



PSB#052385
Stabilizer Modification to Tandem Vector Canopies
May 23, 1985

TANDEM OWNERS

ENCLOSED FIND THE FOLLOWING ITEMS:

- 1. Modification form to be returned to the Relative Workshop. 2. Stabilizer modification instructions.
3. Brake setting modification instructions.
4. Two main and two reserve lines to be used in the modifications. 5. Wire for finger trapping in the modifications.

ALSO INCLUDED:

- 1. Tandem canopy packing instructions to be added to your Tandem Master Reference Book.
2. Tandem exit procedures to be added to your Tandem Master Reference Book.
3. Check for \$50.00 to be used for the modifications or to be returned to the Relative Workshop with your rig.

Because Tandem jumping is still operating under a waiver from the FAA, meticulous records must be kept. Please complete this form and return it to the Relative Workshop, 1725 N. Lexington Ave., DeLand, FL 32724.

Thank you!

Name of Tandem Vector Owner: \_\_\_\_\_

Tandem Vector Serial #: \_\_\_\_\_

1. MAIN CANOPY: Serial #: \_\_\_\_\_

Steering Line Modification

Completed By: \_\_\_\_\_ Date: \_\_\_\_\_

Stabilizer Modification

Completed By: \_\_\_\_\_ Date: \_\_\_\_\_

2. RESERVE CANOPY: Serial #: \_\_\_\_\_

Steering Line Modification

Completed By: \_\_\_\_\_ Date: \_\_\_\_\_

Stabilizer Modification

Completed By: \_\_\_\_\_ Date: \_\_\_\_\_

REMEMBER: This work must be done by an FAA Master Rigger before the next jump.

If you do not want to do this work, please ship the complete rig to the Relative Workshop. It will take a minimum of three weeks for us to return the rig.

## TANDEM CANOPY BREAK-IN

When you think about it, we're asking a lot of a Tandem Canopy. We want it to open softly at 180 mph, yet we want it to open quickly (within a few hundred feet) at 35 mph (after a breakaway). Through a lot of fiddling with all of the factors that effect opening shock, we have been able to come up with a canopy that can do both of these things! The average loss of altitude in a Tandem breakaway is under 300 feet, and yet, the same canopy, packed the same way, has taken 3 successive test drops with 500 pounds, at 225 mph, with no damage.

However, prudence dictates that you take it easy on your canopy while it is new (the first 100 jumps). When F-111 fabric is new, it is very non-poris. As you use it, it gains porosity. As it gains porosity, your canopy opens slower, thus softer. So a good rule of thumb for the first 100 jumps or so, seems to be: Avoid long delays (over 8 seconds) with heavy loads (more that 320 pounds).

Your main canopy is equipped with two brake settings. The lower, NORMAL setting (closer to the toggle) produces the smoothest, cleanest openings. It is the one you will want to use for most Tandem jumps. However, this setting will not always give you acceptable opening shocks on long delays with heavy loads while the canopy is new.

### Bulletin 5/23/85 Stabilizer Modification to Tandem Vector Canopies

This bulletin advises you to modify the Vector Tandem Main Canopy and Vector Tandem Reserve Canopy before the next jump on the system. These canopies must open reliably and softly at speeds of 35 to 180 mph while carrying from 100 to 400 lbs, when the canopy is new as well as after 200 jumps. This requires a delicate balance of all the factors that affect opening shock.

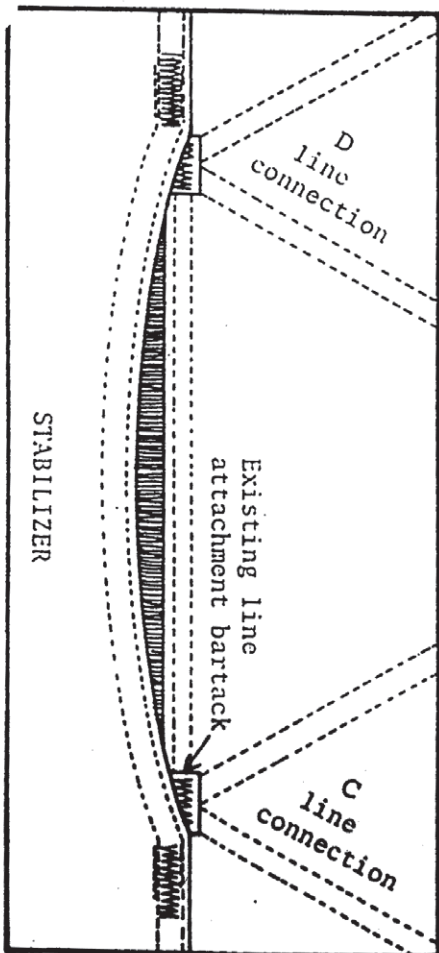
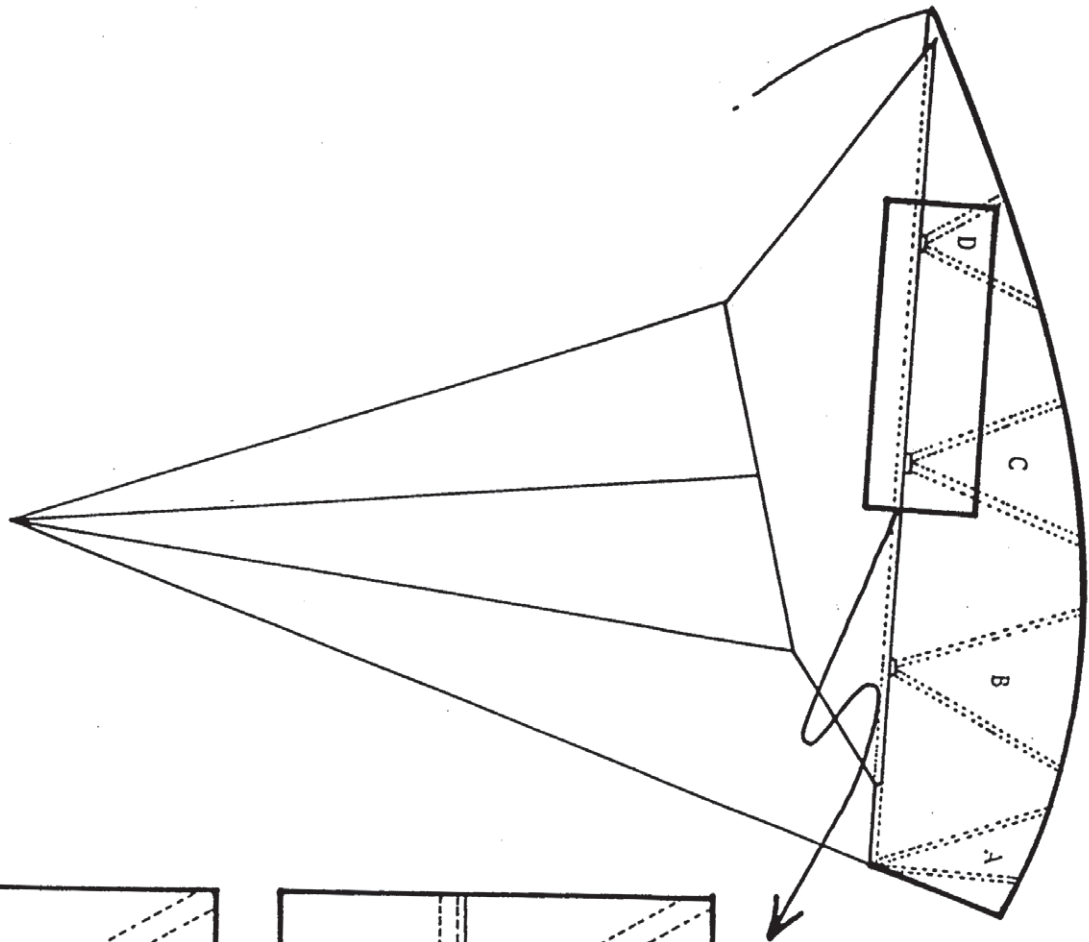
After considerable testing, the Relative Workshop has concluded that these -canopies open more softly and are less likely to be damaged if they have 'slotted stabilizers. Completely slotting the stabilizers gives the softest openings, while sewing them completely shut results in the best landing flare.

But experience has shown that new canopies with completely sewn-up stabilizers occasionally open end-cell first, causing hard openings and canopy damage. Slotting the stabilizers between the C and DJines seems to alleviate this problem without degrading the landing flare very much. Therefore, you must slot the stabilizers on both the main and reserve Tandem Vector Canopy between the C and D lines. Because this is critical to flight safety, this must be done before the next jump.

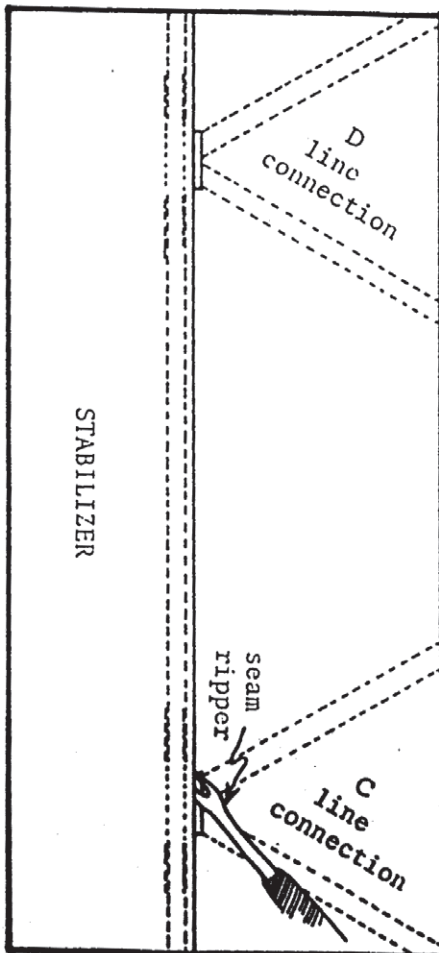
The procedure is straight-forward and must be completed by an FAA Master Rigger. Tools needed are a seam ripper and a zig-zag or bartack sewing machine with nylon E-thread.

Procedure: The stabilizer is sewn to the canopy after the canopy's end rib and bottom skin are sewn together. This means the stabilizer can be detached from the canopy without affecting the seam that joins the rib and skin. When ripping the seam that -attaches the stabilizer to the canopy, be careful not to damage any other seam.

1. Carefully remove the double seam that connects the stabilizer to the canopy between the C and D line. Be sure you have the correct seam.
2. Using a zig-zag or bartack stitch, reinforce the stabilizer attachment point at both ends of the slot with a 1-inch bartack or zigzag. This 1-inch reinforcing must be placed next to (outside of) the existing bartack at the line. attachment points of the C and D lines, not over it (see illustration).
3. Repeat this procedure on the other side of the canopy.
4. Inspect the completed work, log and return the enclosed postcard. Make sure Deployment Brake Modification has been clone before repacking.



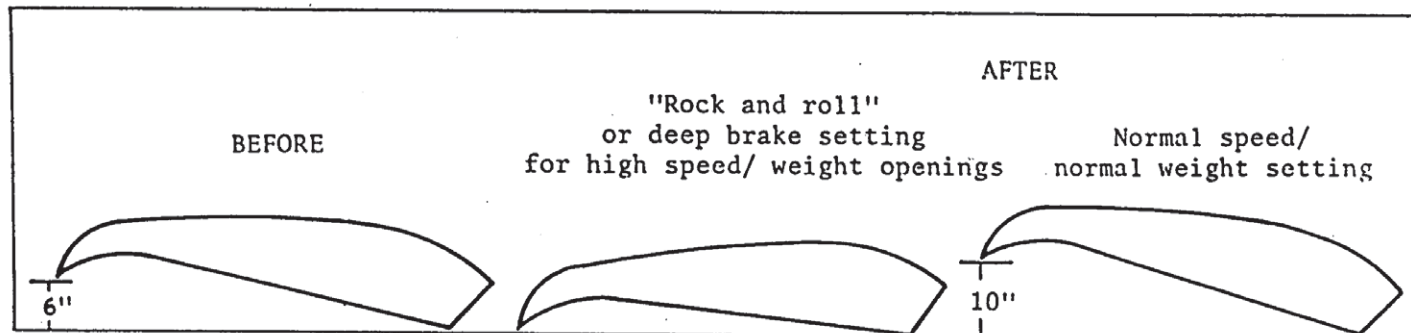
AFTER



BEFORE

The brake setting on the Vector Tandem Canopies you were shipped provided optimum performance for most suspended weights and deployment speeds. Under certain situations--particularly heavy loads at high speeds with a new canopy--this brake setting resulted in hard openings.

It now appears that two brake settings are needed to cover all situations. A very deep brake setting ("rock and roll") provides the softest openings at high speeds and loads. A more normal brake setting provides soft openings for most situations, and is more comfortable because the canopy doesn't "rock and roll" after opening.



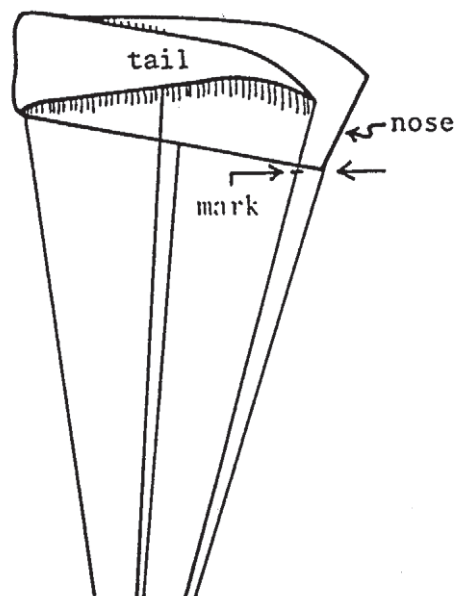
Therefore, you must modify the Vector Tandem main canopy so that both brake settings are available to you, and you must modify the Vector Tandem reserve canopy to the deep brake or "rock and roll" setting. Both canopies must be modified before the next jump.

"Deep brake setting" means using the double loops closer to the canopy, which pulls the tail down the most.

#### Alteration Procedure--Main Canopy

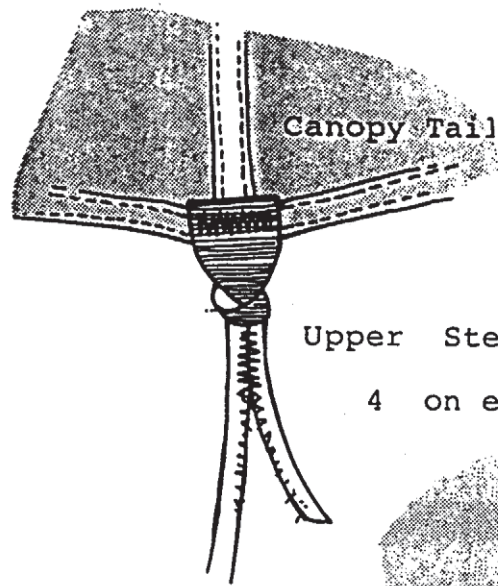
This procedure shortens the upper steering lines by 6 inches and lengthens the lower steering line by 6 inches, leaving the overall length of the steering system the same.

1. Mark the upper control lines in this manner: Set the brakes and anchor the risers. Take one outside steering line and one outside A line and hold them side by side under approximately 10 lbs. tension. Mark the steering line at the point where the A line joins the attachment tape on the canopy. This mark will be approximately 6 inches down the steering line.



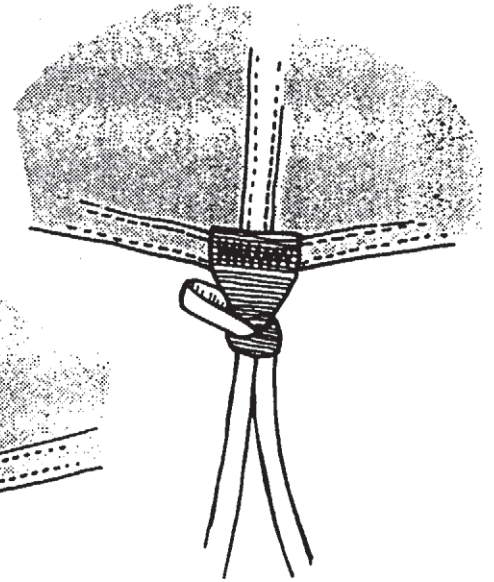
2. Hold the three remaining upper steering lines on one side next to the marked steering' line under equal tension, and mark them at the same point. All four lines should be : marked at the same place so they wi 11 be of equal length.

3. Carefully remove the zig-zag stitching where the free end of the line is sewn back on itself. Do not unthread the line from simply pull the line through the tape so the mark on the line is centered on the line attachment tape. Do this for all four lines. The result is upper steering lines that are of equal length and are about 6 inches shorter than before.

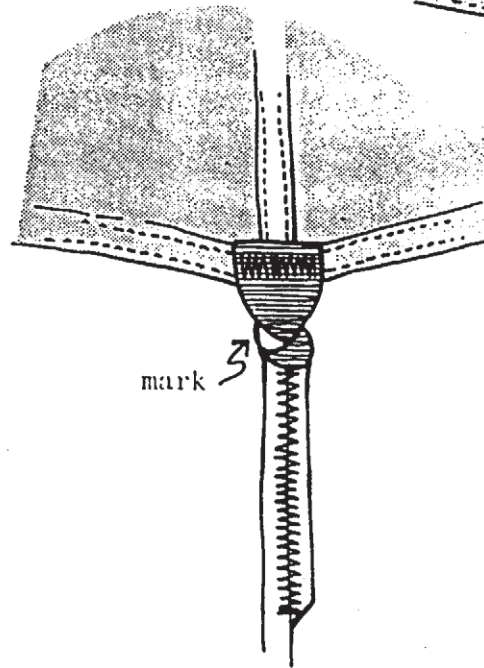


Upper Steering Line  
4 on each side

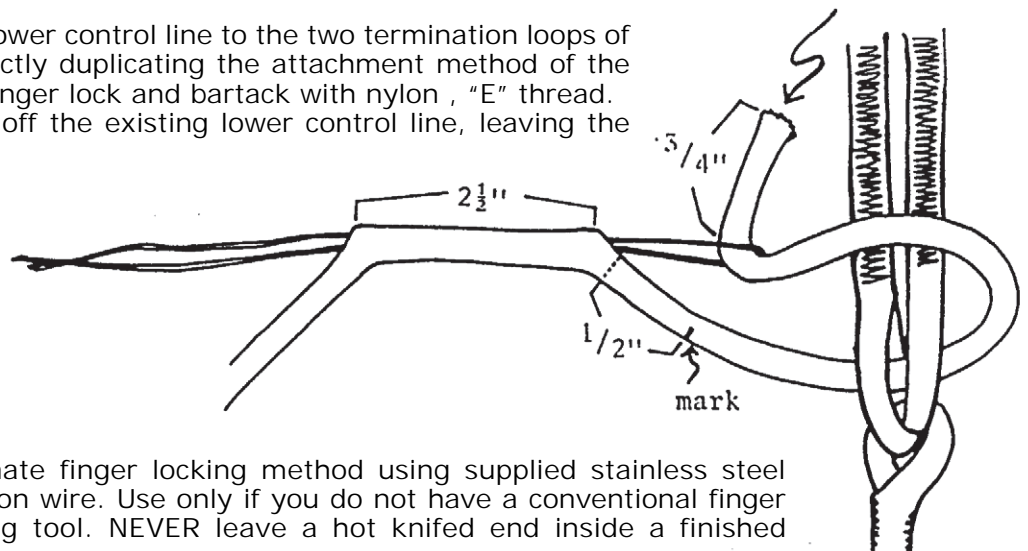
4. Check length by holding all four lines next to each other under equal tension.



5. Resew the free end of the line back on itself for a length of 3 inches. Cut off the excess free end.

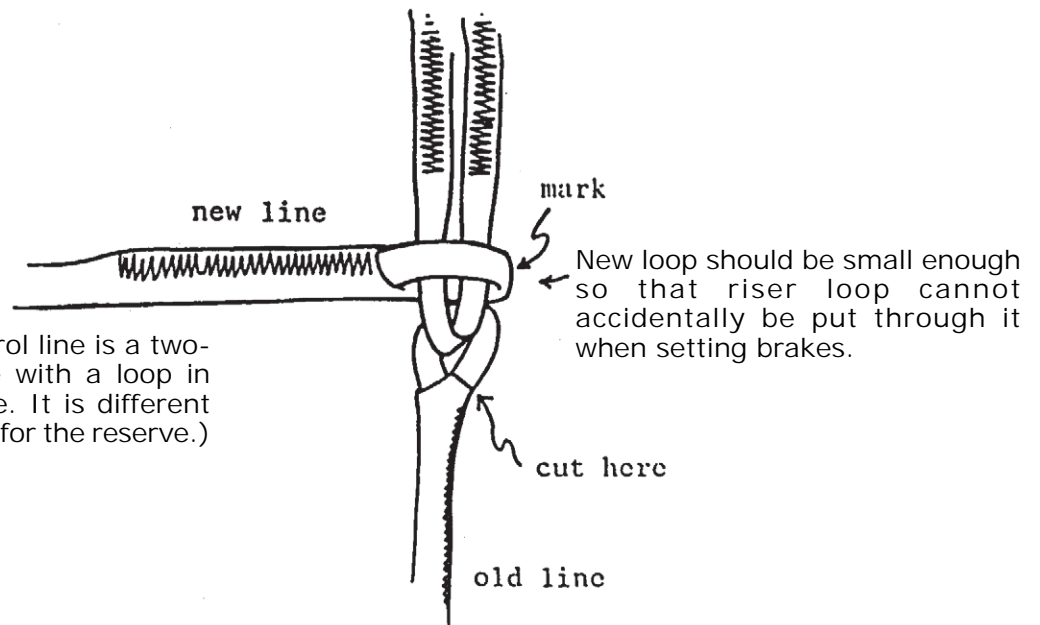


6. Attach the supplied new lower control line to the two termination loops of the upper control lines, exactly duplicating the attachment method of the existing lower control line Finger lock and bartack with nylon, "E" thread. (See illustration.) Then cut off the existing lower control line, leaving the new one in its place.

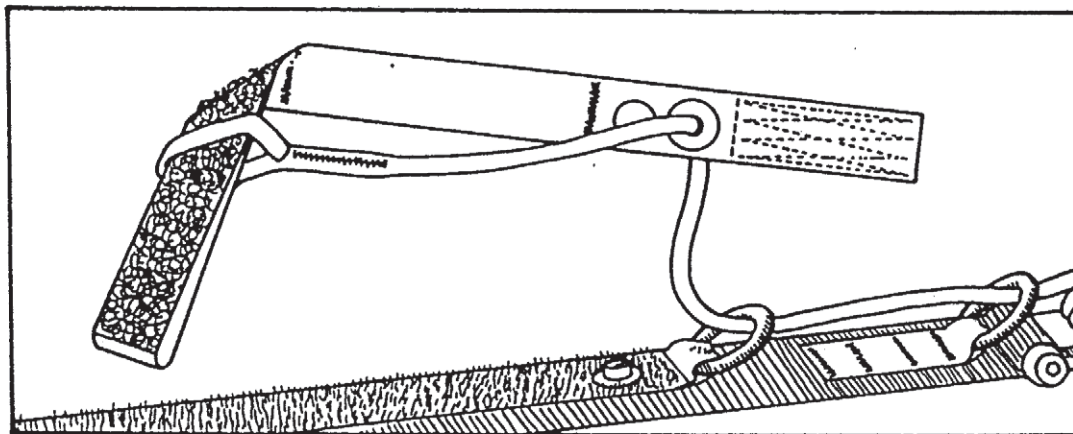


Alternate finger locking method using supplied stainless steel Aviation wire. Use only if you do not have a conventional finger locking tool. NEVER leave a hot knifed end inside a finished

(Note: The supplied lower control line is a two-piece assembly of 900-lb. line with a loop in one end and two in the middle. It is different from the one-piece line supplied for the reserve.)



7. Thread lower control line through both steering line guide rings on the riser, then attach toggle as shown in diagram.



8. Compare modified steering system on one side of canopy to existing steering system on the other side. The overall length from canopy trailing edge to toggle should be the same (plus or minus 1 inch).

9. Set the brakes using the upper loops (deep. brake mode) and anchor the risers. Compare the tail of the canopy to the nose; the line attachment points on both should line up.

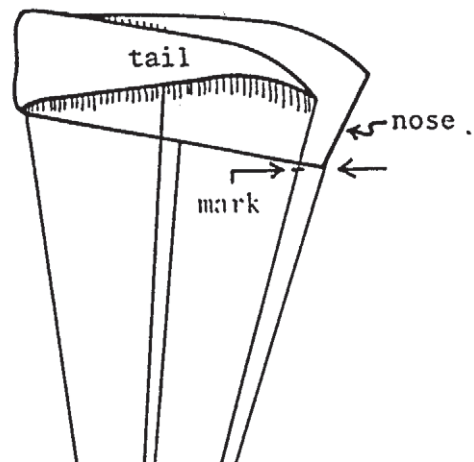
10. Repeat steps 1 through 7 for the other side of the canopy. Compare the steering system on both sides of the canopy; they must be identical. 11. Be sure stabilizer modification has been accomplished before repacking canopy. If you are not sure, contact us.

12. Log and return confirmation card to the Relative Workshop.

#### Procedure--Reserve Canopy

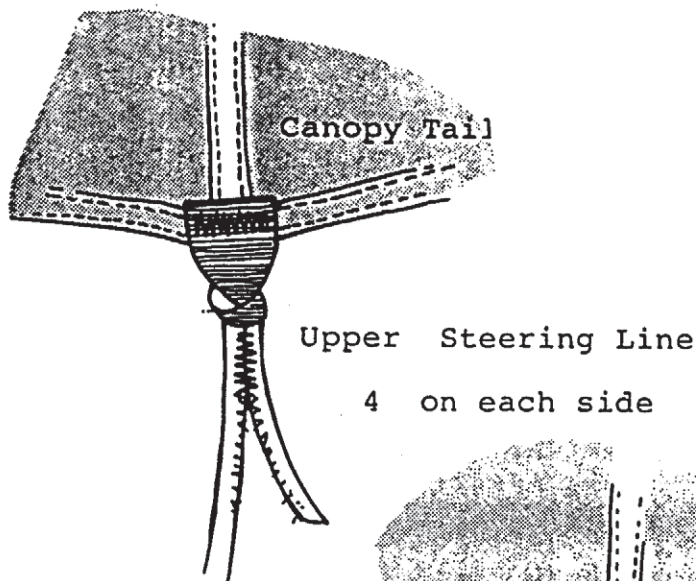
This' procedure shbrtens the upper: steering lines by 6 inches and lengthens the lower, steering line by 6 inches, leaving the overal length of the steering system the same.

1. Mark the upper control lines in this manner: Set the brakes and anchor the risers. Take one outside steering line and one outside A line and hold them side by side under approximately 10 lbs. tension. Mark the steering line at the point where the A line joins the attachment tape on the canopy. This mark will be approximately 6 inches down the steering line.

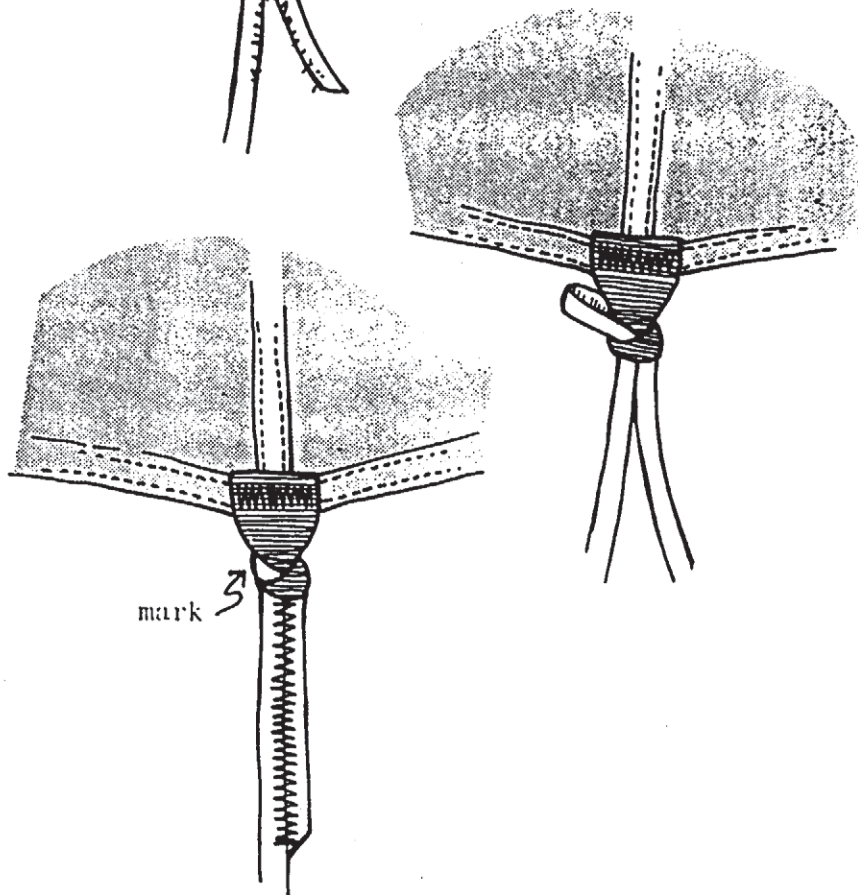


2. Hold the three remaining upper steering lines on one side next to the marked steering line under equal tension, and mark them at the same point. All four lines should be marked at the same place so they will be of equal length.

3. Carefully remove the zig-zag stitching where the free end of the line is sewn back on itself. Do not untread the line from the tape; simply pull the line through the tape so the mark on the line is centered on the line attachment tape. Do this for all four lines. The result is upper steering lines that are of equal length and are about 6 inches shorter than before.

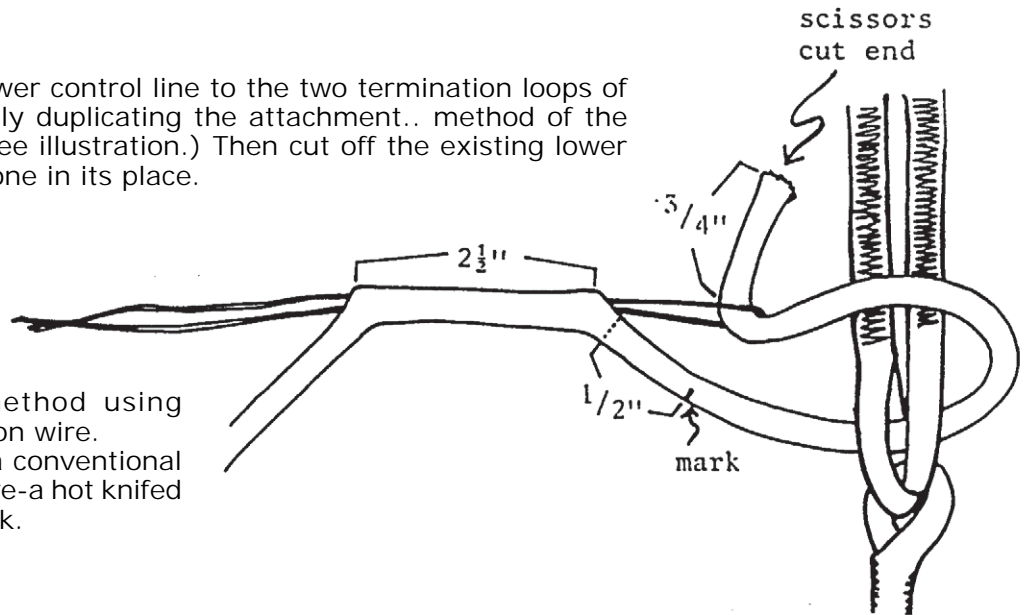


4. Check length by holding all four lines next to each other under equal tension.

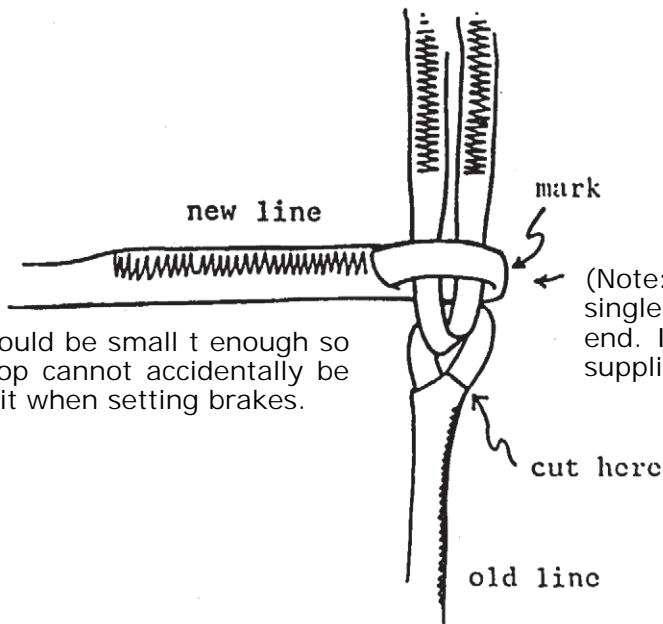


5. Resew the free end of the line back on itself for a length of 3 inches. Cut off the excess free end.

6. Attach the supplied new lower control line to the two termination loops of the upper control lines, exactly duplicating the attachment method of the existing lower control line. (See illustration.) Then cut off the existing lower control line, leaving the new one in its place.



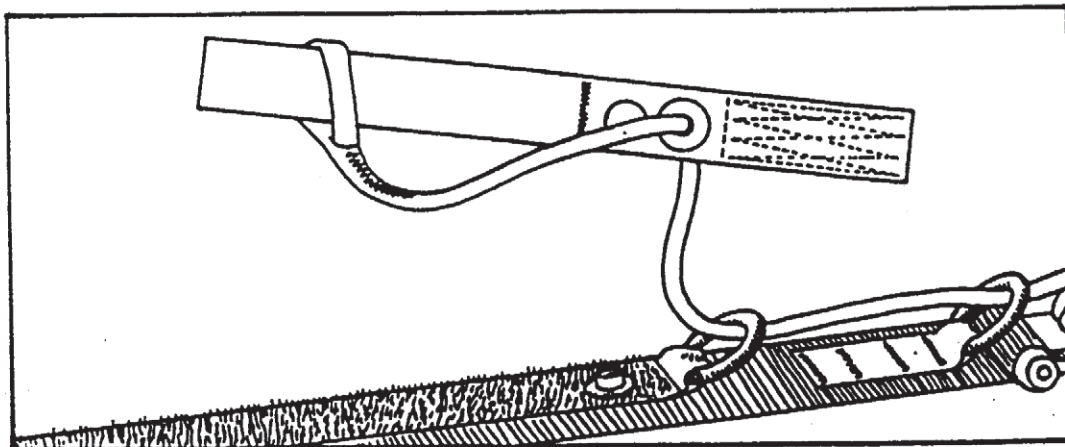
Alternate finger locking method using supplied stainless steel Aviation wire. Use only if you do not have a conventional finger locking tool. NEVER-leave-a hot knifed end inside a finished fingerlock.



New loop should be small enough so that riser loop cannot accidentally be put through it when setting brakes.

(Note: The supplied lower control line is a single piece of 900-lb. line with a loop in one end. It is different from the two-piece line supplied for the main.)

7. Thread lower control line through steering line guide ring on riser, then attach toggle as shown in diagram.





8. Compare modified steering system on one side of canopy to existing steering system on the other side. The overall length from canopy trailing-edge to toggle should be the same; although the brake loops should be approximately 6 inches closer to the canopy.

9. Set the brakes and anchor the risers. Compare the tail of the canopy to the nose; the line attachment points on both should line up.

10. Repeat steps 1 through 7 for the other side of the canopy... Compare the steering system on both sides of the canopy; they must be identical. 11. Be sure stabilizer modification has been accomplished before repacking canopy. If you are not sure, contact us.

12. Log and return confirmation card to the Relative Workshop.

## Use

Use the upper (deep) brake setting for suspended weights of more than 320 lbs. and freefall delays of more than 8 sacs.

Use the lower brake setting for suspended weights of less than 320 lbs. or freefall delays of less than 8 seconds, regardless of suspended weight.

Be sure both brakes are set the same.

If you don't know the weight or delay of the next jump, always pack the canopy with the deep brake setting.

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