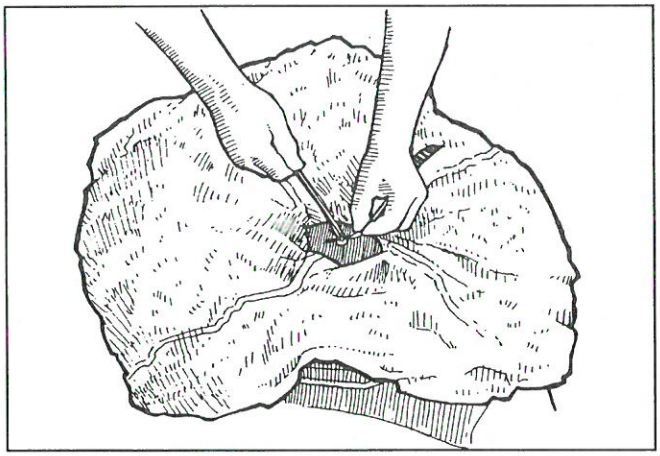
17. Count your tools.

CAUTION

If the force necessary to close the last two flaps seems excessive, the loop may be too short. Use a scale to determine how much force is needed to extract the pin; 8 to 12 pounds is correct.

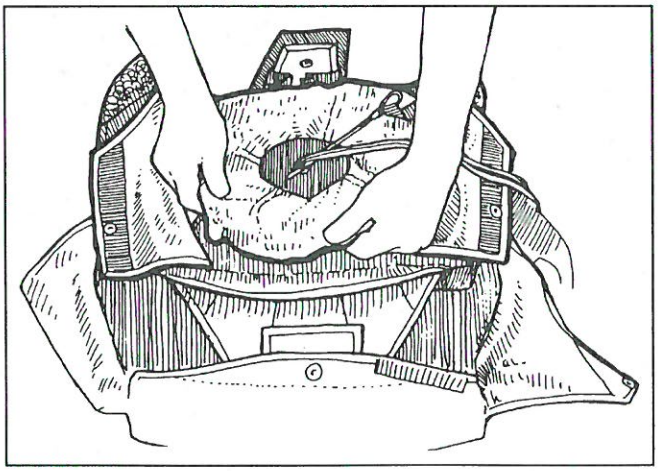
7. Make sure the pilot chute is centered over the loop, then compress it straight down and lock it with a temporary pin.

8. Pull all the canopy fabric out, away from the spring. Folding the fabric, rather than stuffing it between the coils, increases pilot chute launch performance and reduces the bulk of the packed container. After pulling the fabric away from the spring, check to make sure the pilot chute base is centered under the crown.

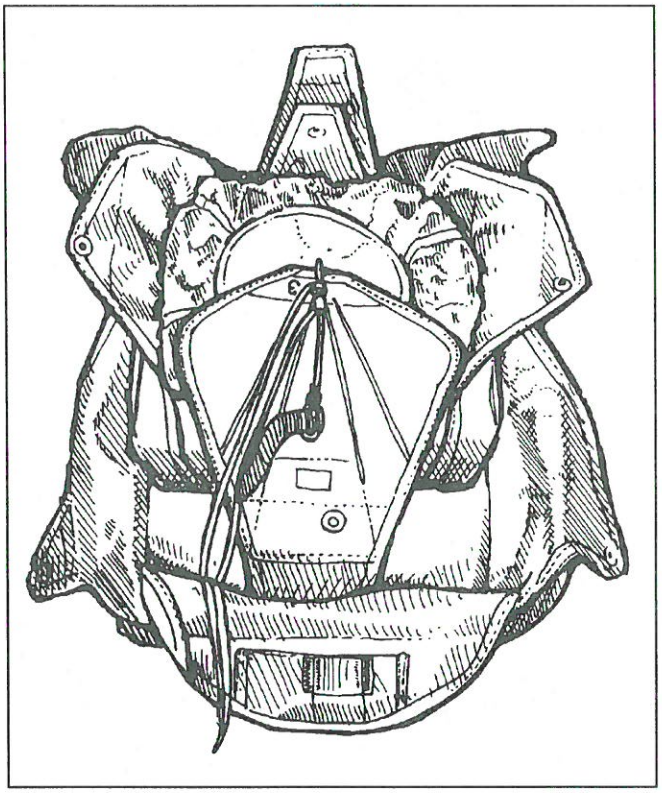


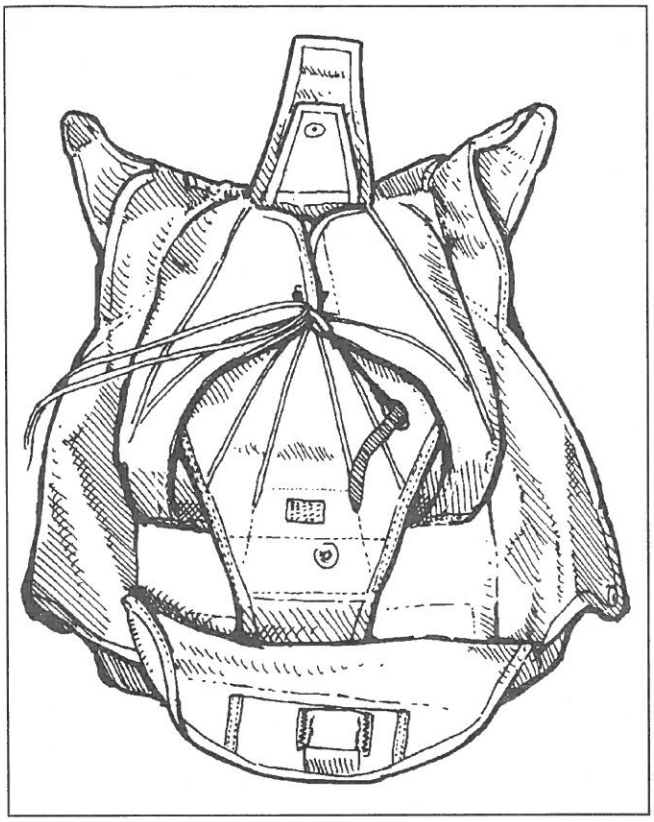
Now fully compress the spring to see how much loop can be pulled through the top of the pilot chute. If you can pull more than 1/2 to 3/4 inches through, the loop is too long. Now would be the best time to open the container and shorten the loop.

9. Lay the fabric flat all around the pilot chute and fold it under in wide folds to the center. Fold the top and bottom first, then the sides. Keep the fabric folds of the pilot chute from under the open flaps.



10. Thread the pull-up cord through the bottom center flap (Flap #3) and secure it with the temporary locking pin.



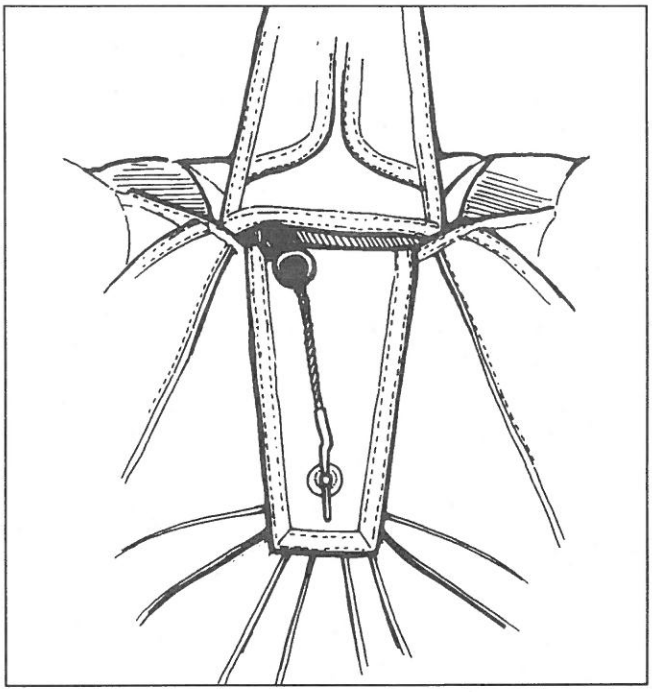


11. Thread the pull-up cord through the side flaps (Flaps #4 right and #5 left) and close and secure with a temporary pin. Make sure the folds in the pilot chute stay flat and neat.

12. Thread the pull-up cord through the reserve top flap (Flap #6) and close and secure with the temporary pin.

13. Place the rig on a clean surface with the backpad facing up and walk on it with stocking feet or clean shoes to expel air from the container and make it flatter.

14. Replace the temporary pin with the reserve pin.



15. Insert the ripord handle into its pouch on the main lift web.

16. Dress the container, seal, sign and log the reserve. Close the reserve container pin protector flap.

17. Count your tools.

CAUTION

If the force necessary to close the last two flaps seems excessive, the loop may be too short. Use a scale to determine how much force is needed to extract the pin; 8 to 12 lbs. is correct.

5. The 3-Ring Release System

INTRODUCTION

The 3-Ring Release System was invented by the Relative Workshop in 1976. It was the first practical release that allowed parachutists to jettison their main canopies in one motion by simply pulling a single handle.

Not only is the 3-Ring easier to operate than previous canopy release systems, it is also more reliable.

Once the main is jettisoned, the only things left on the harness are two smooth rings that cannot snag a deploying reserve. Some other release systems can—and have—interfered with the deploying reserve.

MODIFYING THE 3-RING RELEASE

The great reliability of the 3-Ring system results from the proper functioning of every one of its individual components. Therefore, the owner should not modify the system in any way, nor should he replace genuine 3-Ring parts with others.

These modifications (among others) may cause the system to not work properly:

o Substituting risers that don't have Type 2 sheathing for the locking loop. Don't use risers that have loops made of Kevlar or solid cord.

o Not using a breakaway handle with cable with the special yellow coating. This Teflon-impregnated coating is important; other plastic coatings may cause the cables to bind in the housings or loops, making it difficult or impossible to jettison the risers.

o Using a breakaway handle with cables of the wrong length. The length of the cables is critical to insure each riser releases in the proper sequence. Replacement handles are available from the Relative Workshop.

The 3-Ring Release is now found on other rigs besides Vectors as the Relative Workshop has licensed its use to other manufacturers.

GETTING TO KNOW THE 3-RING

Knowing how the 3-Ring release works will help you assemble and inspect it properly.

Begin by peeling the release handle from the Velcro on the harness. Peeling, rather than pulling, makes it easier to separate the handle from the webbing.

Look behind the risers near the harness and observe the movement of the yellow cable as you pull the handle. When the cable clears the white loop, the release is disengaged.

Now slowly pull one of the risers off the harness. As you pull, you'll notice that the white loop gets pulled through the grommet by the action of the smallest ring.

shock usually totals about 1,000 pounds or 500 pounds on each riser.)

Because of the mechanical advantage provided by the 3-Ring design, only a force of approximately a pound on the top ring keeps the release together.

That's why it's important to keep foreign matter like bits of grass and sticks out of the 3-Ring assembly. A small stick in the white loop could prevent a riser from releasing.

It is also important to understand one of the properties of the nylon components of the system.

When nylon stays in the same position for a long time, it begins to conform to that position, or take a "set." If the 3-Ring release system stays assembled for too long, the nylon can become so stiff that the low drag from a malfunction (such as a streamer) won't pull the riser off the ring.

The 3-Ring release system must be disassembled, flexed and inspected every month. Procedures for this are listed in the care and maintenance chapter of the manual.

NOTE

1-Inch Type 17 Risers

Certain brands of risers built from 1-inch Type 17 webbing have been known to break more frequently than others. There are several reasons why this may happen.

1) One reason is the type of webbing used to hold the small RW-4 ring in position. We often see Type 3, 3/4" or 1" binding tape used. This tape is of "ribbon weave" construction and exhibits less durable characteristics than the "herringbone weave" of Type 1, 9/16", which we prefer. Ribbon weave tape is not designed to handle a heavy load, but rather to reinforce seams or to join several layers of material together and to protect the edges from wear, hence the term "binding tape."

2) There are several versions of Type 17 webbing. One type is "shuttle-woven," the other is "needle-woven." Needle-woven is the least desirable due to its less stable construction technique. If the edge of Needle-woven webbing is cut, that piece of webbing will pull apart under less load than its shuttle-woven counterpart.

3) The hole for the grommet must be seared with a hot knife to help stabilize the area. Bartacking the area around the hole will also help reinforce that area. The grommet area is commonly thought of as the "weak link" on a Type 17 riser though our pull tests have proven this theory invalid. The riser generally breaks at the webbing area that wraps around the largest ring on the harness.

Type 17 risers are a high-performance piece of equipment. High-performance translates to low durability. Like a race car it goes faster than a normal car but will not last as long. We recommend inspecting Type 17 risers frequently for wear and damage. We have not established a service life, but 150-250 jumps are good figures to work with. If you own a Microlined canopy and the lines are ready for replacement, change the risers at the same time.

Here is another point to consider: The risers used today break less often than the canopies they are attached to. The risers are certainly not the weakest link. For instance, Blue Track canopies from France have

from France have broken many lines which resulted in breakaways and reserve deployments. The combination of Microline and Type 17 risers is reducing the total amount of elasticity normally enjoyed by the entire parachute assembly. Harder canopy openings due to this lack of elasticity can also be attributed to the slick surface of the Microline which allows the slider grommets to slide more freely. With the introduction of stainless steel grommets, the sliders are descending even quicker because the stainless steel is harder and smoother than brass, resulting in less friction.

Abrasion is another factor that affects the life of Type 17 risers. Packers who drag their rigs to them as they stow lines on the deployment bag are causing irreparable damage to the webbing that supports the two riser rings, thereby decreasing the life of the risers.

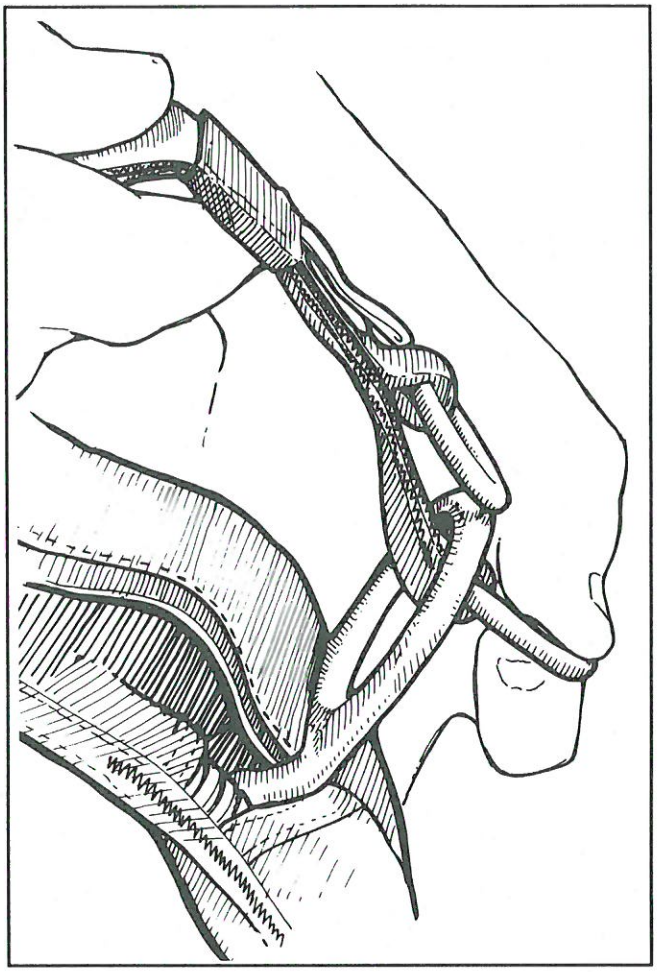
In short, Type 17 risers work just fine when inspected every 25 jumps for abrasion, cuts, burns or other damage. Change the risers between 150 and 250 jumps. Most of all, remember that these are "high-performance" components that yield low durability. They will not last forever! If you are worried about the durability of Type 17 risers, or will not take the time to inspect them regularly, we suggest using the standard Type 8 risers.

ASSEMBLY

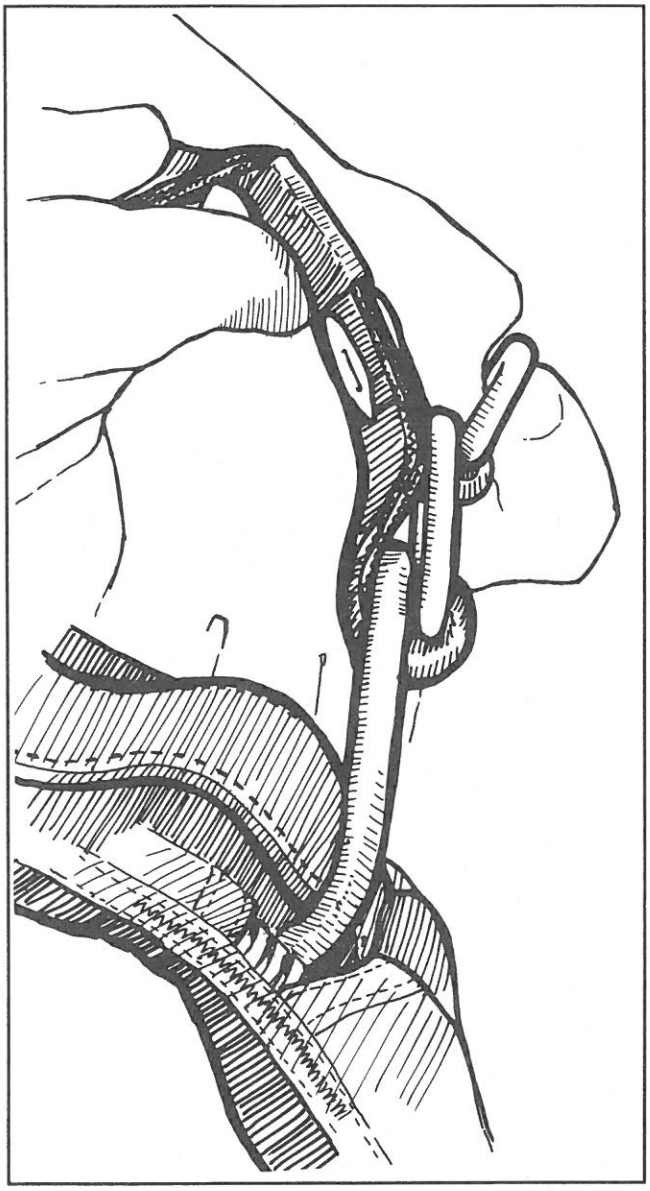
Before assembling the 3-Ring release, make sure the risers aren't twisted or reversed. Lay the Vector face down, as you would to pack it.

1. Thread each cable into its housing and stick the handle to the harness. The handle should be positioned as close to the ends of the housings as possible so that no cable is exposed.

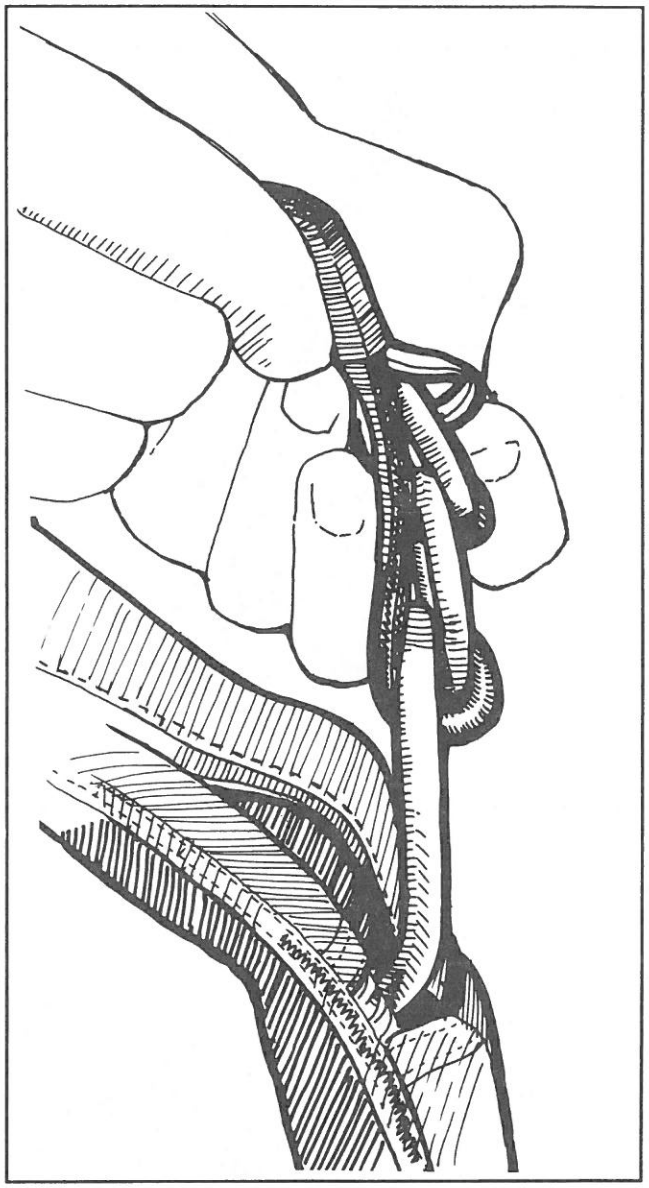
2. With the rings of the riser facing toward the floor, pass the middle ring on the end of the riser through the large harness ring from above. Fold it back toward the canopy and risers.



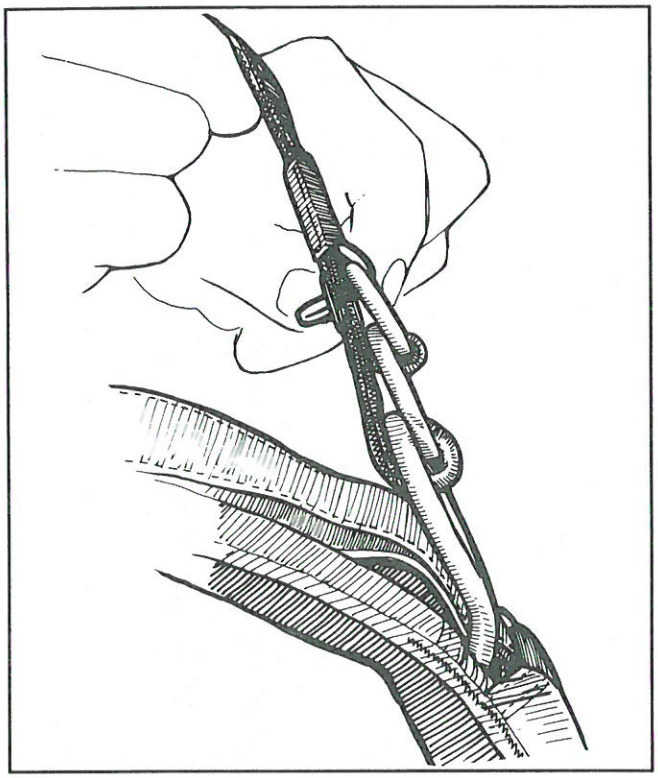
3. Thread the smallest ring through the middle ring in the same way, but make sure it doesn't pass through the large ring.

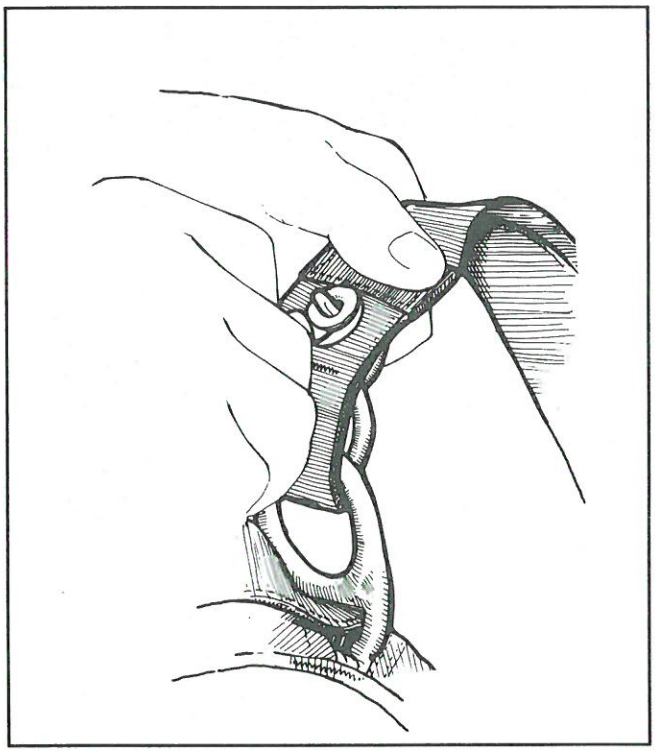


4. Bring the white loop over the small ring only and then through the riser grommet so it pokes out the back of the riser.

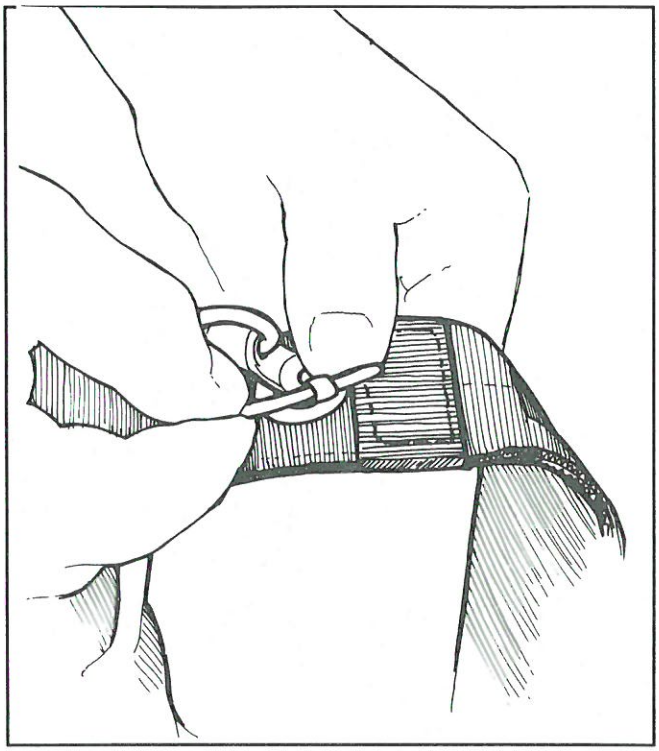


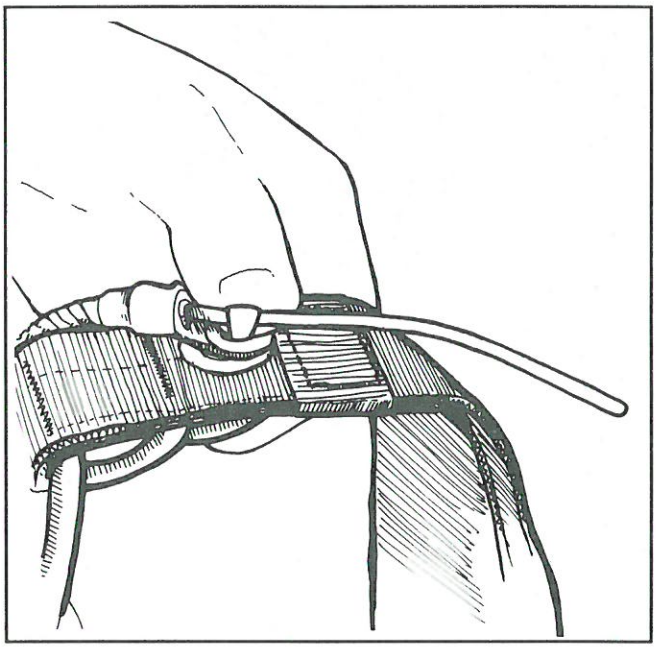
5. Continue threading the white loop through the grommet on the end of the cable housing. The flat side of the cable housing grommet should be against the riser.



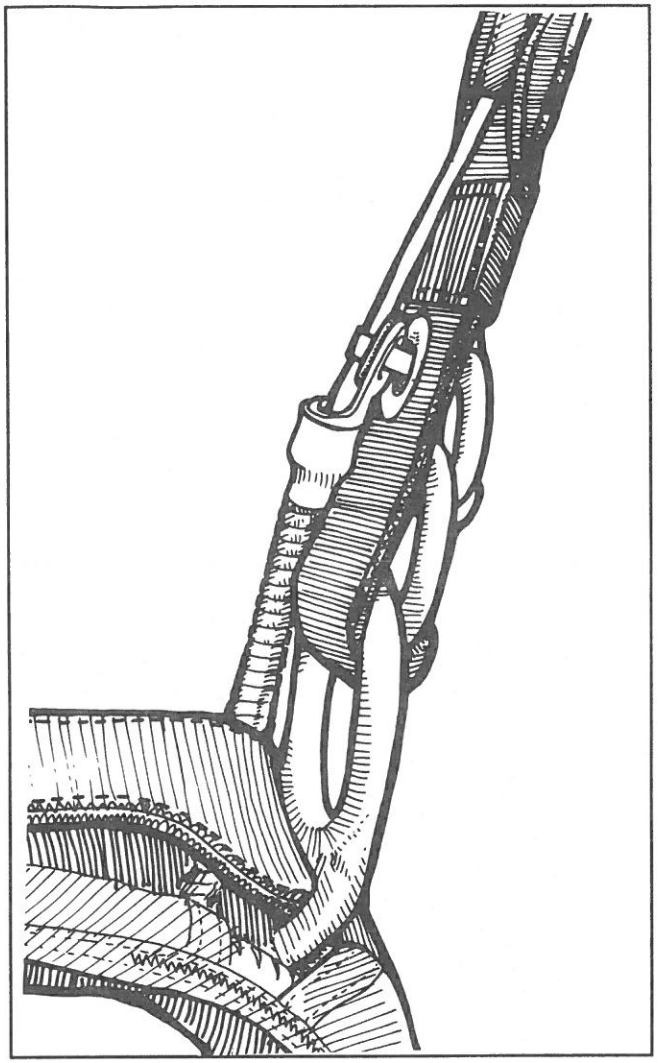


6. Thread the yellow cable through the white loop, making sure the loop isn't twisted. Be careful with the cable so you don't bend it too sharply or kink it. Insert the free end in the channel on the back of the riser.





7. Repeat the above steps with the other riser.



PRE-JUMP INSPECTION

Before jumping the Vector II, check the 3-Ring release system for the following:

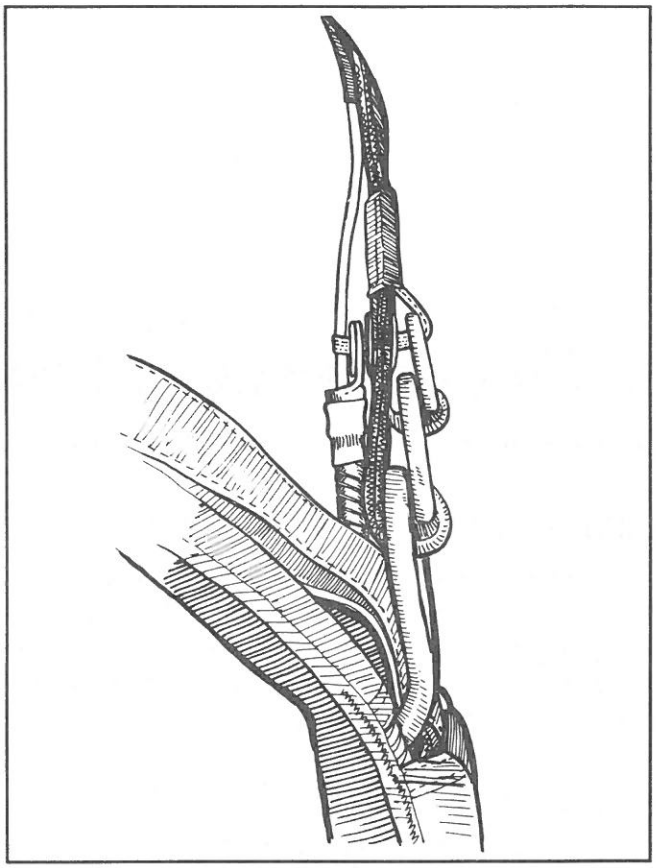
1. Each ring passes through only one other ring.

2. The white loop passes through only the small ring.

3. The white loop passes through the grommet on the end of the cable housing without twisting.

4. Nothing passes through the white loop except the yellow cable.

5. The 3-Ring release handle is securely stuck to the harness, and no cable is visible between the handle and the cable housings. If your release handle has a tendency to hide itself under your main lift web, undo the Velcro and twist the handle in a clock-wise rotation (when wearing rig) so the handle will stick-out and slightly forward for a better grip.



NOTICE

If a Vector II is fitted with 3-Ring risers that weren't built by the Relative Workshop, it is important that they be checked for proper configuration. The side view above shows a correctly built 3-Ring riser attached to the harness ring and put under moderate tension. Note the following: (1) The rings overlap each other and maintain metal-to-metal contact between each other. (2) The rings are aligned in parallel planes. (3) The smallest ring is not pulled snug against the grommet; the white loop is long enough to give it some play. (4) The white locking loop goes straight down through the center of the riser grommet on its way to the cable housing end fitting; it does not extend past the edge of the grommet hole and then turn back upwards towards the hole. If your riser configuration does not match this illustration, the 3-Ring release might not function correctly. You should contact a rigger or the Relative Workshop before jumping with those risers.

6. Maintenance & Care

INTRODUCTION

Your Vector II will last longer, look better and function correctly if it is maintained. A Vector II actually requires very little maintenance unless it is subjected to unusual conditions such as a jump into salt water or a muddy landing.

INSPECTION

The best approach in maintaining your rig is to periodically spend a few minutes examining every detail on it. This inspection should be done at least every month. If any wear or damage is found, have it fixed immediately. Putting off repairs might result in a malfunction.

In addition to inspecting the rig yourself, ask your rigger to inspect the entire assembly every time the reserve is repacked.

Particular attention should be given to these areas:

1. Breakaway System. Refer to the 3-Ring section in this chapter for detailed information on inspecting the canopy releases.

2. Reserve System. This includes the reserve ripcord, locking loop, pins, handle, housing, container and associated sewing. You should not attempt any repairs or modifications to any of these items unless you are a rigger. You can, however, spot little problems before they become major.

3. Harness. The harness should be inspected periodically for broken stitching or frayed webbing.

4. Main Container. Inspect the plastic stiffeners in the container flaps and replace any that are broken. Replace any grommets that are badly deformed or are pulling out of their setting.

5. Main Pilot Chute. Check the center line (the length of nylon tape inside the pilot chute that extends from the handle to the base) of the main pilot chute. It must be firmly sewn at each end; there must be no broken stitches or torn fabric.

Inspect the seam that joins the pilot chute mesh to the pilot chute fabric. If the mesh is torn or badly frayed, replace the pilot chute.

6. Locking Loop. The main container is held shut with a locking loop made of nylon suspension line sheathing. This loop is subject to wear. If it wears out and breaks, the main canopy may release prematurely and a malfunction may result. Replace the loop with a duplicate if wear is noticed.

CAUTION

Never jump a Vector with a worn locking loop.

7. Velcro tape has many applications within parachuting. Even though it can eventually wear out, there exist few materials that can compete with Velcro with regard to its flexibility, adaptability, and wide variety of possible applications.

Hook Velcro often attracts dirt, bits of grass, hair and other debris. Cleaning the hook can be facilitated with the use of a fine-tooth comb. The pile section generally remains clean but the nylon fibers tend to get pulled out of place. When you find that your Velcro is loosing its adhesive qualities, then it should be replaced.

Although the Relative Workshop strives to find better alternatives to Velcro, there still remain some areas on the Vector II where nothing else will do, namely: The Velcro for the breakaway handles, ripcord pockets, hand deploy bridles, steering toggles, reserve static line lanyards, and riser covers.

CARE

Your Vector II is manufactured mostly from nylon. Nylon is very durable, but is susceptible to damage from several sources:

1. Sunlight. The ultraviolet rays in sunlight quickly and permanently weaken nylon. Keep your Vector out of direct sunlight as much as possible.

2. Acids. Nylon is also damaged by acids. Keep your Vector away from hangar floors, dirty car trunks and similar areas where acids may be found. If such contamination does occur, immediately and thoroughly wash the rig with plenty of warm soapy water. Until a rig can be washed, baking soda will quickly neutralize most acids. If acid damage occurs or is suspected, a rigger should thoroughly inspect your Vector.

3. Oils and Grease. Most petroleum compounds do not weaken nylon; they simply stain it. Such stains should be promptly removed by a rigger using the proper petroleum solvent.

4. Water. Water will not structurally damage your Vector II, but prolonged agitation in clear water weakens webbing or may cause some fabric and tape colors to run. Salt water may damage nylon and rust hardware if not promptly and thoroughly washed off with plenty of fresh water. Your rig will maintain its new appearance longer if it is kept dry.

5. Soil. Soil may damage your Vector II. Brush off the soil after it has dried and gently wash with warm soapy water. Be sure that the soil is not in the housings, snaps, 3-Ring release or reserve ripcord pins or loops. Consult a rigger if your rig is heavily soiled or extremely dirty.

6. Sand. Fine sand will weaken and cut webbing and fabrics of all kinds. Prolonged exposure to sand will shorten the life of the entire parachute assembly.

7. Abrasion. Nylon quickly frays if dragged over concrete or other rough surfaces. Do not drag your rig on the concrete while packing.

FAA regulations require that reserves worn in the USA be inspected every 120 days by a certificated rigger.

REQUIRED PERIODIC MAINTENANCE FOR THE 3-RING

The Booth 3-Ring Release System has been in use for many years with excellent results. Although the system is as durable as the rest of the rig, it requires periodic maintenance and inspection to ensure proper operation.

Generally, it is NOT recommended that the risers be attached to the harness when new and "forgotten." Like all skydiving gear, the 3-Ring Release should be carefully inspected and operated on a regular basis.

The procedures below should be done at least every month. This is especially important if the rig has not been used for a month or more, such as during the winter. Immediate inspection is required if it has been subjected to some abuse such as a drag across the runway, a water landing or exposure to a lot of dust or sand.

It's important to maintain the system even more frequently in humid, muddy or freezing conditions. If the Vector becomes immersed in mud or muddy water, clean the 3-Ring release system with a mild solution of soap and water. Any rusted components must be replaced.

1. Every month operate the 3-Ring release system on the ground. Extract the cable completely from the housings and disconnect the risers.

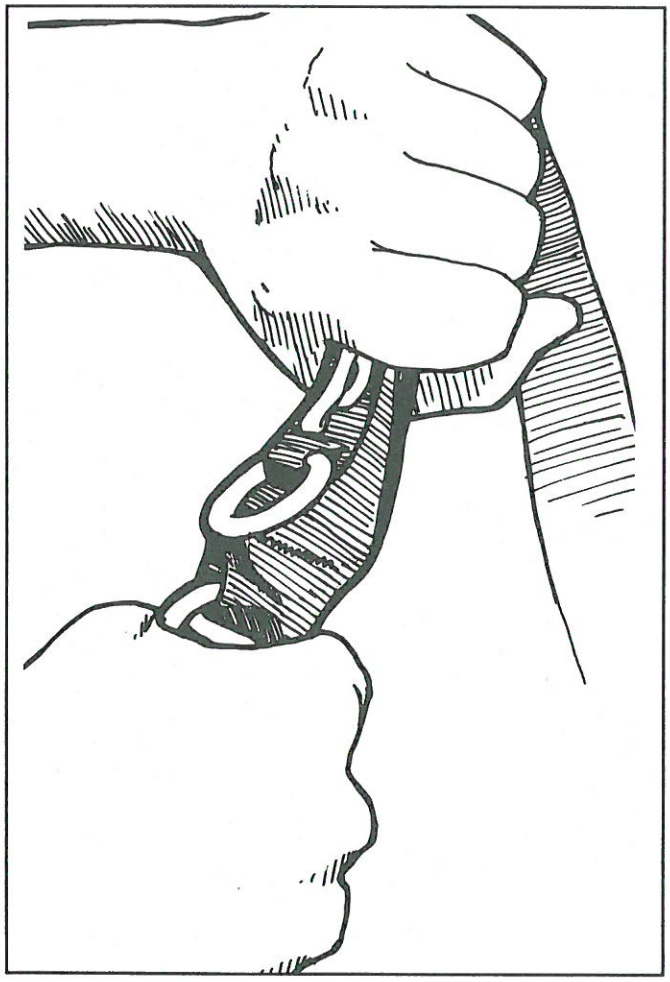
2. While the system is disassembled, closely inspect it for wear. Check the white locking loops (the ones that pass over the smallest ring and through the grommet) to be sure they are not frayed.

3. Check the Velcro on the breakaway handle and main lift web to be sure it is clean and adequately holds the handle.

4. Check the cable ends for a smooth finish. The ends are finished at the factory to have a smooth, tapered surface. This prevents the cable from hanging up in the loop. Check the cable ends and consult a rigger or the manufacturer if a burr or "hook" is present.

5. Check the stitching, including that which holds the large rings to the harness.

6. Check the 3-Ring release housings for solid hand-tacking and proper stretch. The housing ends lay at the chest strap area, pull downward on these housing ends and check that they don't move downwards more than 1/2 inch. Pull the housings from the free end and expect 1-2 inches of movement.



7. Take each riser and vigorously twist and flex the webbing near where it passes through each ring. The idea is to remove any set or deformation in the webbing. Do the same thing to the white loop.

8. Check the housings for dents or other obstructions. Use the cable to do this.

9. Clean and lubricate the release cable with a light oil such as "3-in-1" brand or silicon. Put a few drops on a paper towel and firmly wipe the cable a few times. A thin, invisible film should remain—too much will attract grit and dirt, or the oil could become tacky in cold weather. Too much oil will require more force to extract the cable during a breakaway.

10. Inspect the fittings at the end of each housing. If one of these fittings were to come off the housing, a riser might release prematurely.

11. If any wear is found, consult the Relative Workshop or a rigger before using the Vector.

12. Reassemble the system. Double check it. Make sure the risers aren't reversed.

The Relative Workshop appreciates any comments from users that relate to the safety, operation or maintenance of the 3-Ring release.

REPLACEMENT PARTS

The Relative Workshop supplies replacement parts for its rig at a reasonable cost. When ordering parts for your rig, include the serial number, type and date of manufacture of your Vector so the proper items can be quickly supplied. This information is written on the label tucked under the collar between the top two flaps of the reserve.

7. How to Use the Vector II

This chapter provides specific procedures for using the Vector II. It is not a training syllabus.

It is the responsibility of the owner to insure he knows everything he needs to make a safe parachute jump, including how to use his equipment. This knowledge can be gained only by personal instruction.

SUGGESTED EQUIPMENT

It is essential that a new Vector II jumper practice normal and emergency procedures on the ground before jumping the rig for the first time. This practice should be done using training aids that duplicate the equipment to be used in the air.

The Relative Workshop can provide a Vector II training harness. It is equipped with simulated breakaway, reserve and main deployment handles that are located in the same positions as the Vector II. If you build your own practice harness, make sure the main, reserve and breakaway handles are located in the same positions as on the Vector II.

PRE-JUMP EQUIPMENT CHECK

The equipment check should follow a logical order like top to bottom, front to back.

Starting at the front:

1. Make sure the 3-Ring system is assembled properly and free of dirt or other foreign matter.

2. Check the position of the breakaway and reserve ripcord handles. Don't remove them from their pockets unless you suspect a problem, because the Velcro will wear out quickly. Insure the chest strap is not threaded through the reserve ripcord handle.

3. Check the leg straps to be sure they are threaded properly (if you step into the harness), or if they are unthreaded, make sure they are not wrapped around the main lift web but hang straight (if you choose to thread them up every jump.)

4. Open the reserve container pin protector flap by grasping the sides of the flap, and pulling straight up. Do not grasp the bottom edge of the flap. This will cause the end of the flap to curl up, becoming permanently deformed and more easily snagged. Upon checking the pin, it should be straight and seated well into the locking loop with the end of the pin covered by the pin protection pocket. *Note: When asking for a pin check by another jumper, brief them on the proper procedure.*

5. Slide the reserve ripcord cable back and forth in its housing to be sure it moves freely.

6. Lift the main container pin-protector flap and check the curved locking pin. It must be at least halfway through the locking loop. Be sure the yellow Velcro patches on the bridle and container flap are mated.

7. Be sure the bridle is routed correctly from the locking pin, under the right-hand flap along the main lift web and into the pilot chute pouch. Routing the bridle around the leg strap will cause a pilot-chute-in-tow malfunction.

8. Check the 3-ring release (breakaway) handle. It should be mated to the Velcro on the harness properly. No more than 1/2 inch of yellow cable should be visible between the breakaway handle and the cable housings.

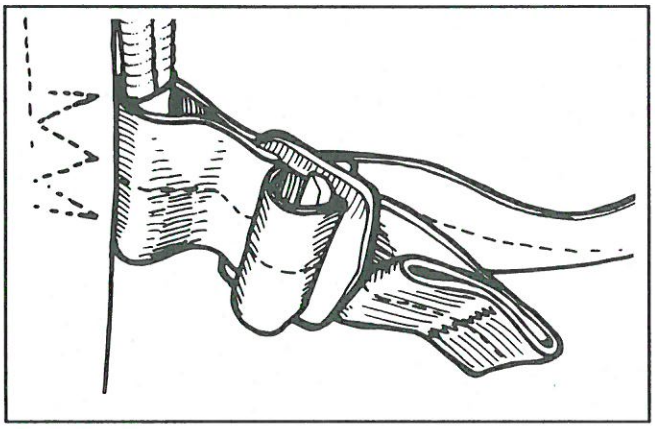
9. Calibrate and arm the AAD (if installed) according to the instructions provided by its manufacturer.

DONNING AND ADJUSTING THE VECTOR II

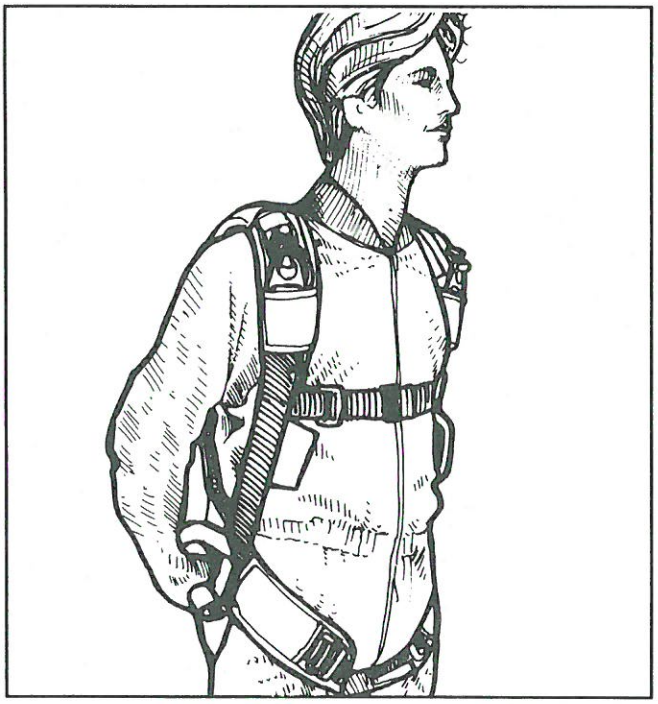
The Vector II is designed so that it fits snugly, yet comfortably, when the harness is properly adjusted.

1. Pick up the Vector II by grabbing it by the main lift web where the 3-Rings are. Put it on as you would a coat.

2. Check the leg straps for twists before threading them. Be sure to route the webbing correctly, then tighten them until they are snug. Slide the excess strap through the black elastic keepers provided and then stow the excess strap in the pockets on the leg pads so they won't flop around in the air.



3. Thread the chest strap. (If an altimeter is worn on the chest strap, put it on now.) The strap enters the adjuster from behind (the wearer's chest side), around the sliding bar, and back through between the bar and the end of the adjuster. Adjust it so the main lift webs are parallel when the chest strap is tight. Stow the end through the black elastic keeper.



An improperly threaded chest strap will not hold the jumper in the harness.

SUMMARY

To summarize the above adjustment procedures:

Always give your gear a complete check before putting it on your back.

Put the packed rig on over your jumpsuit.

Thread the leg straps through the adaptor or connect the straps, checking that they are not twisted, and position the comfort pads properly.

Tighten the leg straps until snug.

Stand up straight and close the chest strap; it should not be cinched too tightly.

JUMPING THE VECTOR II

This section contains recommended procedures for operating the Vector II.

DEPLOYING THE MAIN PARACHUTE

Before a jumper uses a hand deploy system, he should first practice the procedure on the ground under an instructor's supervision. These procedures are used in the air:

1. While falling in a stable position, look at the hand deploy pilot chute handle.

2. Firmly grasp the handle with your right hand while compensating for stability with the left.

3. Extract the pilot chute from its pouch and throw it into the airstream away from your body.

It's not enough to simply release the pilot chute into the airstream; it must be thrown out and away from your body. Otherwise it may blow back into the turbulent air behind you and cause a malfunction. The motion of your arm should be parallel to the ground. If it isn't, the pilot chute and bridle may pass under your arm, possibly causing a malfunction.

Any wave-off procedure should be completed before pulling the hand deploy pilot chute. Waving off with the pilot chute in hand could cause a premature pack opening and possibly a malfunction.

Many jumpers watch the pilot chute inflate and begin extracting the main canopy, then lower their heads while the main inflates.

DEPLOYING THE RESERVE PARACHUTE

This section is not a detailed course in coping with parachuting emergencies. It discusses the causes of some total and partial malfunctions and how a jumper wearing a Vector II might react to them.

Note that the procedures for dealing with malfunctions do not consider the installation of an AAD. Since it is a back-up device, the jumper should act as if it wasn't there.

Total Malfunctions

A total malfunction exists when the main canopy is still in its container after some effort has been made to deploy the main pilot chute. The pilot chute may or may not be trailing behind the jumper.

A total malfunction may result from a variety of causes, most of which can be prevented by proper packing, maintenance and use of the Vector II.

Because the jumper is descending at a high rate of speed, he has little time to attempt to correct a total malfunction.

The reserve ripcord should be pulled using a "look, reach, pull," procedure. The ripcord should be grasped with both hands and pulled until the arms are completely extended.

When presented with a total malfunction, it is usually not prudent to jettison the risers before pulling the reserve ripcord. Doing so wastes the limited time and altitude available.

Typical total malfunctions and the experienced jumper's response include:

1. Towed pilot chute. The pilot chute is out behind the jumper, but does not extract the main canopy for some reason. (Causes include misrouting the hand deploy bridle during packing, not mating the yellow Velcro patches on the bridle and flap, and others.)

RESPONSE: Assume a flat and stable position and immediately pull the reserve ripcord. It is unlikely the jumper will be able to identify or correct the cause of a pilot chute-in-tow before impact with the ground.

2. Pilot chute hesitation. The pilot chute may become trapped in the turbulent air over a jumper's back and stay there. (Causes include not throwing a hand deploy pilot chute vigorously to the side and others.)

RESPONSE: The jumper should roll over on his side momentarily. This should blow the pilot chute off his back or out of the turbulent air. If it doesn't leave immediately, the jumper should roll back over and assume a flat and stable position and pull the reserve ripcord. Because simultaneous deployment of the main and reserve canopies can occur in this situation causing both to malfunction, before pulling the reserve, the jumper should try all possible methods to free the main pilot chute, while maintaining altitude awareness.

3. Lost or stuck deployment handle. Jumpers will sometimes be unable to locate the deployment handle or, if they do locate it, will not be able to pull it.

RESPONSE: The jumper should look at the deployment handle. If he cannot see it or feel it, or if two hard pulls on it won't extract it from its pouch, he should assume a flat and stable position and pull his reserve.

Partial Malfunctions

A partial malfunction results when the main canopy comes out of the container and extends above the jumper but does not open correctly. Most partial malfunctions result from incorrect packing, poor body position upon deployment, or problems with the canopy itself.

Some partial malfunctions can be corrected by the jumper in the air. These might not require the use of the reserve parachute and can be landed safely. Identifying and dealing with such situations is the responsibility of the jumper.

Some jumpers delay several seconds between jettisoning their main and pulling the reserve ripcord. This allows them to achieve stability before the reserve deploys. However, such a delay can be fatal if the jumper is too close to the ground.

Some jumpers put one hand on the breakaway handle and the other on the reserve ripcord handle and then attempt to pull them both simultaneously or in rapid succession. There have been incidents, however, where this technique resulted in the reserve deploying before the risers were jettisoned—a dangerous situation.

Therefore, experience has so far shown that the "two-step" method is usually best.

RESPONSE: When presented with a partial malfunction that requires the use of the reserve, the jumper should arch his back and tuck his legs behind him. He should then look down and locate the reserve ripcord handle and the breakaway handle. Grasp the breakaway handle and peel it away from the main lift web. Look at the reserve ripcord handle. Then pull the breakaway handle down towards the knees until the arm is completely extended. Throw it away and immediately grasp the reserve ripcord with both hands and pull it until the arms are completely extended.

AAD MALFUNCTIONS

A jumper may find himself under his reserve canopy if his automatic activation device on the Vector II malfunctions, or if it was improperly calibrated, or if he has descended below the preset altitude at a high rate of speed.

If the main container is still closed, the jumper should land under the reserve canopy.

If the main container is open but the main canopy is not inflated, it should be jettisoned using the breakaway handle.

If both the reserve and main canopy are open and inflated, the jumper should respond as he was trained by his instructor. (If the main canopy is a ram-air, many instructors teach their students to jettison it and land under the reserve. Procedures for round main canopies depend on a number of factors—such as the exact type of main—that are beyond the scope of this manual.)

OTHER EMERGENCIES

A skydiver may be faced with any number of emergencies not listed here, including those in the aircraft, during climb-out or exit, in freefall, under canopy, and during landing. As stated above, training for any and all emergencies must be provided by a currently rated instructor or parachute center.

If you need assistance or require clarification on any point in this manual, please call, write or Fax the Relative Workshop.

Relative Workshop
1645 N. Lexington Avenue
DeLand, FL 32724
Phone: 904-736-7589
Fax: 904-734-7537

PRODUCT RECALL

ISSUE DATE: 21 MAY 1992

SERVICE BULLETIN #010592

SUBJECT: This bulletin affects all Type 17 (Mini 1") main risers with reserve static lines (RSLs) attached which were manufactured by Relative Workshop of De-Land, Florida, USA.

STATUS: MANDATORY

BACKGROUND: Type 17 (Mini 1") risers have been in use for more than six years. Recently, however, the shock loading these risers are being subjected to has become much greater due to one or all of the following reasons:

1) Jumpers are falling faster due to tighter jumpsuits, and are jumping smaller canopies which, because of their smaller square footage and/or zero porosity fabric, open faster. (Faster fall rate plus faster opening equals greater opening shock.)

2) Microline, unlike Dacron, will not stretch. Consequently, much more of the opening shock is now transmitted directly to the risers instead of being absorbed by the suspension lines.

3) Microline, due to its small bulk, may not always be held securely by standard rubber bands or Tube Stoes. (This condition may be aggravated by too small a line bight.) This may cause out-of-sequence deployments, hard openings and uneven riser loading.

4) The new generation of collapsible, zero-porosity pilot chutes may cause accelerated bag-snatch and line-dump which also result in out-of-sequence deployments, hard openings and uneven riser loading.

5) The practice of rolling all of the nose in the same direction will often cause one side of the canopy fo inflate before the other, which again results in uneven riser loading.

These Type 17 (Mini 1") risers are designed to withstand loads up to 2500 pounds. It is apparent that newly designed canopies with Microline used by heavier jumpers occasionally exceed this design limit. These risers, on average, appear to be stronger than the canopies they are attached to. Scores of canopies have blown up during this period without damaging Type 17 (Mini 1") risers. While a main canopy breaking may be unsettling, breaking a Type 17 (Mini 1") riser with an RSL may be fatal. It may deploy the reserve canopy into the now malfunctioning main canopy.

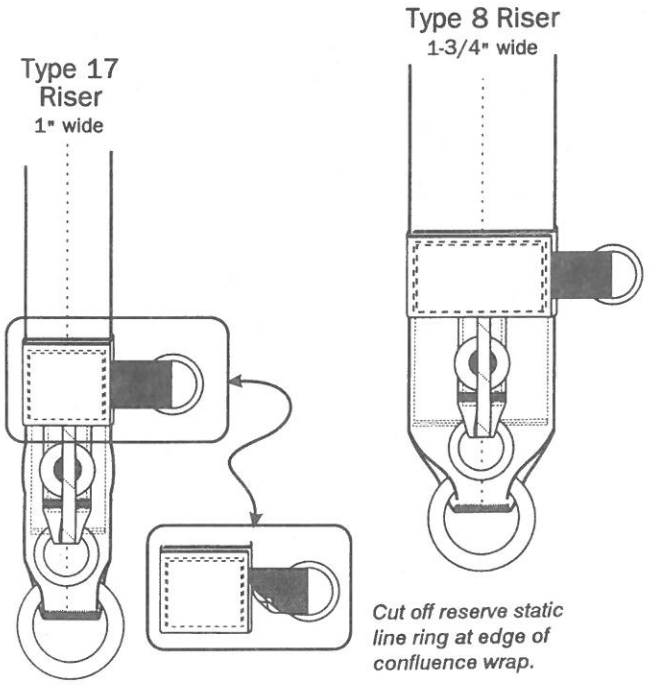
REQUIRED ACTION: Immediately disconnect the RSL from the Type 17 (Mini 1") main riser. Have a currently rated parachute rigger cut the RSL attachment ring off the riser. Then attach the snap shackle end of the RSL around either the adjacent short or long cutaway housing. You may continue to jump the system set up this way until you install replacement Type 8 (1-3/4") risers set up for an RSL. These are much stronger and have never broken in use. Contact Relative Workshop or your dealer with the serial number of your system and we will supply you with Type 8 (1-3/4") risers at no cost, if your RSL was installed by Relative Workshop.

(If your RSL is an after-market installation, we will supply you with the recommended Type 8 (1-3/4") risers at a reasonable cost.)

REMEMBER: This bulletin only affects those Type 17 (Mini 1") main risers with RSLs attached which were manufactured by Relative Workshop. It does not affect Type 17 (Mini 1") main risers without RSLs.

COMPLIANCE DATE: Immediately, prior to the next jump.

DISTRIBUTION: Skydiving publications worldwide; USPA; PIA; Relative Workshop dealers.



Cut off reserve static line ring at edge of confluence wrap.

RELATIVE WORKSHOP

1645 Lexington Avenue • DeLand, Florida 32724 USA • Phone +1 386 736 7589 • Fax +1 386 734 7537
rws@relativeworkshop.com • www.relativeworkshop.com