



Strong Enterprises

"The parachute company with imagination"

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Strong Tandem System Maintenance Checks

This is not only meant for Tandem Instructors, but also for Drop Zone Operators, Riggers, and most importantly Packers.

This booklet is intended to ensure the continued safety of both Tandem Instructor and student. Just as the FAA requires a pilot be responsible for the safety of the aircraft they fly, the Tandem Instructor is responsible for the equipment they jump, no matter who packs or owns it. These checks are not meant to be viewed as yet another obstacle to overcome but as a tool to help save time, money, and lives. Performing these checks regularly and in the scope in which they are intended will keep everyday wear areas from becoming dangerous and life threatening issues. If this maintenance is kept up, when it is time for recertification the process will be less time consuming and less costly. By recognizing heavy wear areas of your Strong Tandem you will be able to make repairs before it gets to the point of becoming dangerous, and help avoid repetitive partial or complete factory replacement. Ultimately the instructors responsibility is to provide a fun and safe experience for both student and themselves.

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Strong Tandem Maintenance Checks

The Strong Enterprises Tandem System is manufactured under strict quality control standards from the finest materials available. However, your care will determine the useful service life of the system. Always use a drag mat under the harness and container when packing to avoid damage to the risers and hardware. Keep the rig and canopies out of direct sunlight as much as possible to prevent deterioration of the nylon and to keep the colors from fading.

While inspecting and maintaining this system, Strong Enterprises highly recommends you use the Inspection Checklist included in this booklet. Please make copies of the checklist in order to be able to have a separate sheet for each container and canopy in use. While conducting this inspection, keep in mind that an inspection does not make a parachute system airworthy. The inspection itself is useless unless any identified problems are corrected.

1. Harnesses Instructor and Student



1.1 Hardware:

Inspect all hardware for rust that might inhibit the operation of the unit. Inspect for proper hardware.



Rust.



No rust. Deep V shape connector.

Shallow V should be replaced.



Snap or "click" the gates open and closed on the quick ejector and butterfly snaps to verify the spring inside is still operational.



Gate bent.



Snaps close completely.
Not bent or broken.



Spring broken, snap stays in open position.



Tacking tight and secure.

Inspect the large O-Ring student side attachment point on the main harness to ensure O-Ring secure.



Tack missing.

Inspect the tackings on the quick ejector snaps.

1.2 Webbing



Webbing free of cuts.

Inspect all webbing on both harnesses for cuts or fraying.



Cut webbing.



Frayed webbing.



4-Point Stitch Tight.

Inspect all 4 -points and single needle stitching to ensure they are not unraveling.



Unraveling 4-Point stitch.

Look at the overall appearance of the harness and try to locate any excessive fading in color by its dull dry look. This is an indication of over exposure to ultraviolet rays which can weaken the webbing substantially.

2. Container



Smooth Grommets.

2.1 Grommets

Inspect all the grommets for rough edges, dents or bends in the metal. Rough edges can be smoothed out with very fine emery cloth; large dents or bends in the metal require resetting or replacement.



Bent grommet.

Grasp the grommet with two fingers and try to spin the grommet in place to ensure that it is still set properly and secured to the container. It should not move at all.



Fingernail doesn't slide under rim.

Next make sure that a finger nail can not be slid under rim of grommet (fingernail test).



Fingernail under rim.

2.2 Drogue Riser



Screws tight.

Tighten the screws on the separable "L" link that attach the drogue riser to the diagonal back straps.



Loose screws.



Tacking secure on drogue riser.

Ensure the tacking that attaches the ripcord cable housings to the drogue riser are secure and have not come loose.



Tacking broken.

Inspect the drogue riser for cuts or frays in the webbing.

2.3 Fabric

Inspect all closing flap and tuck tab stiffeners. Ensure they are intact and not broken.



No holes, tears, or broken stitches.

Look at the overall appearance of the fabric and binding tape looking for any holes, tears, or broken stitches in the fabric. Oil and grease may be removed with alcohol, lighter fluid or other approved cleaning solvents.



Tears in fabric.



Drogue pouch secure. No holes.

Inspect drogue pouch, make sure it is secure, no loose stitching. Check for holes in drogue pouch.



Drogue pouch ripped.



Drogue secure in pouch.

Ensure the pouch securely holds drogue.



Loose opening.

2.4 Velcro©

Mate all Velcro© to check and ensure it stays secured. Clean off any grass or dirt that might have accumulated on it. Worn out Velcro© should be replaced.



Clean, secure Velcro©.



Dirty, worn out Velcro©.

3. Ripcords, Drogue Release Handles and Housings



Hardware in good shape.

3.1 Ripcords and Drogue Release Handles

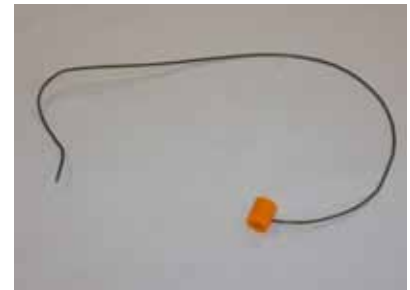
Ensure ripcord hardware is approved for use with the system and is free of heavy wear.

Any homemade or otherwise modified ripcords are not approved for use with the Strong Tandem System.



Smooth straight cable.

Inspect the ripcord cable for kinks, broken strands, rough areas, proper dimension, and a smooth crack free plastic coating. A closing loop stuck in a cracked plastic coating resulted in a tandem fatality.



Bent Ripcord.



Cable tip smooth.

Check cables to ensure that no metal cable strands have become exposed, and that cables are approved for use with system.



Non-approved metal cable and metal unraveling.



Pin straight.

Inspect the reserve ripcord pin to ensure it is not bent.



Bent ripcord pin.



Swedge's secure.

Check that the swedge's on cutaway, reserve, primary, and secondary ripcord cables are secure. The most common fail spot is where the cable connects to the swedge.



Not an approved swedge.

3.2 Three-Ring Release



Securing loop in tact.

Inspect the 400 lb red H.G. line for cuts and frays.



Loop frayed.



Properly routed and in good condition.

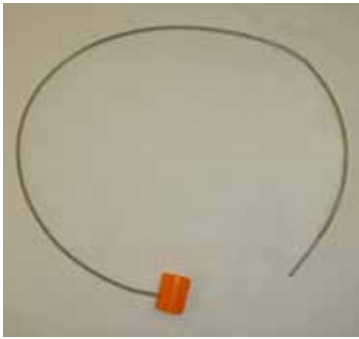
Ensure all rings are securely attached, no loose stitching.

Inspect rings to make sure all are free of dents, rough edges, cracks, and are proper shape. Make sure to check both main risers and drogue riser.



Large ring not round, around both smaller rings. Loop through both small rings.

3.3 Cables and Cable Housings



Clean bend free cable.

Keep cables and housings clean: Pull the release cables out of the housings and make sure there are no kinks or prominent curves in the cable. Pay particular attention where the cable leaves the housing, as a bend or sharp curve may increase pull force as it feeds back through the housing. If the cable shows signs of unraveling, or cracks in the plastic coating it should be replaced.



Bent cable.



Housing complete.

Ensure housings are all complete, no broken or missing housing caps.



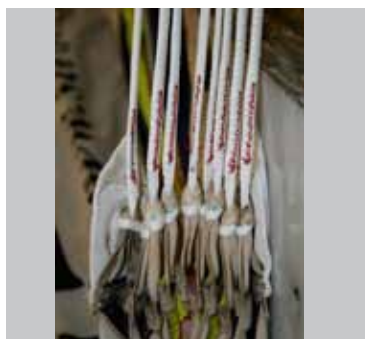
Housing slipped through housing cap.

Clean the cables, the inside of the housings, and the 400 lb H.G. line on the riser which holds down the small ring, then lubricate using any of the following:

- i) We use these two products, Pedros Extra Dry by Pedros USA and White Lightning a similar product described as a self-cleaning lubricant (www.whitelightning.com). Approximately \$7.00 a bottle from your local bicycle shop. We found it easiest to just squirt the lubricant into the end of the (cleaned) cable housing since it dries completely. Both parts get lubricated with one simple procedure. Be careful as it may stain your fabric.
- ii) SuperLube with Teflon - This is a spray that can be found at auto parts stores. Leaves a dry film of Teflon. (Don't lubricate the loop with Teflon Spray.)
- iii) Silicon spray - Be sure to wipe off the wet silicon with a clean dry rag as this residue will attract contaminant's. (Don't lubricate the loop with Silicon). All cable housings including the small release cable housings should be inspected for damage. Check all tackings to ensure they are secure, replace tackings if loose.

4. Main 366 & 400 Canopies

4.1 Lines



Lines trimmed properly.

Check lines for stretch or shrinkage. While anchoring riser links follow to line tabs, if lines look like a smile they are out of trim. Symptoms include slow openings and tension knots. Use line dimension and trim chart in section 7 if lines are out of trim.



Lines out of trim.



Clean lines.

Inspect the lines for excessive wear and replace if necessary. Tandem systems are subject to heavier loads. This should be taken into consideration when looking at a frayed line that is questionable.



Frayed

Inspect the bartacks at the links, at the cascades, and at the canopy attachment points.

4.2 Risers



Housing secure in place.

Check hand tacking of housings installed in rear riser channels. Ensure the housings are clean and free of debris.



Housing out of place, tacking missing.



Webbing in tact.

Inspect the webbing at the 3-ring for signs of wear. Any wear at this location can lead to riser failure. DO NOT install used riser on a new canopy. ***"The life of the canopy is equal to the life of the risers"*** per Strong Enterprises.



Webbing worn and fraying.

Inspect the stitching on the complete riser for unraveling.



Link in good condition.

Inspect the stainless steel snap shackle (Swedish link) to ensure it functions properly.

Inspect the Rapide Links for cracks and tightness.



Link bent and rusted.

4.3 Slider

Inspect the fabric for holes or burns, repair as necessary.

Inspect the grommets for burrs and separation, replace or reset if necessary.

Grasp the grommet with two fingers and try to spin the grommet in place to ensure that it is still set properly and secured to the slider. It should not move at all.

Next make sure that a finger nail can not be slid under rim of grommet (fingernail test).

4.4 Fabric

Check the seams and line attachment points for stitch integrity. This can be done by turning the canopy face up and standing on a chair, hold the top leading edge (nose) of the canopy at shoulder height, spreading each cell apart to look inside.

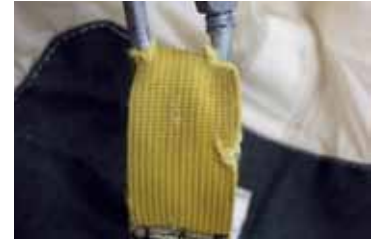


Attachment point clean.

Inspect each panel for damage.

Inspect the canopy for holes, tears, burns, and broken stitching and repair as needed.

Inspect bridle attachment point for wear.



Attachment point frayed.

5. Drogue and Deployment Bag

5.1 Drogue

Starting at the top of the drogue and working down, inspect the canopy fabric for holes or tears.



Fabric free of holes.

Ensure drogue pud is secure and in tact.

Check inside the drogue where deflation lines is attached. Check stitching and bar tacks.

Inspect the reinforcing tape for missing stitches.

Ensure the zigzag stitching at fabric base is complete.



Fabric damaged.



Mesh complete.

Inspect the mesh for rips and holes.



Ripped mesh.

5.2 Bridle



Bridle secure.

Moving down to where the drogue is attached to the bridle, inspect zigzag stitching for any unraveling.

Inspect the entire bridle for loose stitching and signs of wear.



Worn bridle.



Proper bridle end.

Check for wear at the cotton wrapped end of bridle. Hockey tape can be used to wrap end of bridle, this will help prevent wear.



Shredded bridle end.

Ensure plastic bumper is in place over Rapide Link, and neither are damaged. The plastic bumper helps to keep the Rapide Link nut from wearing at the bridle.



Attachment points secure.

Inspect drogue 3-Ring attachment and main closing pin attachment, replace or repair as necessary.



Fraying ring attachment point.

5.3 Y-Deflation Line

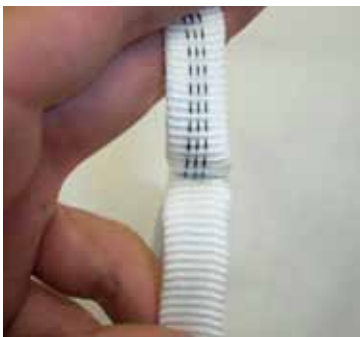


Bartacks secure, tubular in good condition.

Inspect bartacks on Y-deflation line for unraveling and deflation line itself for wear.



Badly worn Y-Line.



Secure and in good condition.

Most wear is found at the point where the two pieces of tubular come together in the Y, so check carefully.



Frayed and worn connecting point.

When replacing the Y-deflation line the new deflation line can be pulled through the bridle, from the top, using the old deflation line by attaching the two together.



1 Find a vent at apex of drogue material. Grasp the existing deflation line and make visible.



2 Cut existing line and lark's head new line to apex attachment point.



3 Tie old line to one end of new line. There is no need to tie both ends. Ensure both are out when finished.



4 Using the bridle opening pull new deflation line through bridle.

5.4 Deployment Bag



Shock cord loops 3 inches.
Grommets in place.

Ensure shock cord loops are not broken or frayed and are no longer than 3".



Shock cord loops stretched
out. Missing Grommet.



Rubber bands good.

Inspect the rubber bands, Velcro® and grommets on the deployment bag, replace if required.



Worn rubber bands.



Velcro® secure.



Velcro® worn out.

6. Strong Tandem Inspection Check List

Use this check-list to ensure all steps of the Strong Tandem Maintenance Check booklet are completed.

Harness/Container SN _____ Date of Manufacture _____ In Service Date _____

**Refer to
Maintenance
Booklet:
Page Section**

Date	Date	Date	Date	Harnesses (Instructor and Student)	Page	Section
				No rust on hardware	3	1.1
				Proper hardware installed.	3	1.1
				Springs on snaps still functional.	4	1.1
				4-point stitching on instructor side O-Ring attachments secure with no broken stitches.	4	1.1
				Hardware functional and tacked (leg strap Quick Ejectors).	4	1.1
				No cuts on webbing.	4	1.2
				Stitching is not unraveling on webbing.	5	1.2
				No excessive fading of webbing.	5	1.2

Date	Date	Date	Date	Container	Page	Section
				No rough edges, dents, or bends in grommets.	5	2.1
				Grommets secure and in place.	6	2.1
				Grommet fingernail test complete.	6	2.1
				Drogue riser "L" link screws tight.	6	2.2
				Closing pin housing on drogue riser securely tacked.	6	2.2
				No cuts or frays in drogue riser webbing.	6	2.2
				Closing flap and tuck tab stiffeners in good condition.	6	2.3
				No holes or tears in Cordura or binding.	7	2.3
				No broken stitches in Cordura or binding.	7	2.3
				Drogue pouch secure.	7	2.3
				No holes in drogue pouch.	7	2.3
				Opening securely holds Drogue.	7	2.3
				All Velcro© locations are clean.	7	2.4
				Velcro© is secure and in place.	7	2.4

Date	Date	Date	Date	Ripcords, Drogue Release Cables and Housings	Page	Section
				No excessive wear of ripcord hardware.	8	3.1
				No kinks, frays, or broken strands in ripcord cables.	8	3.1
				Cable tip is not exposed.	8	3.1
				Reserve Pin straight.	8	3.1
				Swedge's are secure and approved parts.	9	3.1
				Red H.G. line on 3-ring release not frayed or cut.	9	3.2
				Rings on 3-ring release secure.	9	3.2
				No dents, cracks, or rough edges on rings.	9	3.2
				No prominent curves in 3-ring release cable.	10	3.3
				Housings complete, no broken or missing housing caps.	10	3.3
				Cable housings free of all dirt, gravel, sand, debris and are lubricated.	10	3.3

Main Canopy SN _____ **Date of Manufacture** _____ **In Service Date** _____

**Refer to
Maintenance
Booklet:
Page Section**

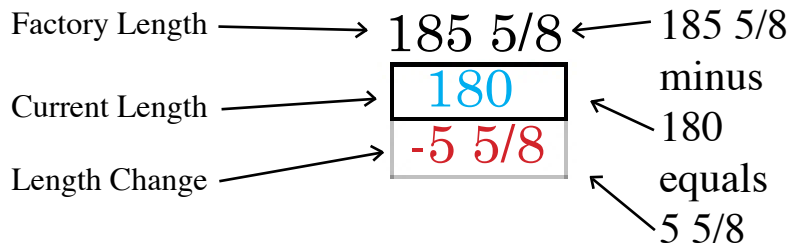
Date	Date	Date	Date	Main Canopy	Page	Section
				Like line group deviation within 1-inch.	11	4.1
				No excessive wear in lines.	11	4.1
				No loose stitching at link, cascade, and canopy attachment bartacks.	11	4.1
				Rear riser cable housings secure.	11	4.2
				Rear riser cable housing clean and free of debris.	11	4.2
				No webbing wear at 3-ring attachment point.	12	4.2
				Stitching on riser webbing unbroken.	12	4.2
				Swedish link functional.	12	4.2
				No cracks in Rapide Links.	12	4.2
				No holes in slider, stitching good.	12	4.3
				No burrs on slider grommets.	12	4.3
				Slider grommets secure.	12	4.3
				Grommets on slider do not spin.	12	4.3
				Fingernail test on slider grommets complete.	12	4.3
				Seam and line attachment stitch intact.	13	4.4
				All panels free of damage.	13	4.4
				No holes, tears, or burns in the fabric.	13	4.4
				No excessive wear at bridle attachment point.	13	4.4

Date	Date	Date	Date	Drogue and Deployment Bag	Page	Section
				No holes or tears in fabric.	13	5.1
				Reinforcing tape on drogue body undamaged.	13	5.1
				Stitching and zigzag at base of drogue canopy complete.	13	5.1
				Drogue mesh free of holes and tears.	14	5.1
				No loose or broken stitching in bridle.	14	5.2
				No holes or excessive wear in the bridle.	14	5.2
				Bridle attachment point not worn or frayed.	14	5.2
				Bumper and Rapide Link not damaged and in correct place.	14	5.2
				3-ring attachment complete and not bent or damaged.	15	5.2
				Y-deflation line bartack not loose or fraying.	15	5.3
				No excessive wear and no twists in the Y-deflation line.	15	5.3
				Drogue flex pin smooth, no nicks in coating, no broken strands in cable.	15	5.3
				Shock cord loops not broken or frayed, and not stretched out longer than 3 inches.	16	5.4
				Rubber bands in place and in good condition.	16	5.4
				Deployment bag grommets secure.	16	5.4
				Velcro secure and in good condition.	16	5.4

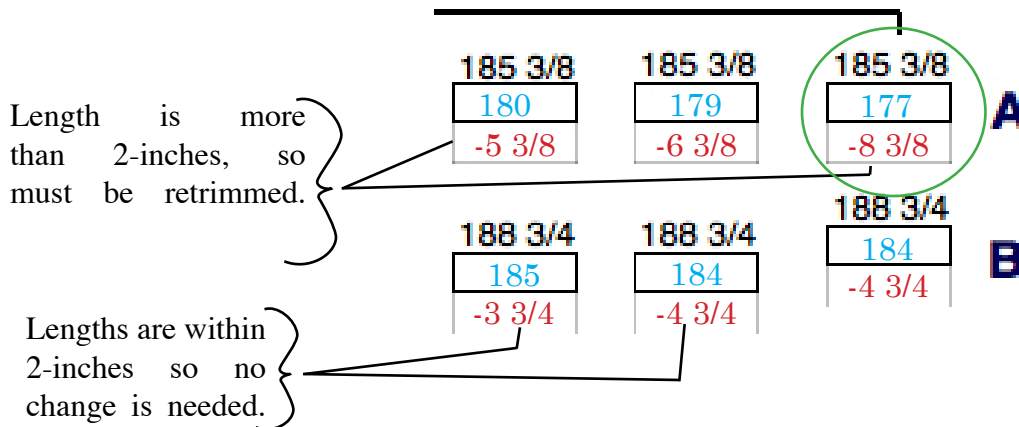
7. Line Dimension and Trim

Considering the shrinkage that occurs with Spectra and Dacron lines, Strong Enterprises recommends that line trim on tandem systems be checked during the 25-jump inspection. The following line dimension charts are to give you an understanding of lengths, and trim.

To use the charts first place lines under even pressure. Measure the lines from end to end, (control lines should be measured without toggles). Write the length in the corresponding box. Next determine the longest line length. Then subtract the new length from the longest length and write the difference in the second box.



Now look at each line group (A, B, C, D, CL) as a whole, outer and inner lines should be viewed as two different line groups (Outer B's and Inner B's). The lines in any group may not differ by more than 2-inches (longest to shortest). Lengthen lines to correct dimensions by opening the fingertraps and then retrapping at the new dimension. Remember the canopy will fly better if dimensions are closer. You may find it helpful to mark lines that need to be worked by circling the boxes.



Next holding "A" lines for reference place "B", "C", "D", and control lines on "A" lines and measure the difference. Using the following line trim chart ensure trim of line groups are within 1-inch of correct trim length.

366 Line Trim

	Outer Lines	Inner Lines
"A" to "B"	3 1/4	3 7/8
"A" to "C"	11	12 1/2
"A" to "D"	22	26 1/8
"A" to Steering line	15 1/4	
"A" to Outer Flare line	41 1/2	
"A" to Inner Flare line	44 1/4	

400 Line Trim

	Outer Lines	Inner Lines
"A" to "B"	4	4 1/4
"A" to "C"	12 1/2	13 3/4
"A" to "D"	23 1/2	27 1/2
"A" to Steering line	17 1/2	
"A" to Outer Flare line	44	
"A" to Inner Flare line	47	

If it is determined that retrimming or replacement is necessary (in our example 1 line needs to be retrimmed) a certified master rigger may complete these duties. However it is highly recommended that the canopy be returned to the factory for a complete inspection, retrim, and replacement.

SET 366 Line Dimensions

SN _____

Date Inspected _____

Inspected By _____

How to use this chart
 1) Measure the individual line
 2) Write the measurement in the space provided below the recommended length
 3) Subtract the two numbers. This is the amount the line is out of trim

	L	E	A	D	I	N	G	E	D	G	E	
A	185 3/8	185 3/8	185 3/8	185 5/8	185 5/8	185 5/8	185 5/8	185 5/8	185 3/8	185 3/8	185 3/8	185 3/8
B	188 3/4	188 3/4	188 3/4	189 1/2	189 1/2	189 1/2	189 1/2	189 1/2	188 3/4	188 3/4	188 3/4	188 3/4
C	197 3/8	197 3/8	197 3/8	198 1/8	198 1/8	198 1/8	198 1/8	198 1/8	197 3/8	197 3/8	197 3/8	197 3/8
D	208 3/8	208 3/8	208 3/8	210 3/4	210 3/4	210 3/4	210 3/4	210 3/4	208 3/8	208 3/8	208 3/8	208 3/8
CL	222 7/8	222 7/8	222 7/8	230 5/8	227 3/4	227 3/4	227 3/4	227 3/4	222 7/8	222 7/8	222 7/8	222 7/8

Notes:
 All lines measured from one end to the other
 Control lines are measured without the toggle
 Like dimensioned lines should not vary more than 2"

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$1/8 = 0.125$ $1/4 = 2/8 = 0.25$
 $3/8 = 0.375$ $1/2 = 4/8 = 0.5$
 $5/8 = 0.625$ $3/4 = 6/8 = 0.75$
 $7/8 = 0.875$

SET 400 Line Dimensions

SN _____

Date Inspected _____

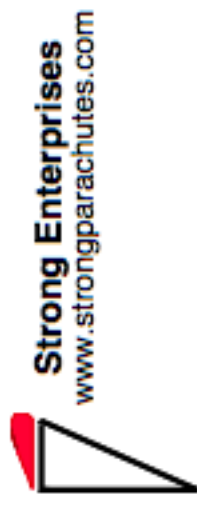
Inspected By _____

How to use this chart

- 1) Measure the individual line
- 2) Write the measurement in the space provided below the recommended length
- 3) Subtract the two numbers. This is the amount the line is out of trim

	L	E	A	D	I	N	G	E	D	G	E	
A	195.50	195.50	195.50	195.50	195.50	195.50	195.50	195.50	195.50	195.50	195.50	195.50
B	199.50	199.50	199.50	199.25	199.25	199.25	199.25	199.25	199.25	199.25	199.25	199.50
C	208.00	208.00	208.00	209.25	209.25	209.25	209.25	209.25	208.00	208.00	208.00	208.00
D	219.00	219.00	219.00	222.75	222.75	222.75	222.75	222.75	219.00	219.00	219.00	219.00
CL	233.50	233.50	233.50	242.50	239.50	239.50	239.50	239.50	233.50	233.50	233.50	233.50

Notes:
 All lines measured from one end to the other
 Control lines are measured without the toggle
 Like dimensioned lines should not vary more than 2"





Photos of Tom Noonan and Dave Bazzoni

SET-366

www.strongparachutes.com

- The SET-366 is a high performance, semi-elliptical, 9 cell main canopy
- It provides soft, on heading openings combined with an increase in flight performance
- Toggle pressure has been dramatically reduced on the SET-366, making turns and flaring light and easy

You can spend all day long flying the SET-366 over and over again, and land your last jump of the day as smoothly as your first.

NEW Risers with Every Canopy!

\$3,600.00

Trade in Price: \$3,240.00

Prices subject to change.

SET-400

www.strongparachutes.com

- The most predictable and reliable tandem canopy available
- Durability leader in the tandem industry
- Consistent and dependable openings
- Smooth and responsive flight characteristics
- Exceptional penetration ability and flat glide

The SET-400 is a high performance, semi-elliptical 9-cell main canopy. Setting the bar for Tandem Flight since 1995.



Photos by Phil Roberson



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"The parachute company with imagination"

Division of S.E. Inc.

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