



RIGGING ADVISORY CIRCULAR

Issue Date: 18 August 1993

RAC No. 324 Rev. A

SUBJECT: PIONEER HI-LIFTER TANDEM CANOPY REINFORCEMENT

STATUS: MANDATORY

IDENTIFICATION: Pioneer Hi-Lifter main and reserve canopies used in Tandem equipment.

BACKGROUND: Some years ago when Tandem parachuting was first introduced the Tandem Vector parachute system was limited to sub-terminal deployment. (*Tandem 'terminal velocity' is substantially higher than terminal velocity for a single person system*). It was found that if deployment was delayed to 'tandem terminal velocity' the canopy was susceptible to damage. A terminal reserve deployment was recognised as a real possibility on any descent where a main parachute malfunction occurred. On the basis of in-service experience the Relative Workshop released a directive requiring the Pioneer Hi-Lifter to be modified to withstand the forces of accidental deployment at 'tandem terminal'. (*At the time it was believed all canopies in service had been modified so a RAC was never published*).

A recent accident in the United Kingdom involving a Pioneer Hi-Lifter canopy, which had never been modified, suggests there may be other canopies in circulation which also have not been modified.

MANUFACTURER ADVISORY: Tandem parachute equipment which incorporates a Pioneer Hi-Lifter canopy as a main and/or reserve shall be withdrawn from service until the modification (*detailed on page 2 through 8 following*) has been incorporated.

COMPLIANCE DATE: Before further use.

AUTHORITY: T. K. Donle
Director of Tandem Certification,
International Marketing & Public Relations
The Relative Workshop
1645 Lexington Avenue
DeLand, FLORIDA 32724 USA
Phone: 0011-1 (904) 736-7589
Fax: 0015-1 (904) 734-7537



RIGGING ADVISORY CIRCULAR

Issue Date: 18 August 1993

RAC No. 324 Rev. A

REINFORCING RELATIVE WORKSHOP TANDEM MAIN AND RESERVE CANOPIES

This procedure may be done ONLY by a MASTER Rigger with experience in repairing or building Ram-air canopies. The main should be done first to gain experience before attempting the reserve.

NECESSARY EQUIPMENT

STRAIGHT STITCH MACHINE (Singer 31-15 or comparable). The ideal machine for this is a double needle set to 3/4 to 7/8" gauge. A plain single needle is fine however. A Singer 107WI can do everything called for in these directions.

1" 250 lb nylon tape (used for Reinforcing canopy - supplied by the Relative Workshop)

1" Type 3, 500 lb nylon tape (Mil-T-5038). Used for replacing line attachment tapes if necessary.

ZIG ZAG MACHINE (Singer 107WI or comparable). A bar tacker is ideal.

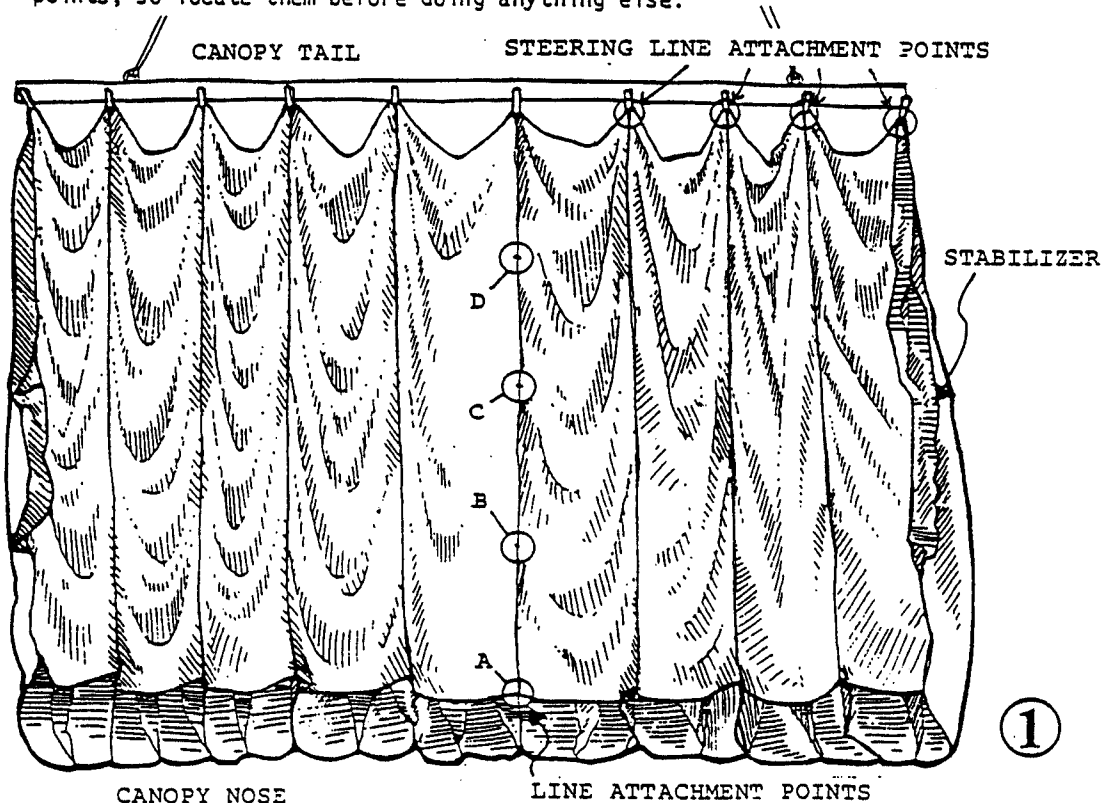
SAFETY PINS / YARD STICK

Nylon Thread, Mil-T-7807, Size "E"

Read these directions entirely before beginning.

1) The ideal way to start this project is to have a long board with 10 strong clips attached to a pulley system so that you can hang the canopy by the tail as shown in illustration #1. If this is not possible, then spread the entire canopy out on the floor so that the top skin is on the ground and the bottom skin is what you see.

All reinforcing will be done across the B and C line attachment points, so locate them before doing anything else.





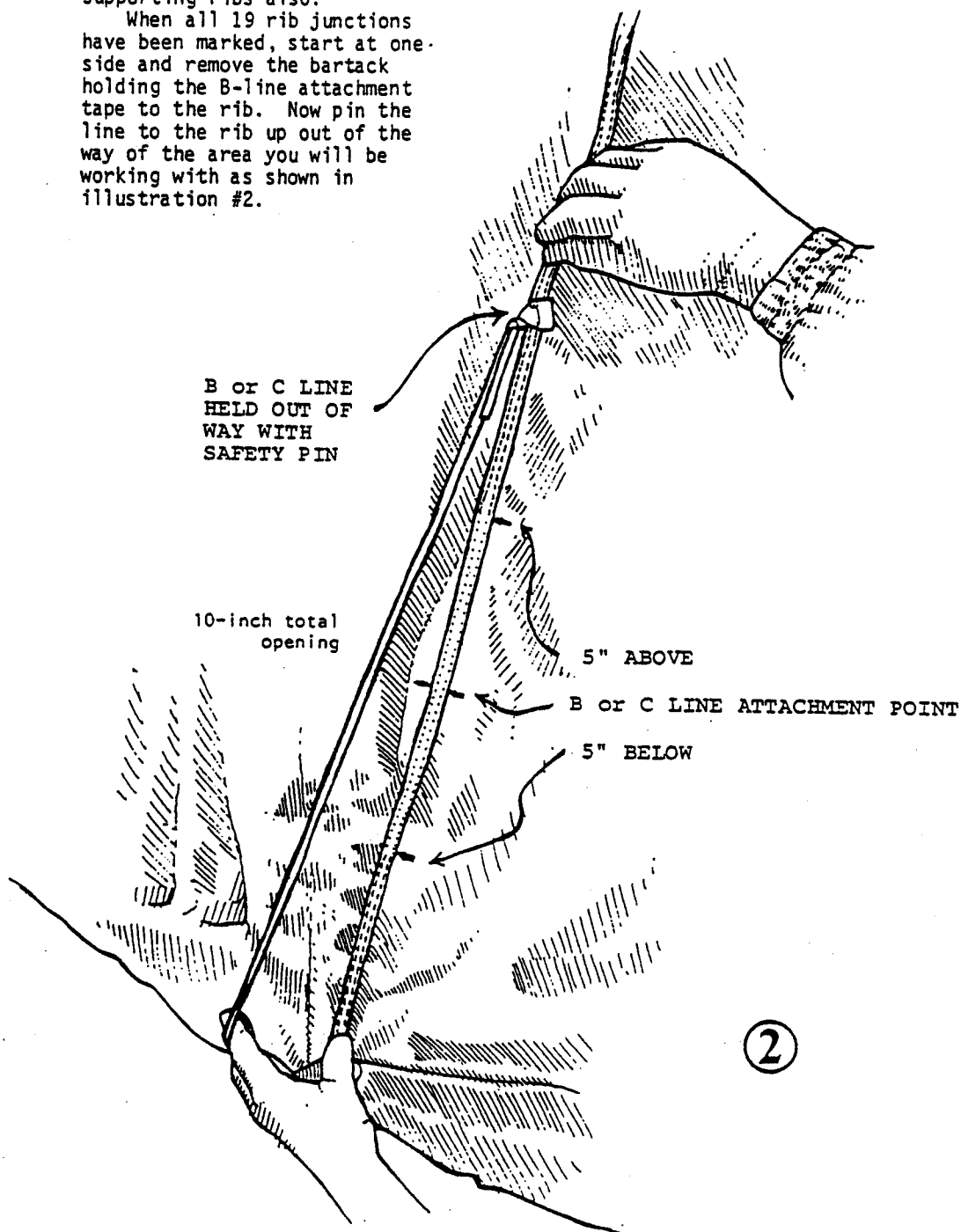
RIGGING ADVISORY CIRCULAR

Issue Date: 18 August 1993

RAC No. 324 Rev. A

2) Start at one side of the canopy and at each B line, make a heavy chalk mark on the canopy fabric on both sides of the line attachment point, and then one mark five inches above and one mark five inches below it as shown in illustration #2. Mark the same area on all the non load supporting ribs also.

When all 19 rib junctions have been marked, start at one side and remove the bartack holding the B-line attachment tape to the rib. Now pin the line to the rib up out of the way of the area you will be working with as shown in illustration #2.





RIGGING ADVISORY CIRCULAR

Issue Date: 18 August 1993

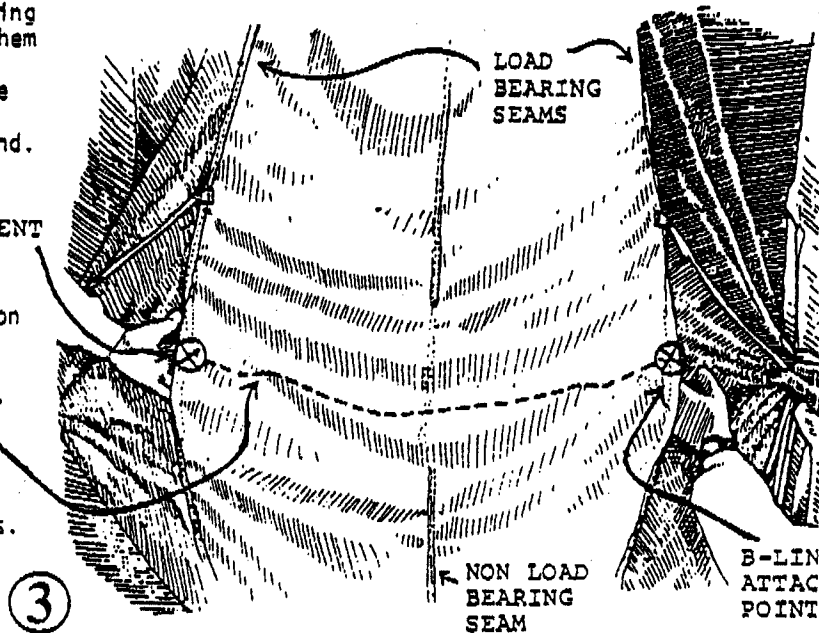
RAC No. 324 Rev. A

3) Carefully remove all stitching between the top and bottom marks on ALL ribs (load bearing and non load bearing). There should now be an open area on each rib as shown in illustration #3

4) Unroll the edges of the bottom skin completely. Using a yard stick, draw a line on the inside of the floor panel across the entire rib over the line attachment marks. You will have to flip the canopy over for this. Draw lines on all nine ribs, being careful to keep them straight so that when the tapes are sewn on they will match up end to end.

B-LINE ATTACHMENT POINT

Chalk line drawn on inside of canopy between B-line attachment points. Reinforcing tape is sewn centered on this line. Repeat process with C-line points.

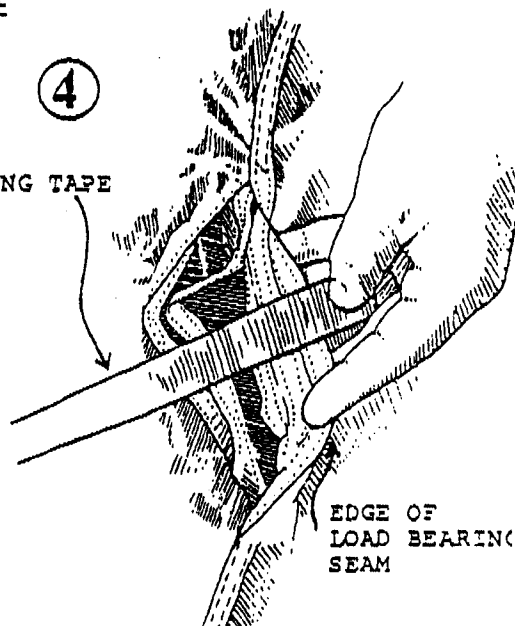


NOTE: When finished, these reinforcement tapes will run spanwise (from side to side across the canopy) from line attachment point to line attachment point at the "B" lines and the "C" lines.

4

REINFORCING TAPE

5) Sew 1" tape (included with these directions) across the inside of the rib so that the line you have drawn runs right down the middle of it. You can either sew it once down the middle and then on either edge, or do one edge at a time (or all at once if you have a double needle machine that is adjusted to 3/4 - 7/8"). When you start and end each rib, be sure that the edges are completely unrolled as shown in illustration #4 and that the tape goes over the edge.



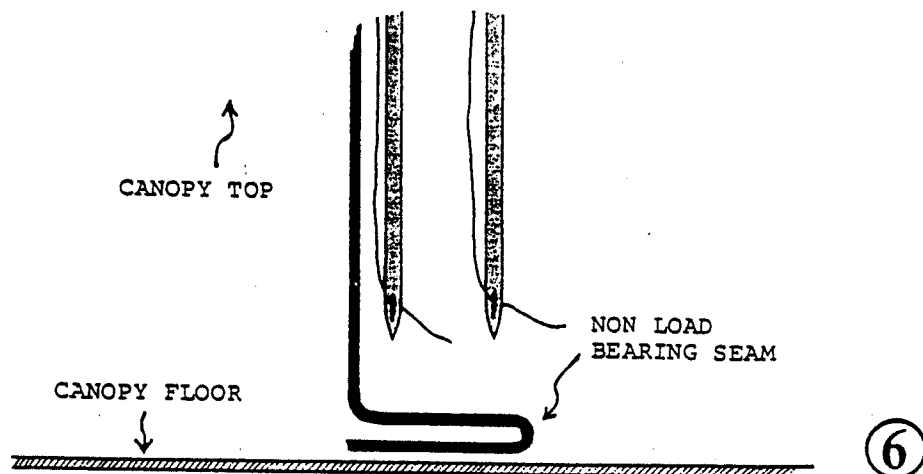
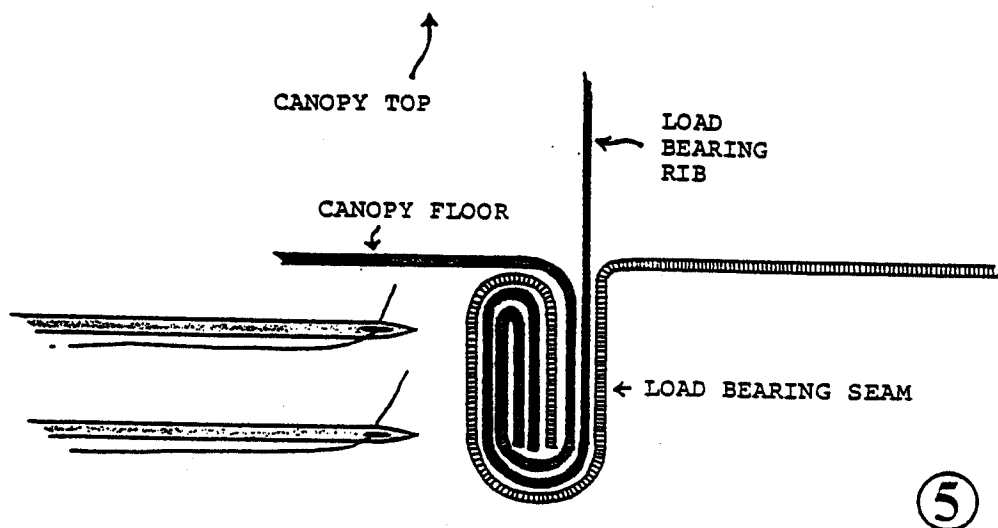


RIGGING ADVISORY CIRCULAR

Issue Date: 18 August 1993

RAC No. 324 Rev. A

6) When each rib has been reinforced with 1" tape, carefully trim the excess tape off the edges with scissors and resew the seams back together exactly as they were originally. It is important that the tapes on the edges of the ribs be rolled into the seam. Illustrations #5 & 6 show cross sections of the seam configurations for the load bearing and non load bearing seams.





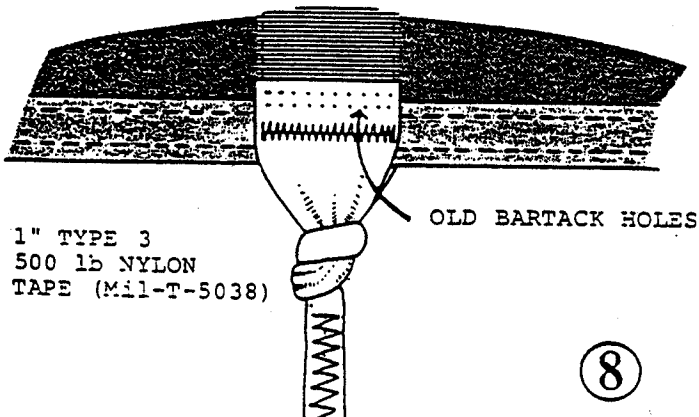
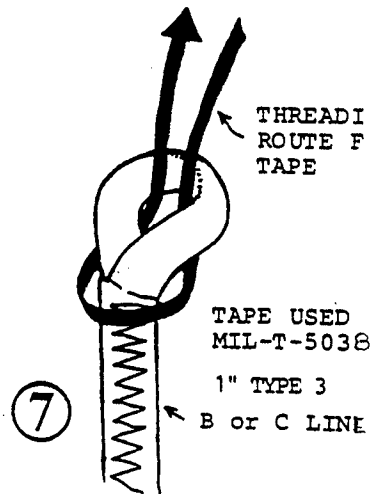
RIGGING ADVISORY CIRCULAR

Issue Date: 18 August 1993

RAC No. 324 Rev. A

7) If the line attachment tape has been damaged while being removed, replace it. To do this, simply unthread the old tape from the loop on the end of the line and thread a new piece in the same way. The tape for this is NOT the same as that used for the reinforcing. Illustration #7 shows how the tape and line end are intertwined. In most cases, the tape will not need to be replaced. If you decide to keep the old tape on, you can push it a little farther up on the seam so that the new bartack will not go over the same spot as the old bartack. See illustration #8.

Reinforcing tape and line attachment tape must overlap exactly. (Reinforcing tape is on inside of canopy. View here is enhanced to show correct positioning)



8) Resew the line to the load bearing rib. The two sides of the line attachment tape **MUST** go on **EITHER SIDE** of the rib. Do not put both tape ends on one side of the rib; this will not be strong enough. Sew the tape on with either a bar tack or zig zag stitch (similar to the original bartack). When using a zig zag machine to make a bartack, set the stitches per inch at 24 (when sewed over twice, this gives the effect of 48 stitches per inch). Start at one end of the tape, zig zag to the other end, then pull the thread back to the starting point (without cutting it) and sew another row of zig zag over the first. This method leaves both ends of the bartack locked. Each end should also have a loose thread.

When using a bartack machine for this, be sure it makes a bartack between 7/8" - 1" using 48 - 56 stitches.

9) Repeat this process with the C line group.

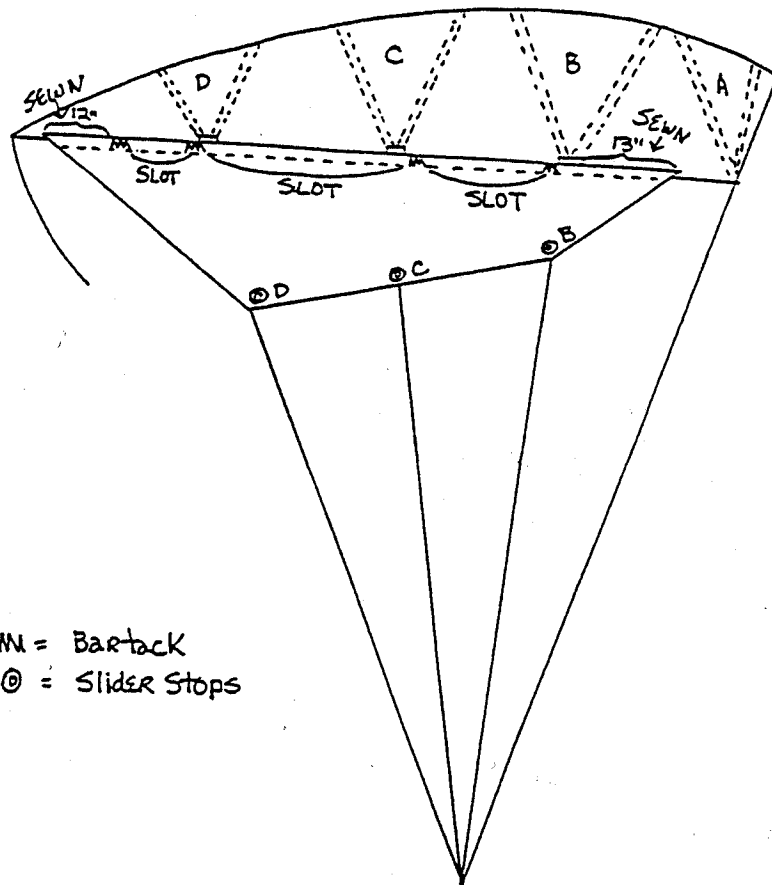
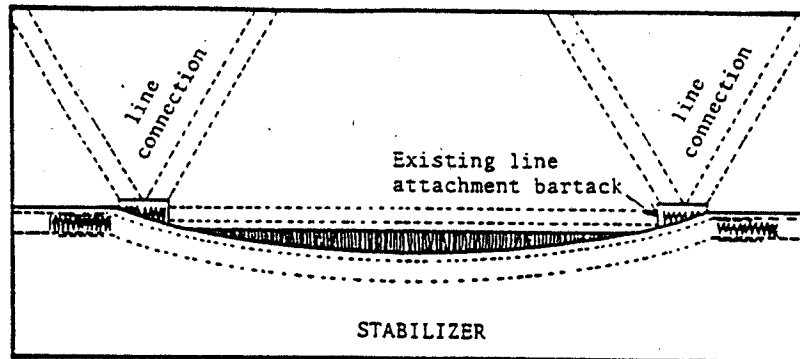
If you have any questions about this procedure, call the Relative Workshop at (904) 736-7589, Monday - Friday 9AM - 5PM EST.



RIGGING ADVISORY CIRCULAR

Issue Date: 18 August 1993

RAC No. 324 Rev. A



MN = Bartack
⊙ = Slider Stops

Because it is necessary to disconnect portions of the stabilizers adjacent to the "B" and "C" line attachment point to do this reinforcement, I have included this Diagram of stabilizer configuration.

All Reserve canopy stabilizers are to be re sewn to match this diagram.

If your main canopy has more than 100 jumps on it, and you had sewn the stabilizers completely shut (no slots) already, and your main opened softly without the drogue, you may sew the stabilizers completely shut again when you finish the canopy reinforcing.



RIGGING ADVISORY CIRCULAR

Issue Date: 18 August 1993

RAC No. 324 Rev. A

FINISHED CANOPY WITH REINFORCING TAPES ADDED

