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Main Canopy Assembly Inspection Guidelines For the Sport Parachutist

1. WARNING AND DISCLAIMER

It is beyond the scope of these inspection guidelines to teach you how to pack, deploy, fly and land your parachute. This manual is only a general guide about inspecting your main parachute assembly. Parachute systems sometimes fail to open properly, even when properly assembled, packed, and operated. There is a risk of equipment damage, serious injury, or death each time this system is used. Each time you use this parachute system you risk bodily injury and death. You can substantially reduce this risk by: (1) assuring every component of the parachute system has been assembled and packed in strict accordance with the manufacturer's instructions. (2) by obtaining proper instruction in the use of this parachute and the rest of the equipment, and (3) by operating each component of the system in strict compliance with the owner's manual and safe parachuting practices.

2. Definitions/explanations

Caution – Indicates an increased chance of malfunction or equipment damage if proper precautions are not taken.

Warning – Indicates death or serious injury could result if proper precautions are not taken.

3. Introduction

These guidelines are intended to help jumpers inspect the parachute systems they jump. Catching problems early helps avoid more serious problems later, problems that can lead to costly repairs, malfunctions, and accidents.

Nothing in these guidelines supersedes the manufacturer's owner's manual. Jumpers should consult the specific manuals related to their equipment, and they should consult the manufacturer or a local rigger for repair advice if they have questions.

The inspection steps below are grouped into two general areas. First are inspection points that can be incorporated into the standard packing sequence. Second are inspection points in a pre-jump equipment check.

4. Packing Sequence Inspections

Following each jump, layout the main canopy and the harness/container (H/C) assembly on a clean, dry packing surface.

Before packing, it's always important to look over your system for any damage. A hard opening, rough landing, canopy contact with anything that might cause fabric or line damage is cause for close inspection.



Figure 3. Awesome Jump, Time to Inspect & Repack!

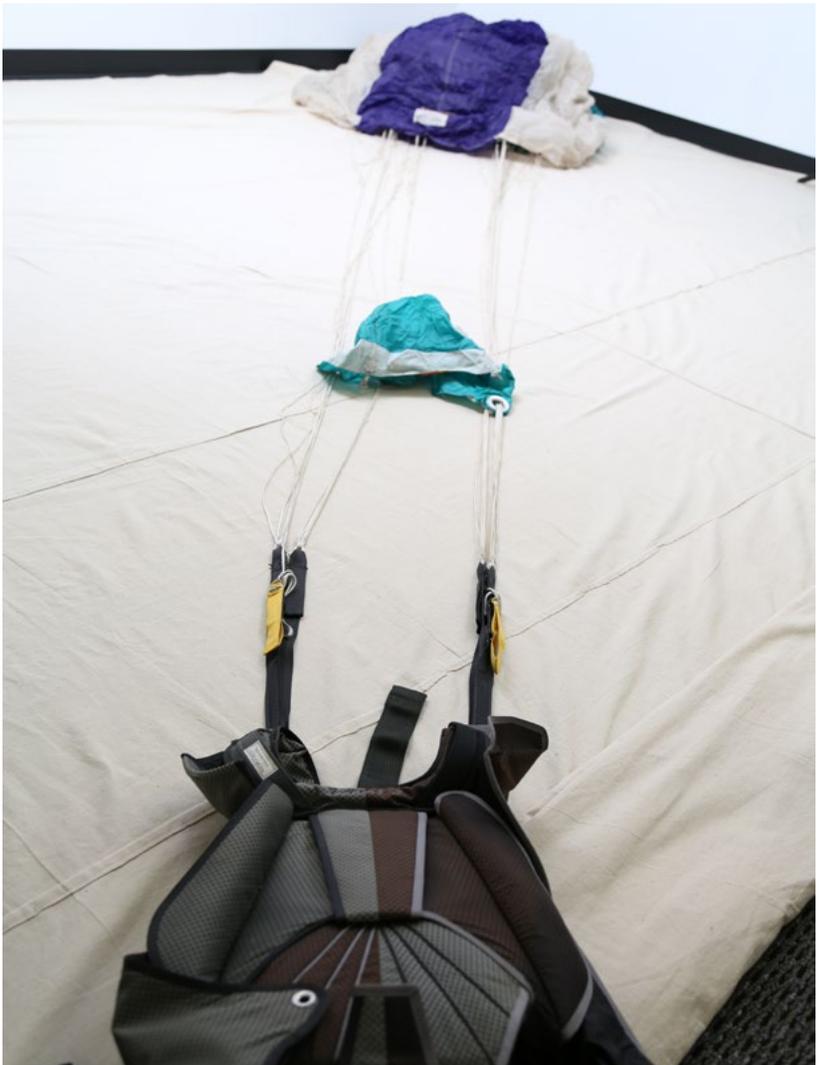


Figure 4. Post Jump - Lay Out the Parachute System

5. Inspect for Damage

Rough landings may damage the harness/ container.

Inspect the container (flap-side) for damage. Light surface abrasion to the Cordura or Parapak is usually cosmetic.

Caution: Serious damage, that wears through the nylon pack material completely or damages the harness, should immediately be evaluated by a **certified rigger**.



Figure 5. Fabric Abrasion & Exposed Plastic Stiffeners

6. Broken Flap Stiffeners

Container flaps with grommets are supported by plastic stiffeners. Inspect your flaps to ensure the plastic stiffeners have not cracked.

Consult your rigger immediately if a broken plastic stiffener is discovered.

Location of the crack will determine whether the system may continue to be jumped, or is grounded until repaired.



Figure 6. Plastic Stiffener Supporting the Grommet

7. Flap Grommets

Check the grommets (on the main container flaps) to ensure they are fully set.

Warning: If you can insert a finger nail between the grommet and the fabric, it may be possible to trap a small diameter suspension line there as well.

Consult your rigger immediately to determine whether the system may continue to be jumped, or is grounded until the grommet is reset.



Figure 7. Ensure Grommets are Fully Set

8. Main Closing Loop

Inspect the condition of your main closing loop. (Type IIA loop material is shown).

Check the inside of the loop where most of the destructive wear will be found. Replace the loop if it shows signs of wear.

Ensure the length is correct as noted in your manufacturers owner's manual.

NOTE: Right photo is a new loop, Left photo is a loop that should be replaced.



Figure 8. Inspect The Main Closing Loop

9. Riser Covers - Tuck Tab

Several riser cover closing methods are used (Magnets, Tuck Tabs or Velcro).

Magnets require little or no maintenance, but when they break they have sharp edges that can quickly wear through their adjacent fabric.

Tuck-tab versions have stiffer plastics within that can break or crack.

Hook and loop fastener material (Velcro) wears out and eventually fails to contain the risers. Consult your rigger if you think you have a problem.



Figure 9. Ensure No Cracks - Internal Stiffeners

10. Riser Covers - Velcro

Inspect the condition of the Velcro.

The pile portion will get fuzzy with repeated use and may fail to adhere to the hook portion.

The hook portion will collect ground debris and can be cleaned with a fine-toothed comb.

Your rigger or the manufacturer can replace the pile portion.



Figure 10. Check the Condition of the Velcro

11. Harness Condition

Inspect the harness if you suspect that damage may have occurred during the last jump.

Any cuts, nicks or heavy abrasion to the webbing should be shown to a certified rigger before the next jump.

Warning: A broken or cut tracer thread on the webbing edge calls for immediate replacement before the next jump.



Figure 11. Inspect Harness Webbing for Damage

12. Leg Strap Condition

Leg straps and leg pads are particularly vulnerable to damage during slide landings, especially on abrasive surfaces like asphalt, sand and gravel.

Damaged webbing should be examined by a rigger. Damage to a leg pad or cover is usually not structural, but should be repaired to prevent damage to the leg strap it protects. Elastic webbing keepers should be replaced if they are stretched or torn.



Figure 12. Inspect The Leg Straps

13. Housings

Inspect all housings. A damaged housing can cause damage to the adjacent fabrics and webbing.

Warning: This damaged cutaway housing was ignored, thus causing major damage to the reserve riser.

Any cuts, nicks or heavy abrasion to the webbing should be shown to your rigger before the next jump.



Figure 13. Inspect Housings

14. 3-Ring Assembly

Inspect the 3-Ring on each side for correct assembly.

Check for proper RSL connection.

Consult your owner's manual for 3-Ring assembly instructions and recommended maintenance. If your manual doesn't specify maintenance levels, it is then recommended to perform an inspection every month or 50 jumps (whichever comes first).



Figure 14. 3-Ring - Properly Assembled

15. 3-Ring Assembly - Loop Damage

The rough edge of the grommet caused fraying to the locking loop.

These risers should be replaced immediately.

Consult with your rigger for specific guidance.



Figure 15. Damaged Locking Loop

16. Main Risers

Fuzzy surface abrasion wear is normal. Cuts on the webbing, especially on the edge of webbing, or multiple broken fibers should be scrutinized by your rigger before the next jump.

Check the grommet area. Webbing pulling out from under the grommet is a clear indicator of eventual failure.

Warning: A broken main riser on the RSL side may deploy your reserve into what remains of your main canopy, which may be spinning.



Figure 16. Inspect Main Risers Condition

17. Canopy Fabric Damage

A series of small holes and burns may also indicate an issue with packing. Review your packing technique with a qualified rigger or instructor.

Individually, these holes may not pose a serious risk if you continue jumping, but as a group, they could develop into a larger hole. Consult a certified rigger to determine whether immediate repair is advised.



Figure 17. Fabric Inspection – Damage Identified

18. Slider Stops

Check all the slider stops. Broken or missing slider stops or damage caused by a slider stop wearing through its cover must be repaired immediately.

Warning: Continued jumping with broken or missing slider stops may lead to a slider hang-up, which can cause a fast spinning, high-speed partial malfunction.



Figure 18. Check for Broken Internal Stiffeners

19. Crossports

Periodically, look inside each cell of your canopy to inspect the ribs and crossports.

Frayed edges and small tears should be shown to your rigger and repaired.

Any tear greater than ½" should be repaired right away.

Vertical tears are less problematic than horizontal tears.



Figure 19. Crossport Inspection

20. Inspect the PCA

Inspect the main bridle connection to the PCA (pilot chute attachment) ring at the top of the canopy. Look for bridle wear at the ring.

Also inspect fabric and reinforcement on canopy for damage.

Warning: If your bridle breaks on deployment, it may leave the bagged canopy on your back with no means of deploying it. This problem could lead to a main/reserve entanglement.



Figure 20. Inspect the PCA

21. Inspect the Main Bag

Check the condition of the grommets. Rough areas and sharp edges will cause accelerated line and stow band damage.

Replace worn stow bands and inspect the stow band loops for damage. Ensure the stow bands are the proper size to secure the lines.

Caution: If stow bands break prematurely during deployment, it can cause an “out of sequence” deployment that may cause a hard opening, canopy damage or a malfunction.



Figure 21. Inspect the Main Bag

22. Inspect the Main Pilot Chute

Check the condition of your main pilot chute's fabric, mesh and stitching.

Inspect the handle connection to the PC. (Hand-Deploy shown).



Figure 22. Inspect the Main Pilot Chute

23. Pro-Packing the Main Canopy

If no major “damaging” events occurred on your last jump, then proceed with packing of your main canopy.

Always avoid rough packing surfaces such as concrete, pavement, sand, etc. Never drag your canopy or harness/container across the packing surface, unless you use a packing mat for the harness/container.

Develop the habit of inspecting the rig, canopy and other main deployment components as you pack. When done properly, this inspection process only adds a few minutes to your packing time.

Check the condition of the following items while you pack.



Figure 23. Preparing to Pro-Pack

24. Control Line Check

Ensure the canopy is ready to pack by performing a control line check.

H/C is laying with backpad down on the packing surface with main risers cleanly organized with toggles facing up.

Run both control lines from risers to tail. If no entanglement or twisting exists, the canopy is ready for packing.

Caution: Remove all twists in the control lines. Excess twists could cause tension knots, line and/or slider entanglements, potentially resulting in a malfunction.



Figure 24. Control Line Check

25. Control Line Guide Rings

Prior to setting the deployment brakes, check the condition of the guide rings. They should have a smooth surface, free of nicks or rough areas.

Caution: Guide ring imperfections can cause control line damage.



Figure 25. Inspect Guide Rings

26. Lower Control Lines & Cateyes

Fuzzy surface abrasion is normal wear. Cuts and multiple broken fibers should be scrutinized by your rigger.

Warning: A broken control line will most likely cause an uncontrolled turn, which may necessitate a breakaway and reserve deployment. If it happens below a safe breakaway altitude, you may have to flare with rear risers for landing, if your model canopy allows it. Many high aspect-ratio canopies (short cord dimension) normally do not flare well with rear risers.

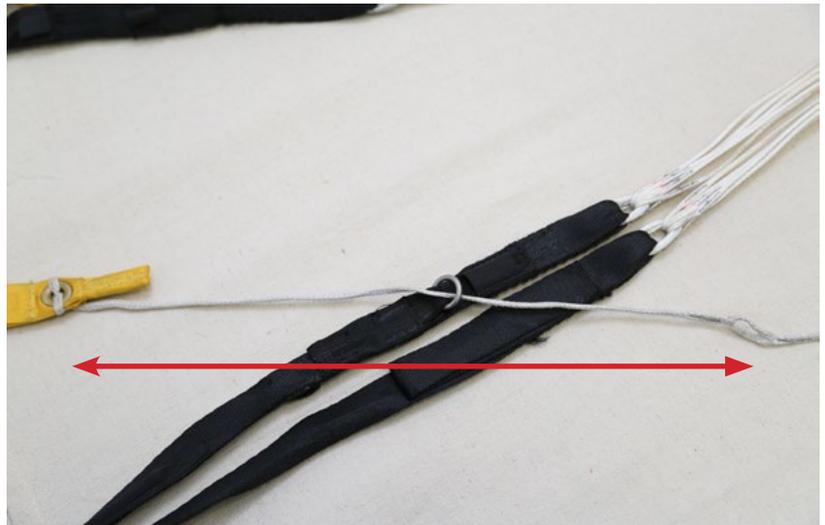


Figure 26. Inspect Lower Control Lines & Cateyes

27. Riser Brake Locking Loops (Not all risers have this feature.)

Check the condition of the loop. Fuzzy surface abrasion is normal wear. Cuts and multiple broken fibers should be scrutinized by your rigger before the next jump.



Figure 27. Inspect Brake Locking Loop on each Riser

28. Toggle Tip Keepers

Check the condition of the keepers to ensure they do their job of securing the top of the toggle to the riser. Elastic or tape keepers all suffer the same problems with repetitive use; the stitching holding them in place may eventually come apart or the fabric deteriorates.

If you identify this, see your local rigger; this is something that can be easily repaired.



Figure 28. Inspect Toggle Tip Keeper

29. Toggle Retention - Tuck-Tab Version

Ensure the tuck tab retention slot securely holds the lower portion of the toggle in place.

Consult your rigger if the retention level is questionable.

This is an easy fix for your rigger.



Figure 29. Inspect Tuck Tab Keeper

30. Toggle Retention - Locking Pin Version

Ensure the locking pin retention securely holds the toggle in place. Consult your rigger if the retention level is questionable. This is an easy fix for your rigger.

Warning: A loose toggle during deployment could cause a premature brake release, which could lead to a hard opening, canopy damage, a spinning malfunction or all the above.



Figure 30. Check Toggle Retention is Secure

31. Toggle Retention - Velcro Version

Monitor the condition of the pile Velcro. Excess fuzziness will lessen the retention capability. The hook portion will collect ground debris, which can be cleaned with a fine-toothed comb.

Typically, Velcro replacement is an easy job for your rigger.



Figure 31. Inspect Velcro Condition

32. Excess Control Line

Check condition of the apparatus for stowing the excess control lines. If Velcro is used for the stowage, watch for abrasion damage to riser webbing and to the lower control lines.



Figure 32. Inspect Line Stowage Apparatus

33. Metal Links

There are several types of links and methods of link treatment and protection, dependent upon the riser/link/line types (Consult your owner's manual for their recommendations. Additional instructions are normally available for after-market components).

Due to the multitude of variants that exist, many manufacturers of harness/containers and canopies do not address this topic completely. Your local certified rigger may be your best source of information.

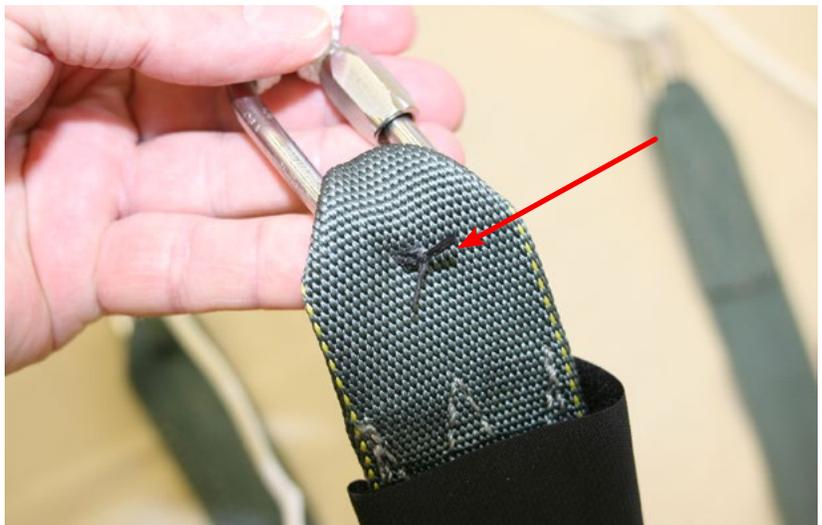


Figure 33. Check Links are Tight – Hand Tack in Place

34. Link Covers

If “link covers” are present, be sure the hand-tacking is secure.

Warning: A link cover that breaks free could slide up the lines and prevent the normal descent of the slider, potentially causing a malfunction.



Figure 34. Link Covers – Properly Hand-Tacked

35. Soft Links

Slinks – Main Canopy Version or similar models.

Check all four (4) are properly assembled and in reasonably good condition. Refer to the “Line Wear” photos on the following pages for guidance on airworthiness of used Slinks.

If protection covers are not installed, then a hand-tack may be useful in keeping the Slink-tab hidden and protected between the riser’s fold-back.

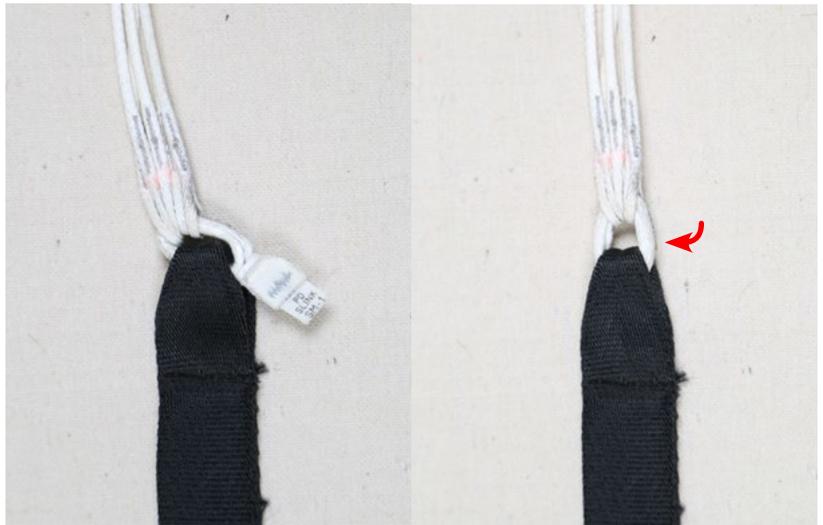


Figure 35. Inspect Soft Links – Assembled Correctly

36. Slider Grommets

Check the inner surface of grommets for dings, sharp edges or rough surface that could damage your lines.

Warning: If you can insert a finger nail between the grommet and the fabric, it may be possible to trap a small diameter suspension line there as well.

Consult your rigger immediately to determine whether the canopy may continue to be jumped, or is grounded until the grommet is reset.



Figure 36. Inspect All Slider Grommets for Damage

37. Improperly Set Slider Grommet

Check the grommets to ensure they are properly set.

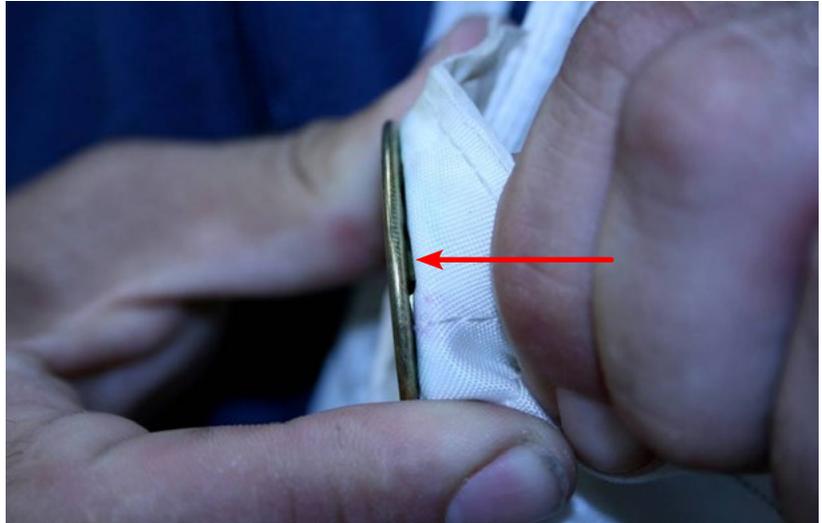


Figure 37. Grommet Improperly Set

38. Inspect the Grommet Washer

The red arrows show where the plastic grommet washer has cracked.

Portions of the washer are missing as well.

Areas where the washer is missing could create a gap that may trap a thin suspension line or damage it.

Seek rigger or manufacturer guidance for repair.



Figure 38. Inspect the Grommet Washer

39. Slider Fabric and Reinforcement

Inspect the slider fabric and webbing/tapes for any signs of damage.



Figure 39. Inspect Fabric and Support Tapes/Webbing

40. Slider Channels

Inspect the draw strings and fabric channels that guide the draw strings on a collapsible slider.

Caution: Under Canopy: Pulling the draw strings tabs too quickly will cause excessive channel wear.

Caution: When Repacking: Carefully extend the slider channels when resetting the draw strings. Doing this too quickly will cause excessive channel wear.



Figure 40. Inspect Channels on Collapsible Slider

41. Line Continuity Check

Pick up the lines as shown.

Separate the four (4) riser groups & control lines. As you walk to the canopy, you can perform a line check so you know the canopy is good and ready for packing.



Figure 41. Line Check – Pick Up Line Groups

42. Suspension Lines & Control Lines

Slowly walk it to the canopy. Look and feel for line damage on the way to the canopy.

Line burns and fraying will be noticeable.

Caution: Light fraying is acceptable. But when the entire line is fuzzy, strength is heavily diminished. Consult your rigger or manufacturer for replacement.



Figure 42. Inspect Condition of Lines

43. Line Condition

Look for extreme wear or any cuts on the lines. A light, fuzzy surface is normal wear, but if it becomes extreme, it may be time to schedule a full line replacement with your rigger or the manufacturer.

Generally, “Lower Control Lines” tend to wear out sooner than other lines due to the repetitive movement through the riser’s guide ring.

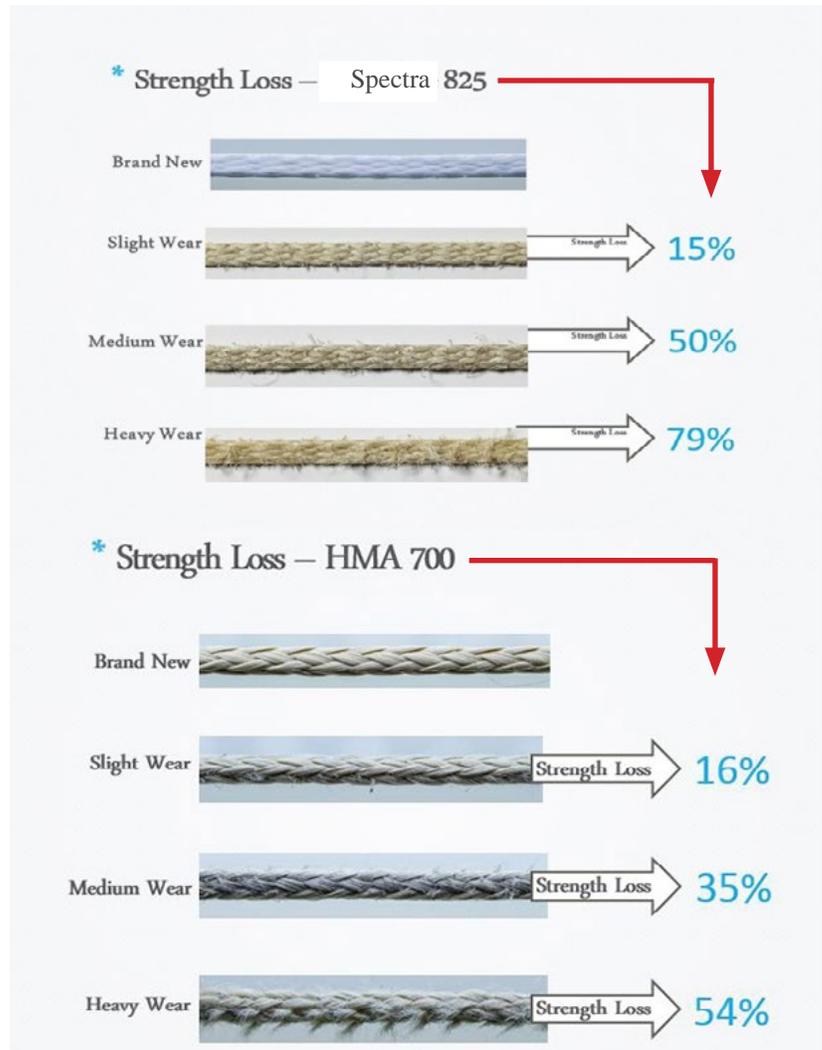


Figure 43. Line Wear Samples

44. Line Wear

The fuzzier the surface, the greater the strength loss.

Discoloration, by itself, may not be a good indication of wear.

The “number of jumps” on the canopy is not always an indicator of overall line life. The packing surface greatly influences lifetime.

A sandy, desert environment will wear out suspension lines at an increased rate than a grassy environment.

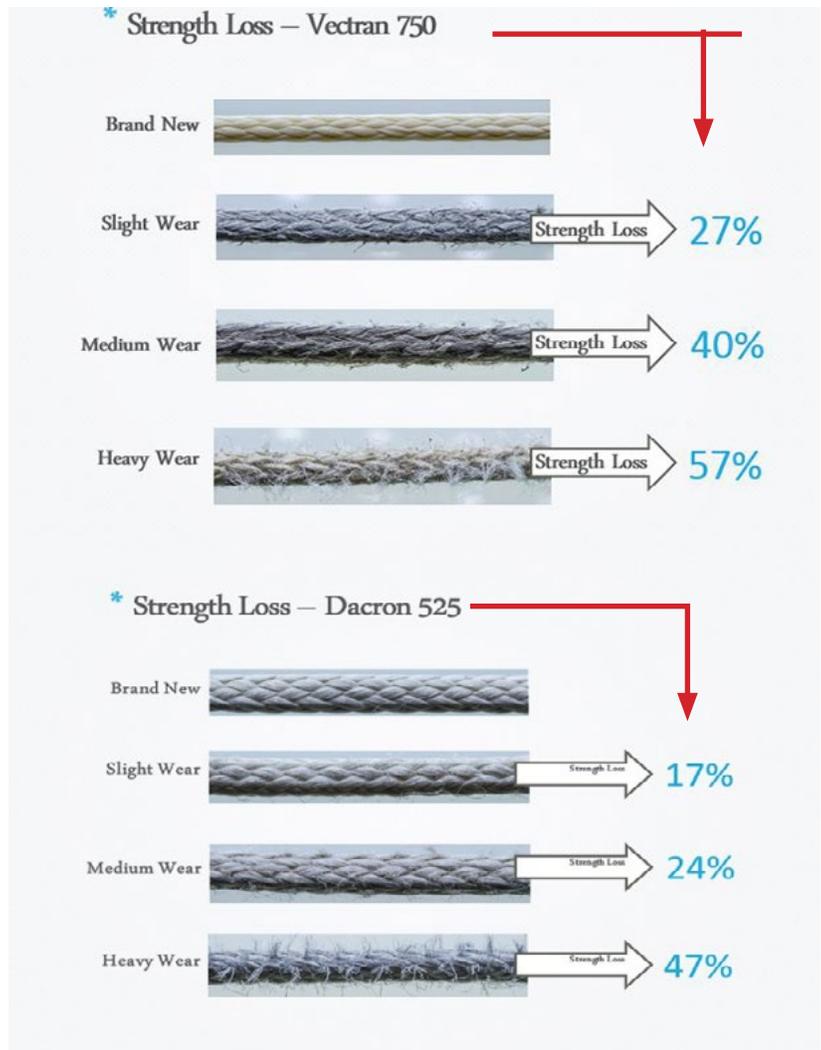


Figure 44. Line Wear Samples

45. Inspect the Container Closing Pin

Check the “curved pin” for nicks or a rough surface.

Caution: A damaged closing pin will cause accelerated damage to the main closing loop. In the extreme, it could result in a pilot chute in tow malfunction.



Figure 45. Inspect the Container Closing Pin

46. Inspect the Bridle Centerline

Some centerline (kill line) materials have been known to either stretch or shrink with use. (red arrow)

Check the centerline length to ensure it completely collapses your pilot chute.

Likewise, when you reset the centerline, ensure the pilot chute is completely uncollapsed.

The fixed centerline tapes allow the pilot chute to go to full extension. (blue arrows)

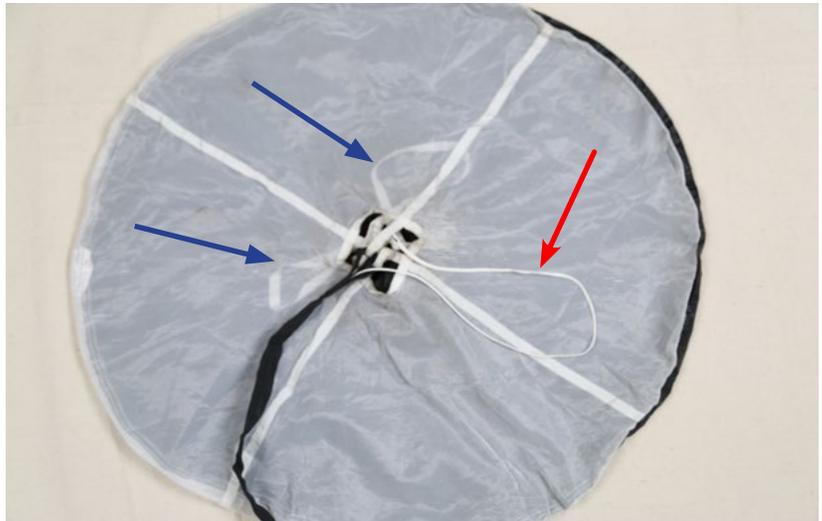


Figure 46. Inspect the Bridle Centerline

47. Inspect the Container Closing Pin

Check the “curved pin” for nicks or a rough surface.

Caution: A damaged closing pin will cause accelerated damage to the main closing loop. In the extreme, it could result in pilot chute in tow malfunction.



Figure 47. Inspect the Container Closing Pin

48. Post-Packing Inspection of the Container

Perform a complete “gear check” prior to your next jump.

This will encompass pin checks, handle checks, main bridle routing, riser covers, 3-Ring assembly, RSL connection and AAD.



Figure 48. Perform a “Systems Check”

49. Reserve Pin Check

Check the pin for proper seating, condition of the closing loop, rigger seal and thread are intact.

If you're unsure about anything, consult your local rigger and review your system owner's manual.

Secure the reserve pin cover flap.



Figure 49. Reserve Pin Check

50. Main Pin and Bridle Check

Open the main pin cover flap and check the main pin is properly seated.

Ensure the main closing loop is sufficiently tight to maintain the pin's position.

Also check the bridle routing is proper for your system. Consult your owners manual or your rigger if you're not sure.

Reclose the main pin cover securely.



Figure 50. Main Pin and Bridle Check

51. Bridle Routing Check

Ensure the bridle is properly routed per the manufacturer's owner's manual. Proper "bridle slack" allows the deployment system to function normally.

Many systems provide bridle protection that totally covers the bridle.



Figure 51. Bridle Routing Check

52. Main Deployment Handle Position

Ensure the main handle is in the proper location and the bridle is tucked under the bridle protection cover.

Caution: Monitor the pilot chute's pouch condition to ensure it provides proper retention of the pilot chute to prevent premature deployment.



Figure 52. Main Handle Check

53. Post-Packing Inspection (Harness Side)

Starting at the top of the system, proceed with a complete check of the important components.

The AAD and RSL locations vary with different H/C systems, but the rest of the critical operating components are generally in the same location.



Figure 53. Harness-side Systems Check

54. Main Riser Covers

Ensure each riser is properly positioned prior to closing the riser cover.

Observe the placarding on the riser cover assembly, or your owner's manual or consult your rigger.

Caution: If the riser covers are closed improperly they can release prematurely (in freefall) or late, which may cause a hard opening.



Figure 54. Riser Covers Secured

55. 3-Ring Assembly

Check for proper assembly.

Middle ring through the large ring, small ring through the middle ring, loop through the small ring, then routed through the grommet in the riser and through the Amp fitting on the cutaway housing, secured in place by the cutaway cable.

Ensure cable is properly stowed away. Consult your owner's manual or rigger for specifics.



Figure 55. 3-Ring Assembly Check

56. RSL Assembly to Main Riser

Ensure the RSL is properly connected to the main riser.

Consult your owner's manual or rigger for specifics.



Figure 56. RSL Check

57. Cutaway (Breakaway) Handle

Ensure handle is mounted high in the pocket to minimize unprotected cable.

Check the Velcro connection is complete and secure.

Consult your owner's manual or rigger for specifics.



Figure 57. Cutaway Handle – Secure

58. Reserve Ripcord

Ensure the reserve handle (metal, pillow or loop style) is securely in its pocket.

If it's secured by Velcro, ensure handle is mounted high in the pocket to minimize unprotected ripcord cable.

Consult your owner's manual or rigger for specifics.



Figure 58. Reserve Ripcord – Secure

59. Automatic Activation Device (AAD)

Ensure the device is turned on and properly calibrated.

Consult your owner's manual or rigger for specifics.

Note: Always perform a complete systems check before you put the system on your back to jump.

Warning: Failure to perform a thorough gear check prior to each jump may result in serious injury or death.

Complacency and bad judgment are the two (2) prime factors that contribute to accidents.



Figure 59. AAD – Properly Calibrated

- END OF INSPECTION GUIDELINES -