Terms You Should Know For Ram Air Reserve Parachutes

Please study these terms BEFORE you do the square inspection block of instruction.

Because some manufacturers number cells from the wearer's right to left, we are using that method of cell numbering for your inspection during the course. The numbering of ribs and lines in this document will also be used for your inspection during the course. Note that The Parachute Manual by Dan Poynter shows the numbering of cells from the wearer's left to right. Also, some manufacturers number cells from the middle out to the end. **Always check the manufacturer's order form for the cell, line and rib numbering convention.**

PIA Technical Standard 100 Standardized Nomenclature for Ram-Air Parachutes contains definitions for these Ram-Air terms and for additional terms that are used by canopy designers and manufacturers. PIA TS-100 is available in the public documents section of www.pia.com web site.

Cascade Line: A suspension line that joins another line (usually in the same set) below the canopy surface but above the connector link which results in a shorter total line length for one of the lines.

Cell: The compartment formed by the top and bottom surfaces and two adjacent load bearing ribs. Each cell is usually divided by a non-load bearing rib to form two half cells. Cells are numbered from right-to-left by full-cell number; use left (L) and right (R) to designate the appropriate half cell. Figure 1.

Chord: Standard definition: The chord is measured (in a straight line) from the leading edge to the trailing edge. Figure 1.

Control Lines: Control Lines (also known as steering or brake lines) are used to steer and modulate the forward speed of the parachute. Control lines are usually fastened to the trailing edge of the canopy, usually in distinct left and right groups, and are commonly constructed as upper and lower sections; the upper section typically consists of two to five lines per side, usually four, that converge and join to a single lower control line per side. The lower portion of each set of the control lines is usually routed through a guide ring on the back of the corresponding rear riser and fastened to a control toggle. Control lines are named by left or right sets and numbered sequentially from outside to inside and are usually attached to the trailing edge at the intersection of the rib seams which are also numbered sequentially (at the trailing edge only) from the outside to the inside. Note that the seam number and the control line number attached to it do not necessarily have to match: e.g. control lines 1, 2, 3, 4 may be attached to seams 1, 3, 5, 7. Figure 1, 2a.

Construction, Chordwise: This is the most common type of ram-air parachute construction. The top and bottom surfaces are assembled from panels that run from front to rear (chordwise) and are joined to the ribs and each other using a variety of sewn seams.

Construction, Spanwise: The top and bottom surfaces are assembled from panels that run from side to side (spanwise) across the full width of the canopy. This usually requires three or four panels each for the top and bottom surfaces.

Cross-Ports: Small holes cut in the rib sections to balance the air pressure within the cells across the full span of the canopy. Cross-ports are not cut in the outboard rib sections on either end.

Deployment Brakes: Used to prevent canopy surge during opening and to provide more reliable openings. The deployment brakes are usually set by pulling the control lines (and thus the trailing edge of the canopy) down to a predetermined point and temporarily fastening them into place at that point; after opening, the user can release them to allow the canopy to achieve full glide.

Flares, Suspension Line Attachment: Flares are used on some canopies to eliminate the load tapes on the ribs. Figure 2b.

Ribs: The sections of fabric installed between the top and bottom surfaces of the canopy and used to establish the airfoil shaped of the canopy. Most canopies have both loaded and non-loaded ribs. The suspension lines are attached to the loaded ribs at the line attachment points. Ribs are numbered from right to left. For canopies with a single non-loaded rib in each cell, this means that loaded ribs have odd numbers and non-loaded ribs have even numbers.

Riser Specifications: Should include overall length (specify finished or cut), type of webbing, type of connector links to be used, stitch patterns, thread, riser release mechanism, etc. The normal position for the control line guide ring is on the back side of the rear risers; the top of the control ring should be located 4" from the canopy end of the riser. Risers using Velcro to hold the control toggles in place most commonly use the hook Velcro on the riser and the loop Velcro on the toggle.

Slider: Used as a reefing device on ram-air parachutes. During deployment, the canopy is reefed as the spreading force of the canopy is resisted by the slider which is held up against the lower surface of the canopy by the airflow. Usually consists of a rectangular section of canopy cloth reinforced on the edges with lightweight webbing or tape with a large grommet or D-ring installed at each corner. Suspension lines (and control lines) from the individual riser groups are routed through the corresponding grommet in the slider.

Slider Bumpers: A plastic, or fabric cover on connector links for the purpose of preventing damage to the slider grommets caused by the grommet contacting the connector links.

Slider Stops: Small pieces of rigid material (plastic, phenolic, etc.) that are installed on the lower edges of the stabilizer panels to prevent the grommets on the slider from riding up over the stabilizer material and damaging the stabilizers or the slider.

Stabilizer Panels: Stabilizer panels are installed on the ends of the canopy and act much as an end plate on an aircraft wing; stabilizers typically run from near the leading edge to near the trailing edge of the canopy; on many canopies the stabilizer is rolled into the outside lower rib seam during construction. Figure 1.

Span: The distance from one side of a canopy to the opposite side. If the length of the trailing edge is not the same as the length of the leading edge, an average span or separate leading and tailing edge dimensions may be given and must be specified. Figure 1.

Suspension Lines: Carry the load from the canopy surface to the risers. The lines are numbered by set number according to the manufacturer’s method shown on their order form. For inspections during the course, line sets will be numbered from right to left.

Tapes, Reinforcement: Different types of tape may be used in each of the locations described below:

Rib Leading Edge Tapes: Found in the leading edge of each rib section.

Leading Edge Tapes: Found in the leading edge of the top and bottom surfaces.

Trailing Edge Tape: Found in the trailing edge seam; usually rolled into the seam.

Line Attachment Tapes: Sewn to the bottom edge of the loaded ribs in alignment with the load tapes; used to transfer the load from the lines to the load tapes. Some canopies use line attachment tapes that continue onto the loaded rib thus taking the place of the load tapes.

Cross Tapes: Reinforcing tapes that run spanwise on the top or bottom surface to distribute concentrated loads into the canopy.

Bridle Attachment Tapes: Used to attach the pilot chute bridle to the top (usually) of the canopy. Most often is tied into the other reinforcing tapes in the canopy in order to distribute the loads.

Toggles, Control: Control (steering) toggles are attached to the bottom end of the lower control lines to allow the jumper an adequate handhold on the control lines. May consist of a wide variety of configurations of webbing or hard plastic T-handles. Where required or critical, a drawing of the control toggle should be supplied.

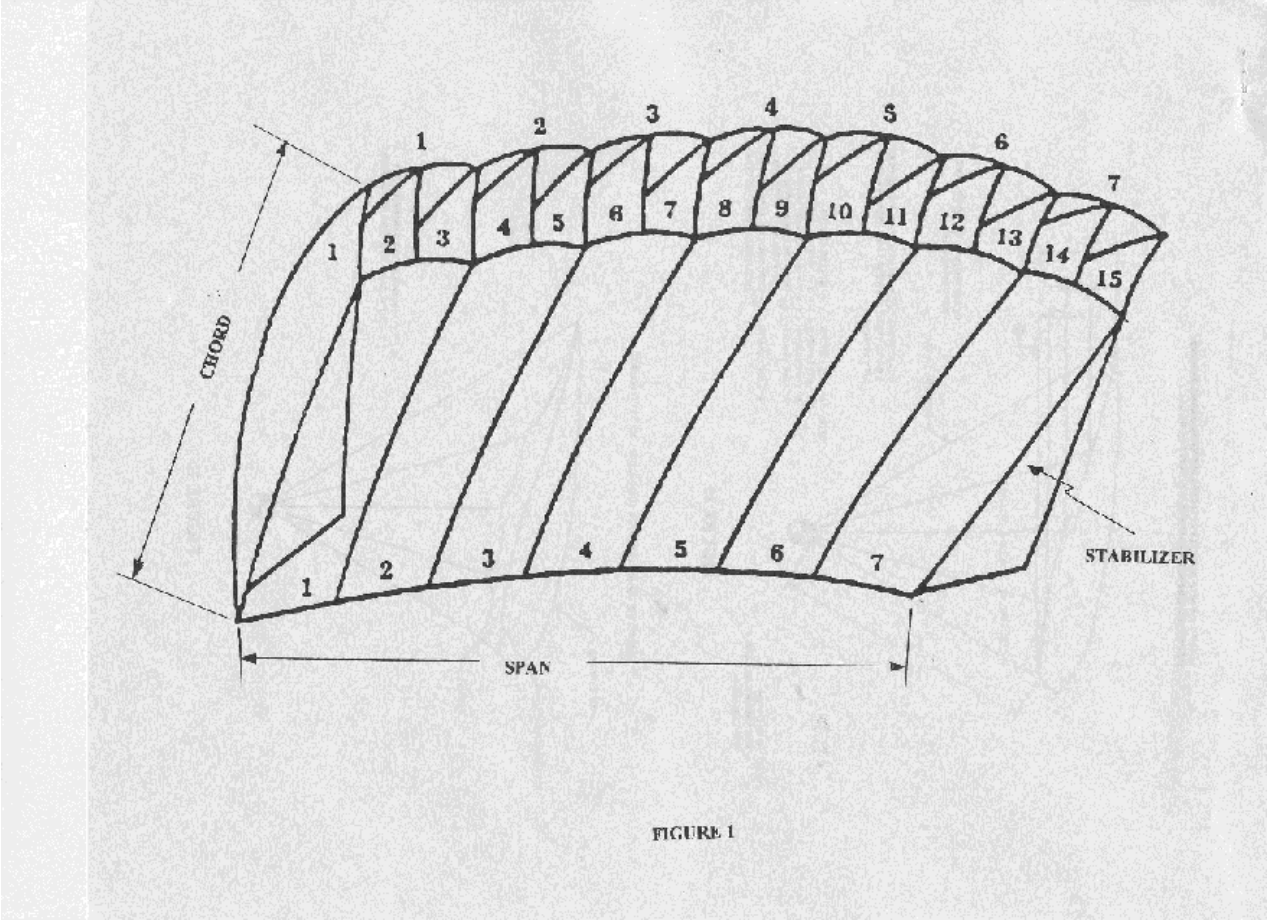
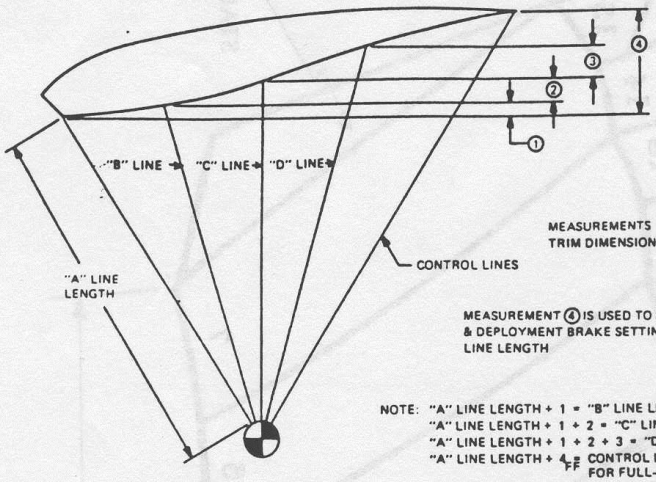


FIGURE 1

LOADED RIB WITH DIRECTLY ATTACHED SUSPENSION LINES SHOWING
SUSPENSION LINE MEASUREMENTS AND TRIM DIMENSIONS



MEASUREMENTS ① ② ③ ARE TRIM DIMENSIONS

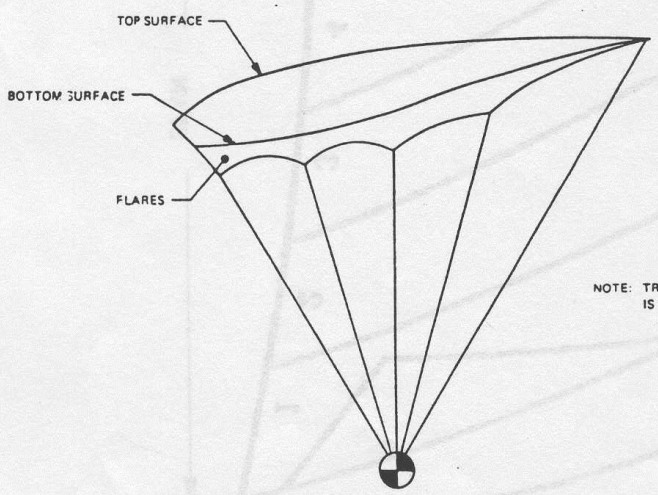
MEASUREMENT ④ IS USED TO SPECIFY FULL FLIGHT & DEPLOYMENT BRAKE SETTING RELATIVE TO "A" LINE LENGTH

NOTE: "A" LINE LENGTH + 1 = "B" LINE LENGTH
"A" LINE LENGTH + 1 + 2 = "C" LINE LENGTH
"A" LINE LENGTH + 1 + 2 + 3 = "D" LINE LENGTH
"A" LINE LENGTH + 4_{FF} = CONTROL LINE LENGTH FOR FULL-FLIGHT SETTING
"A" LINE LENGTH + 4_{DB} = CONTROL LINE LENGTH FOR DEPLOYMENT BRAKE SETTING

NOTE: IN THIS VIEW SUSPENSION LINES ARE NOT CASCADED

FIGURE 2a

LOADED RIB USING FLARES FOR SUSPENSION LINE ATTACHMENTS



NOTE: TRIM AND RIGGING INFORMATION IS THE SAME AS SHOWN IN FIGURE 3a.

FIGURE 2b