

# **Owner's Manual**

For the packing and maintenance of the  
**Dual Hawk Tandem System**  
with the  
**Master Reserve**  
and the  
**SET 400 and SET 360 Main Canopies**



**SET-400**

U.S. PAT. #4,928,989 & 5,003,401  
**STRONG ENTERPRISES**

**SET-360**

U.S. PAT. #4,928,009 & 5,460,401  
**STRONG ENTERPRISES**



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# Disclaimer Of Warranties

There are no warranties which extend beyond the description of the parachute in the flight manual, and neither the seller nor any agent of the seller has made any affirmation of fact or promise with respect to the parachute except those that appear therein.

The liability of the seller is limited to the duty to replace defective parts found upon examination by the manufacturer to be defective in material or workmanship within seven days after purchase and found not to have been caused by any accident, improper use, alteration, tampering, abuse or lack of care on the part of the purchaser.

This is a high performance parachute, and must be packed in accordance with the instructions in this manual and in accordance with Service Bulletin #22

Any person using this equipment must have successfully completed a certification course qualifying him / her as a Strong Certified Tandem Instructor. The correct use of this equipment shall be the responsibility of The Strong Enterprise Certified Tandem Instructor.

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## SCOPE

This manual contains the manufacturer's instructions for assembling, packing, and maintaining The Strong Enterprises Dual Hawk Tandem parachute system.

## DESCRIPTION

The Dual Hawk Tandem parachute system is designed for freefall and open canopy dual instructional applications. It is protected under U.S. patent numbers 4,399,969 and 4,746,084. It allows two people, a Strong Certified Tandem Instructor in the rear and a student in the front, to jump using one extra large main parachute while having the back up reliability of a compatible reserve parachute. The assembly consists of the Dual Hawk Tandem instructor harness and container assembly, and a "student" harness assembly for the student. A choice of 4 ram-air main parachutes are available: the 425 sq. ft. Master main canopy, the 520 sq. ft. T520 canopy, and the SET 400 and SET 360 zero porosity, semi elliptical canopies. The Dual Hawk Tandem system utilizes a drogue stabilization chute with a deflation line and deployment bag. The reserve is the 425 sq. ft. Master ram-air reserve canopy, with Grabber Pilot Chute and free type deployment bag. The packed system, ready to jump measures 26 inches long by 16 inches wide by 8 inches thick. It weighs 53 1/2 lbs when packed with the 425 sq. ft. Master canopy, 55 1/2 lbs when packed with the 520 sq. ft. T520 canopy, 54 lbs when packed with the SET 400 elliptical canopy, and 53 lbs with the SET 360.

## SYSTEM OVERVIEW

**Dual Hawk Tandem Harness and Container Assembly.** (US patent 4,746,084) The Dual Hawk Tandem container is made of 1000 denier nylon Cordura material. The container has a Spandura pouch built onto the bottom of the pack to house the drogue. The drogue is attached to the instructor's harness between the main and reserve containers. The harness is made of type VII webbing throughout. The main riser attachment point is a single piece, forged 3-D ring designed specifically for tandem applications. This 3-D ring allows for independent loading of the instructor and student harnesses under the main or reserve canopy. The assembly includes instructor main ripcord, student main ripcord, reserve ripcord, and cutaway handle. The use of a 2-Pin Tandem Cypres is required.

**Student Harness.** The student harness is made of type VII webbing throughout and uses two 5000 pound butterfly snaps for the primary attachment to the instructor harness, and two 2500 pound adjustable quick ejector snaps for the side attachments. The passenger harness features a shoulder forward suspension point that reduces fatigue to the students legs, thick padding, and an articulated ringed harness.

### Main Canopy Options

**SET 400 and SET 360.** The Semi-Elliptical Tandem (SET) 400, max wt. 500 lb, and 360, max wt. 400 lb, are high performance zero-porosity 9-cell elliptical canopies. The planform is a double taper elliptical with a leading edge that is essentially straight while the trailing edge tapers forward and the airfoil becomes thinner toward each wingtip. The five center cells have a single soft rib, while the four end cells each have two soft ribs. Using the maximum chord (the center cell), the canopy has an

aspect ratio of 2.7; using the mean chord, the aspect ratio is 2.9. The canopy is reefed with a flag slider, and features a combination of cascaded and continuous suspension lines. Materials include 1.18 oz, 0 cfm and 1.12 oz, 0-3 cfm ripstop nylon fabric, 1500 or 940 lb test Spectra® lines, 1500 lb Spectra® control lines, and a combination of 3/8-, 1/2- and 1-inch wide nylon reinforcing tapes.

**Reserve Canopy** The Master Reserve is specifically designed to handle two people and loads up to 500 pounds. The canopy has nine cells with a planform of 425 square feet. Fabric is 1.12 oz, 0-3 cfm ripstop nylon.. The Master reserve uses 700 pound test Kevlar® cord for all lines.

**Reserve Deployment System.** The deployment bag is a wedge shaped “free” type bag made from ripstop nylon with four grommets on the locking flap and four stows on each side. The suspension lines are stowed with bungee and plastic chokers. The bridle consists of a 13 foot length of type XII nylon webbing. The Grabber Reserve Pilot Chute is a spring type, 36 inch diameter, high drag pilot chute made of ripstop nylon with the lower portion meshed.

**Main Ripcords.** The Dual Hawk Tandem system comes with four PVC Main Ripcords (two are spares) made from 5/32 inch coated aircraft cable, 41 inches long. Both the main ripcords (instructor and student) are located on the instructor’s right main lift web. The student’s ripcord and ripcord cable housing is designed to be detached from the instructor’s main lift web and attached to the student’s main lift web as the student is being hooked up to the instructor.

**Reserve Ripcord** The reserve ripcord is a dual cable type utilizing a small angled “D” (Raft) handle. It is located outboard on the left main lift web. The shorter cable is 25 1/4 inches while the longer cable is 26 1/2 inches. Both cables are terminated by a single locking ripcord pin.

**Breakaway Drogue Release Handle** (Mandatory as of January 1, 1995) This breakaway handle has been designed to activate the drogue release ripcord in addition to releasing the main canopy. This is an important change, to ensure release of the drogue, prior to reserve activation. No modifications are required to the Dual Hawk in order to install this system. The soft Cordura® “pillow” attaches onto the right hand outboard main lift web of the instructor harness and has two uncoated 3/32” stainless steel cables protruding from it. The easy grip handle allows for easier pull due to finger pockets.

**Main Bag.** The ALS (Anti-Line-Slump) bag eliminates line slump while allowing the use of rubber bands to stow the lines. One extra flap has been added to cradle the stowed lines during bag snatch. Velcro sides allow easy and orderly placement of the canopy into the bag without disrupting the canopy folds.

**Drogue.** The drogue is a hemispherical design with an open diameter of 3 feet. A deployment handle (drogue pud) is located at the apex. The drogue bridle is 12 feet long, made of 1 1/2 inch Kevlar®, with a deflation system that runs from the apex of the drogue canopy to the main canopy bridle attachment point.

## SYSTEM SPECIFICATIONS

	<b>With SET 400/360</b>	<b>With Master-425</b>	<b>With T520</b>
<b>System weight:</b>	54 / 53 lbs	53 1/2 lbs	55 1/2 lbs
<b>Canopies</b>	SET 400 / SET 360	Master canopies	T 520 Main
<b>Span</b>	34 ft	31 1/2 ft	38 1/2 ft
<b>Chord</b>	12.6 to 10.4 ft / 11 to 9 ft	13 1/2 ft	13 1/2 ft
<b>Area</b>	402 / 356 sq ft	425 sq ft	520 sq ft
<b>Aspect ratio</b>		2.3	2.85
<b>Weight (less risers)</b>	15 / 14 lbs	main, 14 lbs reserve, 13 lbs	16 1/2 lbs
<b>Canopy fabric</b>	1.18 oz, 0 cfm +1.1oz 0-3 cfm	1.1 oz, 0-3 cfm	1.1 oz, 0-3 cfm
<b>Slider dimensions</b>	34" x 34"	33" x 33"	33" x 36"
<b>Forward speed w/ 400 lbs</b>	30 mph	26 mph	20 mph
<b>Rate of descent</b>	12-14 fps	12-14 fps	10-12 fps
<b>Max suspended weight</b>	500 / 400	500 lbs	500 lbs

## INSPECTION

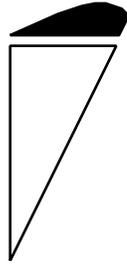
**General.** We are justly proud of our quality control, but prior to assembly, just as with any parachute system, the rigger should inspect the canopy inside and out for any flaws or mistakes in construction. Line lengths being especially critical in ram-air canopies, these should also be checked. See page 40-47 for line length and trim data. This includes the steering lines and brake settings.

**Left Right References.** All references to left or right in this manual are based on the wearer/jumper's left or right unless otherwise specified.

**Suspension Line References.** The "A" lines are at the leading edge (nose) of the canopy, with the "B", "C", and "D", identifying those lines progressing toward the trailing edge (tail). Upper and lower control lines are identified as "E" and "F" lines in that order, "G" lines connect the lower control lines to the toggles.

**Reserve Pre Packing Inspection.** A thorough inspection is required at every repacking. This can be done by turning the complete system (harness and canopy) face up. Standing on a chair, hold the top leading edge (nose) of the canopy at shoulder height, spreading each cell apart to look inside. Inspect each seam and panel for damage. Check to make sure the risers are not twisted while verifying line continuity. The slider should be closely inspected for smoothness of the grommets.

**Pre-Jump Inspection.** Prior to donning the system, inspect for airworthiness to include the harnesses and container, ripcords and cutaway handle, the drogue riser, drogue bridle routing, 3-ring release assemblies, harness adjustments, reserve ripcord pins, and packing data card.



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## Dual Hawk Tandem System Component List

Qty	Component	Part Number
1 ea	Canopy, Reserve, Master	430085
1 ea	Canopy, SET 400	411540
1 ea	Canopy, SET 360	411536
1 ea	Instructor Harness/Container/Passenger Harness	114702
1 ea	Passenger Harness (Optional)	240075
1 ea	Comfort Passenger Harness	240075-4
1 ea	Drogue w/Y Deflation line and 20.5" flex pin	480026
1 ea	Reserve static line lanyard w/ring	780624
1 pr	Risers, Main, Type VII w/toggle pockets	834608
2 ea	Toggles, Master, SET 400, and SET 360 Yellow	866071
2 ea	Toggles, Reserve	866061
1 ea	Ripcord, Reserve	628264100.252100
2 ea	Ripcord, Main Drogue Release (MB)( Option)	67341000
2 ea	Ripcord, Main Drogue Release (PVC) (Standard)	67841000
2 ea	Breakaway/Drogue Release Handle, 3-ring, red	862020
1 ea	Deployment Free Bag with bridle, Reserve	730324
1 ea	Pilot Chute, Grabber	790130
1 ea	Deployment Bag #2, Fits #2 main container	720531
1 ea	Deployment Bag #3, Fits #3 main container	720532
1 ea	Hesitater Loop w/washer	861035
2 ea	Closing loop, Main, 2", Spectra 1800 lb	861017
2 ea	Reserve closing loop, w/Cypres washer 1 1/2"	861014
5 ea	Drogue Riser through loops (4 spare)	861515
1 ea	Y-Deflation Line (Spare)	813016
1 ea	Pull up cord	984119
1 ea	Kit Bag	816003
1 ea	Packing data card	580502
1 ea	Manual, DHT	510045
1 ea	Manual, Cypres	N/A
1 ea	AAD, Cypres 2-Pin Tandem	990063

## INSTALLING CYPRES AAD

1. Test the Cypres, following Airtec's instructions, before installation.
2. Place the processing unit in the pouch.
3. Route the control unit, out from the right side of the pouch, through the channel, up to the top of the container and place it in the clear pocket, on top of the reserve stiffener flap.
4. Route right and left release units, through the channels, under the Velcro® and place in the elastic keepers on each side flap (Illustration CI-1).

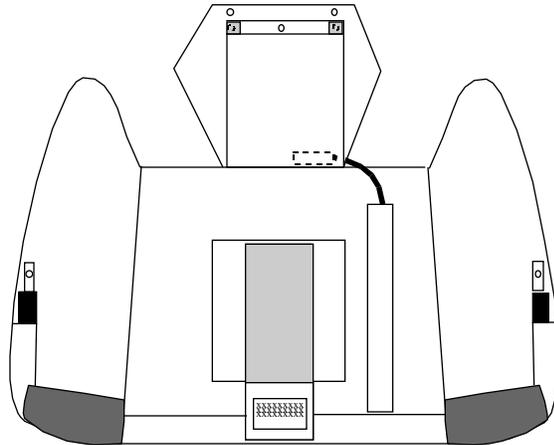


Illustration CI-1

## ASSEMBLING AND PACKING THE MASTER RESERVE

### Note!

*We require that the rigger packing these canopies be completely familiar with ram-air type parachutes. Although we do not require a special rating, the owner/jumper should be sure that the rigger thoroughly understands a ram-air parachute. Having a square reserve on backwards would be a serious matter.*

### Required Rigging Tools

### Part Number

A.	Seal thread	961020
B.	Lead seal	984205
C.	Screwdriver	984440
D.	Seal press	984190
E.	Packing paddle	984030
F.	Pull-up cords, 2 ea	984119
G.	Temporary pins, 2 ea	984068

**Repack Cycle.** The repack cycle for this system is 120 days as required by FAR 105.43

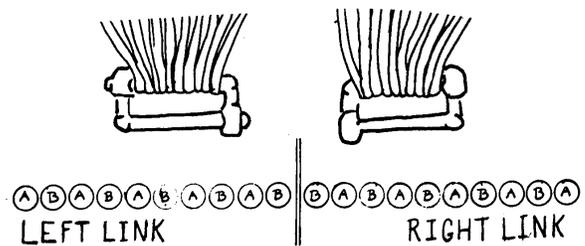
### Assembling the Reserve Canopy.

**Reserve Risers.** The Dual Hawk Tandem harness is built with four reserve risers to accommodate the Master reserve on “L” links. The back of each rear riser is equipped with a guide ring and Velcro® for steering toggles.

### Packing the Master Reserve Canopy

Parts of these packing instructions are similar to those shown in other manuals. This method has worked best under all speeds and conditions tested. The basic difference is that this method utilizes a combination of flopping and stacking the canopy. PRO packing of the Master reserve is not approved.

**Layout and Assembly.** Lay the harness and container on a smooth clean surface as if the wearer were face down, head toward the canopy. Lay the canopy out and straighten the line groups. The front “A” and “B” line groups go to the front risers, the “C” and “D” line groups go to the rear risers. The smooth side of the grommets in the slider goes toward the harness. Attach the connector links to the corresponding risers temporarily and do a complete continuity check on each link to insure proper sequence, then tighten the links. Clear each set (left and right) of upper control lines (steering lines). Lower control lines should pass through the rear grommets of the slider (clear of the suspension lines) then through the Type I webbing guide loop located on the rear riser just below the L-link and then through their respective guide rings on the rear risers. Attach the steering toggles to the lower control lines by inserting the looped lower end of the lower control line through the grommet in the toggle from the Velcro® side, and then passing the bottom end of the toggle through the loop and cinching the loop snug around the toggle. If practical, the rigger should then carefully inflate the reserve as a final continuity and assembly check.

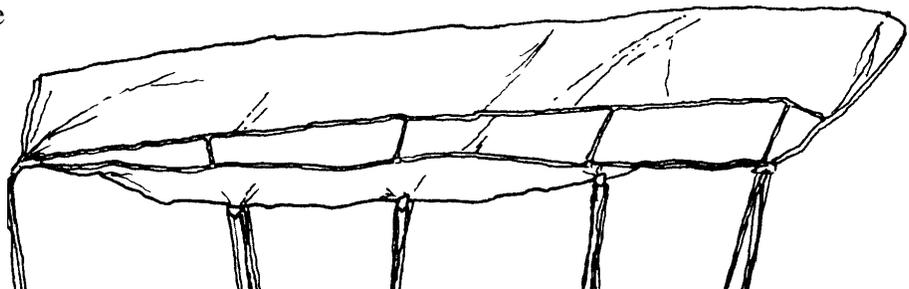


**Bag, Bridle and Pilot Chute.** Pass the 13-foot long bridle webbing through the deployment bag’s loop, then pass the large loop end of the webbing through the smaller loop end and cinch snug. Next pass the large loop end of the bridle through the pilot chute’s loop, and then pass the entire pilot chute through the large loop of the bridle.

### !WARNING!

**This bag assembly must not be attached to the reserve canopy.**

**Layout The Canopy.** Lay the canopy out with the left or right side up. Orient the harness face down, head toward the canopy. Clear the lines of twists and tangles. Confirm suspension line continuity by tracing the lines from each quadrant of the canopy to their proper sequence on each riser. Insure that the control lines are clear of other lines and that they pass through the rear grommets of the slider as well as through the type I guide loop and the guide ring on each rear reserve riser. Position slider near connector links. Clear the nose with a combing motion, picking up the center seam of each cell and pleating each cell all the way to the tail.



**Setting The Brakes.** Pull the control line through the steel guide ring located on the rear riser until both brake loops (built into lower control lines) are just below the ring. Bring the locking loop (located on the riser behind the steel ring) up through both brake loops and pass it through the guide ring .



Insert the tip of the toggle (the portion of the toggle above the grommet) through the locking loop up to the grommet. Mate the toggle to the Velcro® on the riser and place the tip of the toggle in the elastic keeper. S-fold the excess line and lay it next to the toggle. Mate the Velcro® on the toggle keepers. Repeat procedure on the opposite riser. Visually check the lines, they should all be straight, with no slack between the canopy and the harness.



**Fold** (do not stack) the nose over up to the A-line group .



Fold the canopy again half way between the A-line group and the B-line group. Continue with one more fold so that the A-line group is laying directly on top of the B-line group.



Move to the tail of the canopy and slide the tail section over to the D-line group, so that the line attachment points are placed along side the D-line slider stops.



Now grab the D-lines attachments with your right hand, and the top of the canopy with your left hand keeping tension on the canopy.



Now stack the D-lines and control lines on top of the C-lines.



Move the slider up to the base of the stabilizers.



Make certain that any twists in the lines are ABOVE the slider.



Spread the slider out flat (it will be folded in half spanwise) and stow it between the two stabilizers.



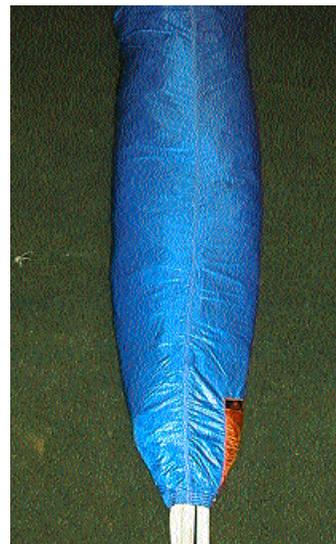
Make one more stack with the tail section placing it on top of the nose section.



**Dress the tail**, half on one side and half on the other so that the center of the tail is on top. Care should be taken when doing this to insure that the steering lines stay neatly stacked on top of the D-lines and do not fan out over the canopy fabric. The trailing edge (four needle seam) should be placed over the slider.



Wrap the tail around each side to make a smooth roll. Gauge the width of the canopy before bagging. It should be the same width as the free bag.



**S-fold the canopy and place in the bag**

Make your first S-fold with the lower 14” of canopy.



Make your next S-fold by folding the canopy back over the first fold keeping everything neat and secure with your other hand.



Keeping everything secure, fold the canopy once back on top of itself.....



....and then back again completing the S-fold.



Now tuck the remaining 6 to 8" of canopy under to create a wedge shape.



**Bag the canopy and stow the lines**

Slide the canopy directly into the bag filling both corners.



Close the mouth of the bag by routing the two center locking stow bungees through their respective grommets and lock with a 1 1/2" bight of suspension line.



Make sure the plastic sleeves are installed properly by stretching the bungee to its fullest capacity then sliding the plastic sleeve up as close to the bight of suspension line as possible.



The next two stows to make are the outer locking stows. Stow the remainder of the lines to within 12 inches of the connector links.

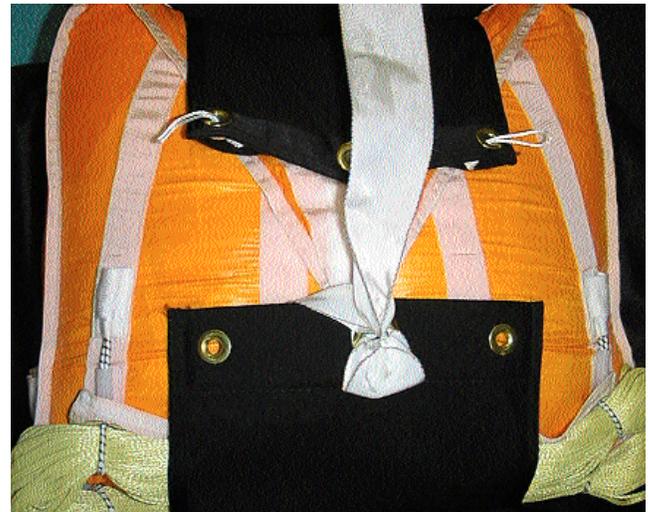
Tip: Forming the bag into a wedge shape using open handed persuasion will help create the ideal shape.

**!Note!**

*Stows should be no longer than the bound edge of bag.*



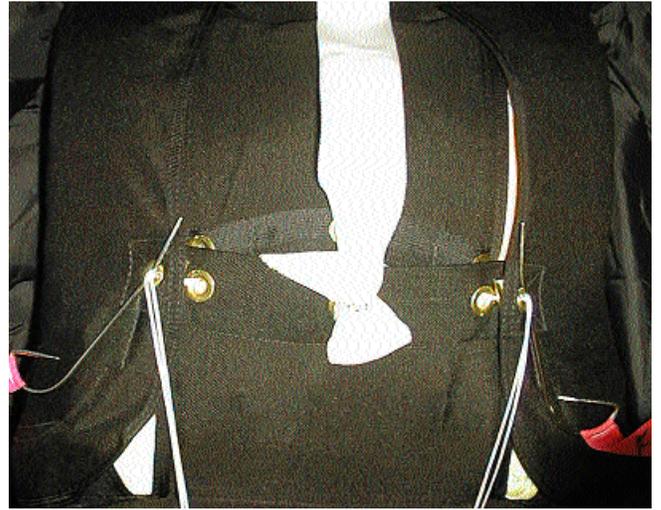
**Closing the Container.** Place the risers and bag into the container spreading the risers so that the toggles are outboard. Fold the top part of the free bag back on top of the bag. Make a bight of the bridle no more than 1 1/2” through the elastic hesitator loop.



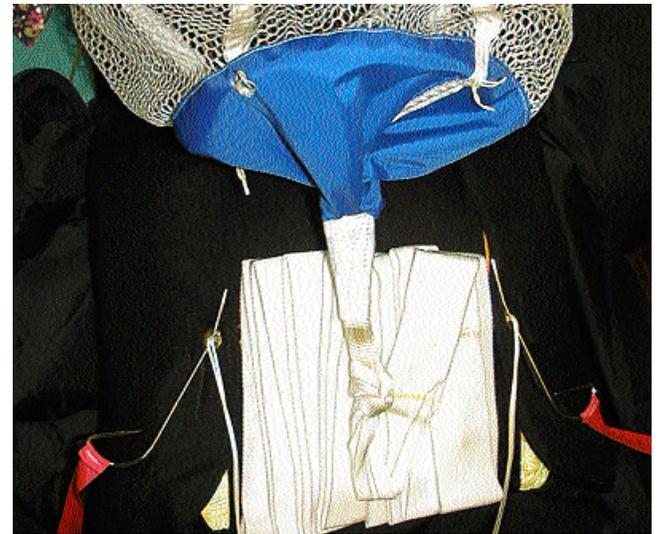
The subflaps are closed by inserting closing loops (using Cypres approved pull-up cords) through the upper subflap, then the lower subflap, routing the bridle out between the grommets.



Close the side flaps next, making sure the closing loops are routed through the Cypres release units (cutters) and insert the temporary pins.



S-fold the bridle on top of the bottom subflap vertically using seven inch (approximately) folds fanning it out on both sides of the hesitater loop.



Thread the pull-up cords through the grommets in the bottom flap. Position the pilot chute in the center of the lower subflap, below the grommets, and compress. Close and insert the temporary pins.



The top flap is closed last but before this is done the reserve static line lanyard is installed. To do this, route both ripcord cables through the top guide ring (the one located closer to the ripcord cable housing) then through the ring on the reserve static line lanyard and last, through the bottom guide ring on the top closing flap.



Dress the container. Pull cable slack up towards pins. Place pins under pin covers. Seal the furthest pin from the cable housing (right). Fill out the data card and personal log, close the pin protector flap. Inspect the complete container and **count your tools**.

## Assembling and Packing the SET 400 and 360 Main

**General.** The person packing this parachute must be completely familiar with ram-air type parachutes and preferably be checked out as a Strong Certified Tandem Instructor. Tandem mains are jumped by two people; therefore, the reliability/confidence levels dictate that the parachute be packed according to the manufacturers instructions by competent riggers/packers thoroughly trained in this procedure.

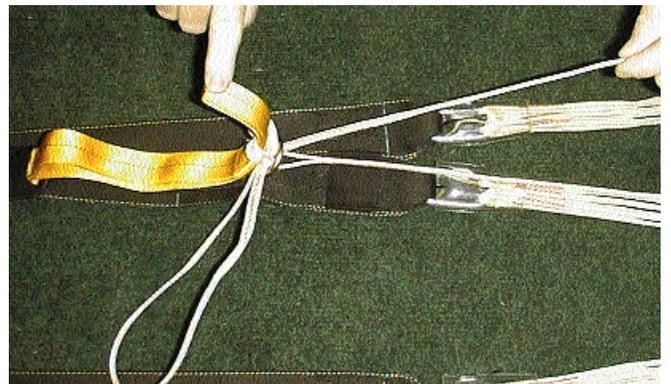
**Assembling the Main Canopy.** Lay the canopy on left or right side. Attach the canopy risers to harness and container and connect the reserve static line lanyard to the stainless steel snap located on the left riser.



Attach Kevlar® drogue bridle to #5 Rapide link on top of the bag. Tighten nut, finger tight plus 1/4 turn with a wrench. Slide plastic bumper over link and handtack in place with two turns through the link bumper and the bridle. Feed Y-lines through #4 grommet on either side of the Rapide link and attach them to the link on top of the canopy.



**Set the brakes and stow the excess control line.** Pull only the control line with the brake loop through the guide ring until the brake loop is just below the steel guide ring on the rear riser. Bring the locking loop (located on the riser) up through the guide ring, pass it through the brake loop and insert toggle. Leave the other control line slack above riser.



Snap the toggle to the riser then fold the toggle between the middle and lower hand grip loops and tuck the lower end of the toggle into the toggle pocket located on the riser. S-fold the excess steering line and stow under the toggle. Repeat procedure on the opposite riser.



Attach a rubber band to the third control line attachment tab from the outside on each side of the canopy. Stow the four inner control lines in these rubber bands, using a double wrap, so their attachment tabs are even with the tabs of the outer “braked” control lines.



The following instructions will cover two different packing procedures approved for use on the Strong Enterprises SET 400 and SET 360 Tandem Canopy. These consist of the Pro-Pack method and the “flop type” Flat Pack method. Although either of these methods may be used, the Pro-Pack is our recommended procedure. For flat pack procedure, go to page 31

### **PRO Pack procedures for packing the SET 400 and SET 360**

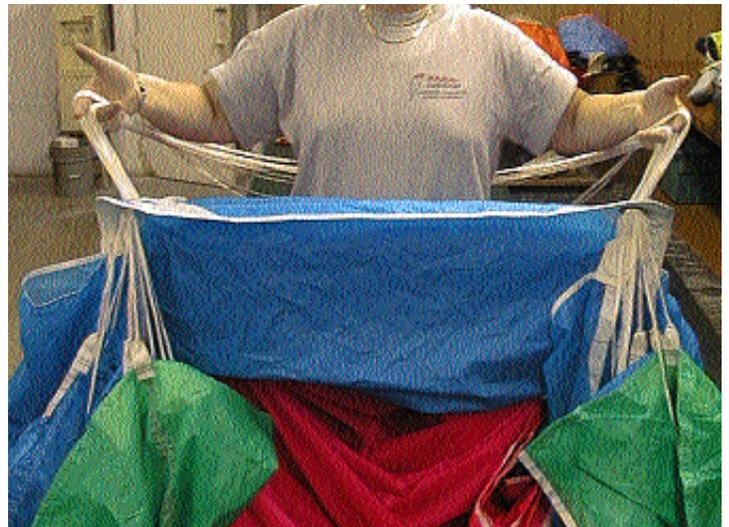
#### **!CAUTION!**

**THE LOOP ON THE RISER MUST BE USED IN ORDER TO KEEP THE BRAKE LINE LOOP FROM DIGGING INTO THE SIDE OF THE TOGGLE, MAKING BRAKE TOGGLE RELEASE ALMOST IMPOSSIBLE DURING A MALFUNCTION. THE INNER CONTROL LINES ARE NOT BRAKED.**

At the risers, pick up the lines and use your fingers to separate the front lines, rear lines, and control lines



While facing the canopy, and still using your fingers to keep the lines separated, walk forward pushing the slider ahead of you until it is seated against its stops.



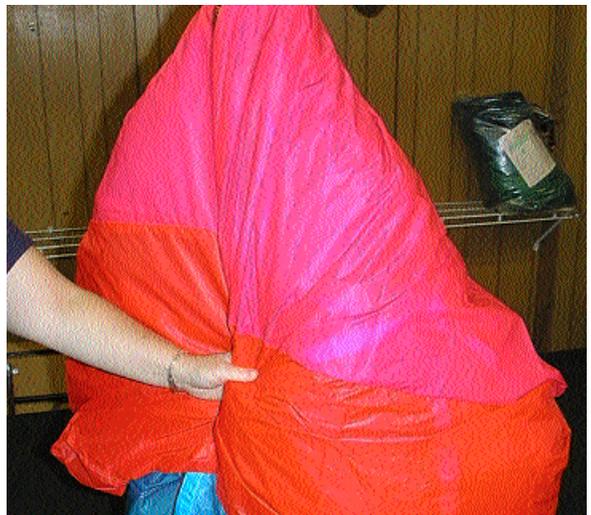
Reach down into the right side of the canopy between the A and B lines and pleat all material out from between the line attachment tabs, this should include 5 lower tapes and the stabilizer. Again reach down into the right side of the canopy between the B and C slider stops and pleat all material out from between those line attachment tabs, this should also include five lower tapes and the stabilizer. Pleat the small section of stabilizer out from between the C and D slider stops. Ensure that all D lines are pulled into the center of the canopy and are clearly visible. Dress the left side of the canopy in the same manner.



Cloverleaf the slider so that it is ready to cup air the moment it is out. Make sure that the four corners are spread and ensure that the slider pocket is out in front of the nose. Because of the inherent soft, lengthy openings of the SET 400, there is no need to do anything with the nose other than to let it hang down naturally, grasp it and push it into the canopy folds a few inches.



Locate the center of the tail near the warning label and pull it up so that it covers the slider grommets. Swing the tail seams around the canopy so that they meet in front of the nose and roll them together several times.



While keeping the tail seams held firmly in your hand, carefully lay the canopy down flat on the packing surface with the lines taut. Purge the air from the canopy and dress to the approximate width of the deployment bag.



S-fold the canopy by grasping at the lines of and folding it up approximately 10”.



Keeping everything contained, S-fold the canopy back on itself, back then forward. Tuck the remaining bit under.



## Packing Instructions for the ALS (Anti-Line- Slump) Bag.

Keep the canopy under control. Hold everything in place while sliding the ALS bag under the folded canopy with the 3 locking bungees toward the packing surface.

**Stowing the lines.** Make your first stow in the center inner rubber band....



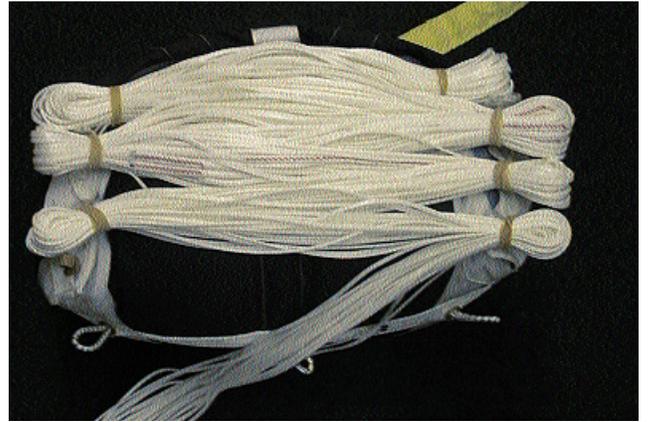
...then make the next two stows on each side....



...and then mate the Velcro sides of the bag.



Stow the remainder of the lines to within about 4 feet of the links.



Fold the ALS flap down over the suspension lines and lock it in place using the bungee loops and three bites of suspension line. Lock the center stow last.

Pull all of the Y-line out through the two grommets in the center of the bag.



### **Arming the Drogue.**

After the canopy has been jumped, several feet of deflation line will be protruding from the bridle of the drogue. Before the bag can be packed into the container, this line must be pulled back inside the bridle. This is done by grasping the drogue deployment pud (located at the apex of the drogue canopy) and extending the drogue bridle to its fullest length. Doing this will pull the deflation lines back inside the bridle.



### **Closing the Container.**

Place the deployment bag into the container, lines facing to the bottom, drogue bridle towards the reserve.



Using the 2 closing loops provided (1800 # Spectra), close the bottom and top flaps of the container with the flex pin or a temporary pin making sure the drogue bridle is routed out the center of the container.



## Assembling The Drogue Riser

### Note!

*Loop closest to the housing is loose and is a redundant safety feature on the two loop system.*

### **!WARNING!**

**Attach the 3-ring drogue riser assembly so that the Kevlar between the large ring and the ALS D-bag is on the reserve side of the drogue riser and away from the 3-ring. Route that portion of the bridle to the jumpers right side and down into the container.**

Pull the drogue riser up, allowing the containers to fold and exposing the riser. Assemble the 3-ring release by putting one of the ripcord cables through one end of the drogue riser thru-loop. The label should face reserve canopy. The thru-loop then goes through the grommet over the bottom ring, and back out through the other grommet. Now insert the other ripcord cable through the other end of the thru loop. Now slide the cables through the tape channels provided. Finally, insert the main closing flex pin into the flex pin housing.



Replace your temporary pins with the single flex pin and stow the assembled drogue riser down in the area between the main and reserve containers as shown.



Close the right, then left flaps with the flex pin. Stow the excess flex pin in the pocket provided as shown. Close the flex pin protector flap and stow in its pocket.



Route the bridle down the container on the right cover flap channel and close the bridle cover flap....

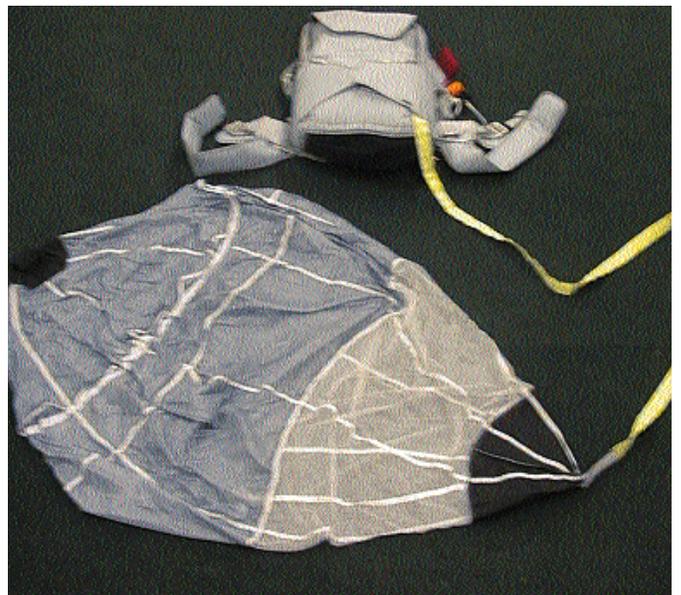


....and tuck into space provided.



### **Packing the Drogue**

Remove all the twists in the bridle, check to make sure the drogue is armed (page 25), and neatly lay the drogue out flat and smooth with the Velcro at the deployment pud facing upwards. If you do your folding near the bottom of the container you can easily gauge the final size of your folded drogue with the drogue pouch.



Make your first fold in the drogue, folding it approximately in half so the bottom of the base is even with the drogue pud (handle).



Fold the drogue again, approximately in half, so that the bottom of the drogue body is even with the top of the base.



Fold the base over the folded body exposing the drogue pud. Make about 3 S-folds with the bridle laying them on top of the base, leaving approximately 42” of unfolded bridle.



Now fold a small portion of the body over half the S-folded drogue bridle, again using the bottom of the container to gage the final size of your folded drogue.



Fold into thirds leaving the drogue pud in the center of the folded drogue.



Roll it up tightly from one side to the other. Remove any twists from the Kevlar bridle.



Stow the drogue in the pouch, stow the remaining bridle, and dress the main container assembly.

Stand the system up and close the riser covers making sure there is no riser or toggle material exposed. Inspect the entire assembly. **Count your tools.**



**Flat Pack Procedures for Packing the SET 400 and SET 360**  
(See page 18-19 for assembly and setting the brakes)

Flake out the canopy and lay on either side. Keeping the lines taut, S-fold the A line group onto the B line group and fold the nose under.



Flake the tail, one seam at a time, to the rear of the canopy so that its control lines lie along side of the D line slider stops.



Grasp the tail and fold it up onto the canopy. Make the fold at the “D” line point.



Pull the slider up to its stops and stow between the stabilizers.



Ensure that the slider pocket is routed forward of the slider and is exposed to catch air.



Continue folding the tail of the canopy toward the nose so that the “C”, “D”, and control line folds are laying against the “A” and “B” line folds.



Fold “A” and “B” lines over “C”, “D”, and control lines. Purge the air from the canopy and dress to the approximate width of the deployment bag.



S-fold the canopy by grasping at the lines of and folding it up approximately 10”.



Keeping everything contained, S-Fold the canopy back on itself, back then forward. Tuck the remaining bit under.

**Packing Instructions for the ALS (Anti-Line- Slump) Bag. Go to Page 23.**



## FAR 105.45

### THIS DATA CURRENT AS OF THE FEDERAL REGISTER DATED MAY 30, 2002 14 CFR - CHAPTER I - PART 105

#### **105.45 Use of tandem parachute systems.**

It is recommended that every user of the Strong Enterprises Dual Hawk Tandem become familiar with FAR part 105.45: Use of tandem parachute systems.

(a) No person may conduct a parachute operation using a tandem parachute system, and no pilot in command of an aircraft may allow any person to conduct a parachute operation from that aircraft using a tandem parachute system, unless:

(1) One of the parachutists using the tandem parachute system is the parachutist in command, and meets the following requirements:

(i) Has a minimum of 3 years of experience in parachuting, and must provide documentation that the parachutist--

(ii) Has completed a minimum of 500 freefall parachute jumps using a ram-air parachute, and

(iii) Holds a master parachute license issued by an organization recognized by the FAA, and

(iv) Has successfully completed a tandem instructor course given by the manufacturer of the tandem parachute system used in the parachute operation or a course acceptable to the Administrator.

(v) Has been certified by the appropriate parachute manufacturer or tandem course provider as being properly trained on the use of the specific tandem parachute system to be used.

(2) The person acting as parachutist in command:

(i) Has briefed the passenger parachutist before boarding the aircraft. The briefing must include the procedures to be used in case of an emergency with the aircraft or after exiting the aircraft, while preparing to exit and exiting the aircraft, freefall, operating the parachute after freefall, landing approach, and landing.

(ii) Uses the harness position prescribed by the manufacturer of the tandem parachute equipment.

(b) No person may make a parachute jump with a tandem parachute system unless--

(1) The main parachute has been packed by a certificated parachute rigger, the parachutist in command making the next jump with that parachute, or a person under the direct supervision of a certificated parachute rigger.

(2) The reserve parachute has been packed by a certificated parachute rigger in accordance with Sec. 105.43(b) of this part.

(3) The tandem parachute system contains an operational automatic activation device for the reserve parachute, approved by the manufacturer of that tandem parachute system. The device must--

(i) Have been maintained in accordance with manufacturer instructions, and

(ii) Be armed during each tandem parachute operation.

(4) The passenger parachutist is provided with a manual main parachute activation device and instructed on the use of that device, if required by the owner/operator.

(5) The main parachute is equipped with a single-point release system.

(6) The reserve parachute meets Technical Standard Order C23 specifications.

## MAINTENANCE

In packing and maintaining this system Strong Enterprises highly recommends you use the 25 jump inspection checklist on page 37. While conducting this inspection, keep in mind that an inspection does not make a parachute system airworthy. The inspection itself is useless unless any problems found are corrected.

1. **Harnesses** - (Instructor and student harnesses).

a. **Hardware** and attachment points. Inspect all hardware for rust that might inhibit the operation of the unit. Snap or “click” the gates open and closed on the B-12, butterfly and quick ejector snaps to verify the spring inside is still operational. Inspect the large RW-0 ring student side attachment point on the instructors harness to insure that the 4-point stitch is not unraveling. Inspect the tackings on the B-12 snaps.

b. **Drogue riser** - Tighten the screws on the separable L-link that attaches the drogue riser to the diagonal back straps. Insure that the tacking that attaches the ripcord cable housings to the drogue riser are secure and have not come loose. Inspect the drogue riser itself for cuts or frays in the webbing.

c. **Webbing** - Inspect all webbing on both harnesses for cuts or fraying. Inspect all 4 -points and single needle stitching to insure they are not unraveling. 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 ultra violet rays which can weaken the webbing substantially. This condition should be non-existent, considering all tandem system owners should protect their equipment from the sun when it is not being used.

2. **Container:**

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

b. Fabric condition - Look at the overall appearance of the Cordura® and binding tape looking for any holes, tears, or broken stitches in the fabric. Oil or grease spots can be removed with a laundry pre-soak detergent available at your local supermarket.

c. Velcro® - Mate all Velcro® to insure it stays secured, clean off any grass or dirt that might have accumulated on it. Worn out Velcro® should be replaced.

3. **Ripcords, 3-Ring Release handle, Cable Housings and cables:**

a. **Ripcords** - Inspect the ripcord pockets for wear, the ripcord handle should fit snug in the pocket. Inspect the ripcord cables for kinks, broken strands or rough areas. Check the tip of the cable to insure that no metal cable strands have become exposed. Inspect the reserve ripcord pins to ensure they are not bent.

b. **3-Ring release** - Inspect the release handle for kinks in the cable, or loose ends. Breakaway/drogue release handle (PN 862020) must be used on all Dual Hawk Tandems. Coated cables are obsolete.

c. **Cable housings** - 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. We have found that some curves can be carefully straightened, however if the cable shows signs of unraveling it should be replaced. Clean the stainless steel cables, the inside of the housings, and the braided cord loop 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](http://www.whitelightning.com)). About \$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 Cordura®.

ii) SuperLube with Teflon - This is a spray which 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 insure they are secure, replace tackings if loose.

#### 4. **Main Canopy:**

a. **Canopy 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. Inspect each panel for damage. Inspect the canopy for holes, tears and burns and repair as needed. Inspect the slider and bridle attachment point for wear.

b. **Lines** - Check for stretch or shrinkage. The tolerance for line length deviation is plus or minus 1 inch. 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 borderline. Inspect the bartacks at the links, at the cascades, and at the canopy attachment points.

c. **Risers** - Check housings installed in rear riser channels. ( If you do not have these housings you may contact Strong for options). Inspect the TVII webbing at the 3-ring for signs of wear. Any wear at this location can lead to riser failure. Inspect the stitching on the complete riser for unraveling. Inspect the stainless steel snap shackle to insure it functions properly. Inspect the #6 rapide links for cracks and tightness.

d. **Slider** - Inspect the fabric for holes or burns, repair as necessary. Inspect the grommets for burrs and separation, replace or reset if necessary. If your canopy has Vectran lines, check to be sure your grommets are stainless steel.

5. **Drogue, ALS Bag** - Starting at the top of the drogue and working down, inspect the canopy fabric for holes or tears, moving down to where the drogue canopy is attached to the bridle, inspect the bartacks for any unraveling. Inspect the whole bridle for loose stitching and signs of wear. Inspect the drogue 3-Ring attachment and the main closing pin attachment and Velcro®, replace or repair as necessary. Inspect the bartacks on the Y deflation line for unraveling and the deflation line itself for wear. 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. Inspect the shock cords, rubber bands, Velcro® and grommets on the deployment bag, replace if required.

6. **Master Reserve Canopy** - Inspect the reserve canopy, lines, bag, bridle and pilot chute at every 120 day repack cycle.

### EXPECTED SERVICE LIFE OF COMPONENTS

Harness/Container/Student Harness	2,000	Jumps
SET 400 main canopy	1200	Jumps
Master and T520 main canopies	1200	Jumps
Drogue	1200	Jumps
Lines on main canopy	400	Jumps
Master Reserve Canopy	20	Rides

## 25 JUMP INSPECTION CHECK LIST

### **Harnesses:**

- q Hardware functional and tacked (leg strap B-12s).
- q Return springs on snaps still functional.
- q Drogue riser L-link screws tight.
- q No cuts, fraying or broken stitches on webbing.

### **Container:**

- q Grommets secure and in place.
- q No holes in Cordura®.
- q No broken stitches.
- q Velcro® is clean and in place.
- q Student side attachments are secure with no broken stitches.
- q Housings securely tacked.
- q Drogue pouch secure, no holes.

### **Ripcords and 3 Ring Release Handle:**

- q No kinks or frays in ripcord cables.
- q Terminal balls are secure.
- q Pins straight.
- q No kinks, dents or loose strands in the 3-ring release cable. Remove and clean cables.

### **Main Canopy:**

- q No holes or tears in the fabric, stitch integrity good.
- q No excessive wear or stretching/shrinkage of the lines.
- q No broken stitching at cascade line junction.
- q No cracks in rapide links.
- q Swedish link good.
- q No holes in slider, stitching good, no burrs on grommets.
- q Grommets secure.

### **Drogue and Main Bag:**

- q Reinforcing tape on drogue body good.
- q Stitching and zig zag at base of drogue canopy complete.
- q No holes or excessive wear in the bridle.
- q No excessive wear and no twists in the Y deflation line.
- q Bungees not broken or frayed, and not stretched out longer than 3”
- q Grommets secure.

**PRODUCT SERVICE BULLETIN #22**  
**20 February 1997**

- A) Dual Hawk Tandem, Use of Unapproved Components**
- B) Dual Hawk Tandem Service Life**

**STATUS: Mandatory compliance.**

**COMPLIANCE DATE: 20 May, 1997.**

**IDENTIFICATION:**

**Dual Hawk Tandem Systems; PN 103000 through 103005 (Dwg No. 1151 & 68E10001).**

**BACKGROUND:**

- A) Strong Enterprises has determined that Dual Hawk Tandem Systems with components not approved by Strong Enterprises present a hazard that is not acceptable for tandem jumping.**
- B) The rapid improvements of the Dual Hawk Tandem System have shown considerable safety enhancements. It is also evident that most systems older than eight years have considerable wear and deterioration with loss of performance and could pose a threat to the users.**

**SERVICE BULLETIN:**

- A) Only components approved by Strong Enterprises may be used on the Dual Hawk Tandem System for tandem jumping.**
- B) All Dual Hawk Tandem Systems shall have a service life of eight years from date of manufacture or be returned to Strong Enterprises for reinspection and recertification. It may then be placed back into service for five years.**

**This service bulletin does not change the requirements for periodic inspections and maintenance as outlined in the FAA Exemption or manufacturers instructions.**

**DISTRIBUTION:**

**All Dual Hawk Tandem System owners, national aero clubs, PIA, USPA, Skydiving, Parachutist.**

**Explanation for:**

**PRODUCT SERVICE BULLETIN #22**  
**20 February 1997**

**A) Dual Hawk Tandem, Use of Unapproved Components**  
**B) Dual Hawk Tandem Service Life**

Strong Enterprises has taken a proactive step to ensure public safety and the safety of our certified tandem instructors by issuing Service Bulletin 22 on 20 February 1997 (attached).

The purpose of Bulletin 22 is to assure that Dual Hawk Systems more than 8 years old are still safe to use, and components that Strong Enterprises has not tested or approved as being compatible are not being used in these systems.

Dual Hawk Tandem Systems that are not in compliance with Bulletin 22 are considered by Strong Enterprises to be un-airworthy. Therefore, the TSO on that system is void and any tandem jumps made on these systems are made in violation of FAR 105.43 (a).

Any Strong Enterprises certified tandem instructor who enters into an aircraft with the intention of making a tandem jump, and the Dual Hawk System he intends using on that jump is not in compliance with Strong Enterprises Bulletin 22, has automatically voided his Strong Enterprises tandem instructor certification and that jump will be made in violation of FAR 105.43 (a) and Strong Enterprises' tandem exemption.

The appropriate FAA FSDO offices will be notified of the serial number, location, and owner of all Dual Hawk Tandem Systems that are not in compliance with Bulletin 22. In consideration of the liability exposure of USPA, a copy of notices related to Bulletin 22 will be forwarded to USPA.

Compliance with Bulletin 22 is quite simple:

1. Use only manufacturer approved components in your Dual Hawk system.
2. If a Dual Hawk system is more than 8 years old, return it to Strong Enterprises for inspection, refurbishing if needed, and recertification as airworthy.

Recertified components are marked:

1. Hrn/con.: Labels sewn on the horizontal back strap of the passenger hrn., inside the main container, and on the front left reserve riser.
2. The main and reserve canopies: A label sewn onto the tail seam.

# Line installation SET 400 main canopy

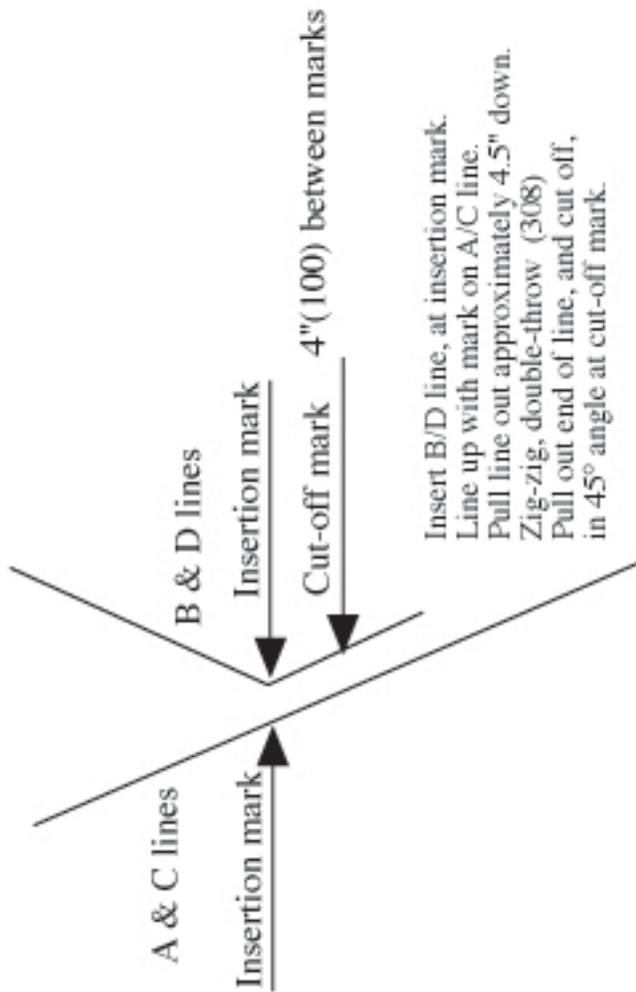
Canopy PN 411540

Line set PN 865053(Spectra®lines)

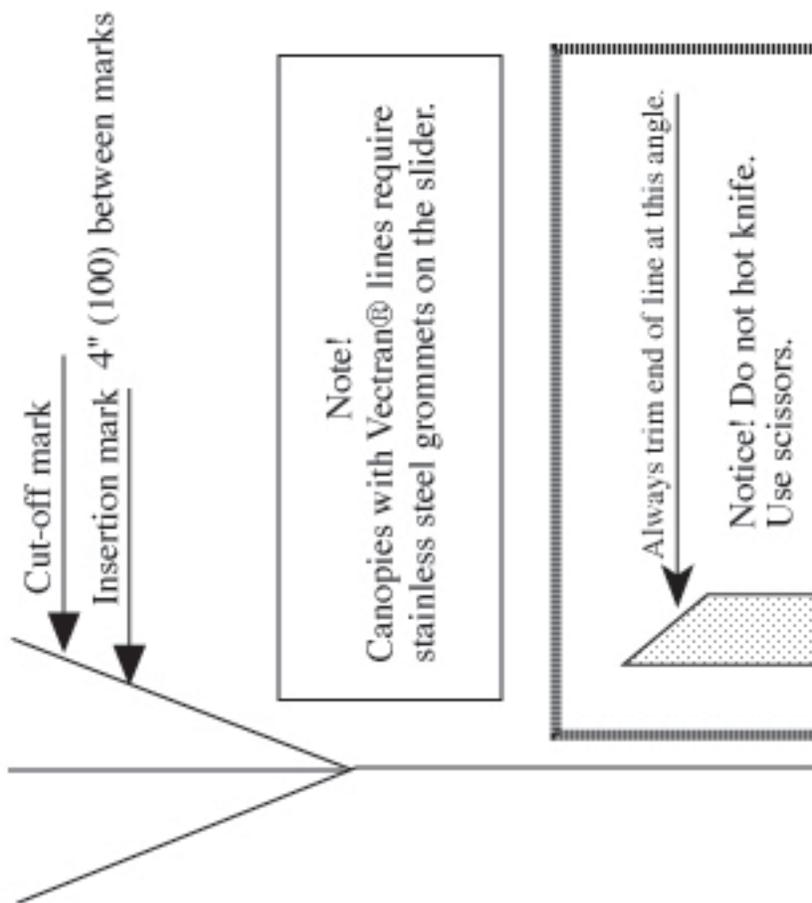
Color codes on suspension lines:

- A- Green
- B- Blue
- C- Black
- D- Red

## Suspension lines SET 400



## Control lines SET 400 E1 and E2 (two uppers)



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11236 SATELLITE BLVD  
ORLANDO, FL 32837  
Tel 407 859 9317  
Fax 407 850 6978  
sales@strongparachutes.com  
www.strongparachutes.com



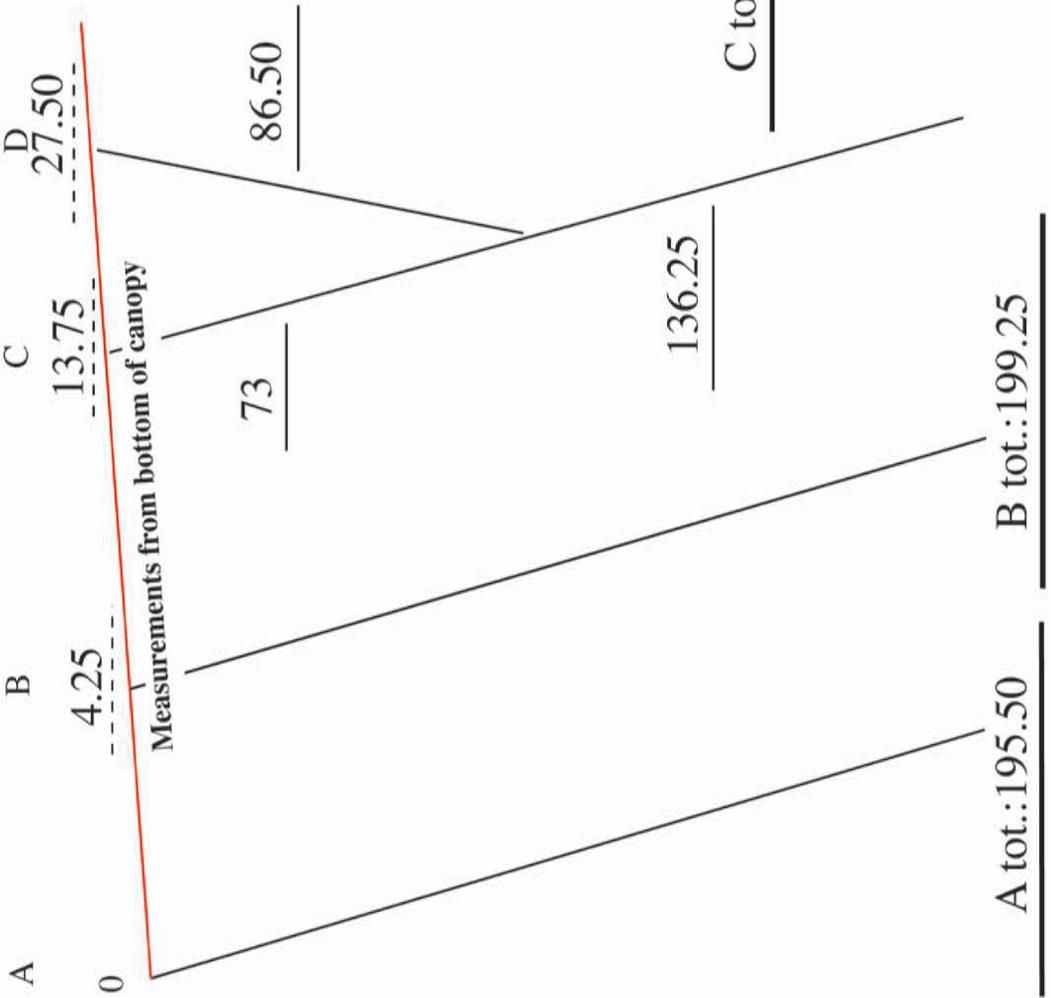
# SET 400 main canopy. Trim and line length, inner lines.

Canopy PN 411540

Ribs no. 4,5,6,7.

Measurements are installed on canopy.

Trim over A-line (0-point) with brakes set.  
Trim measurements underlined with dotted line.



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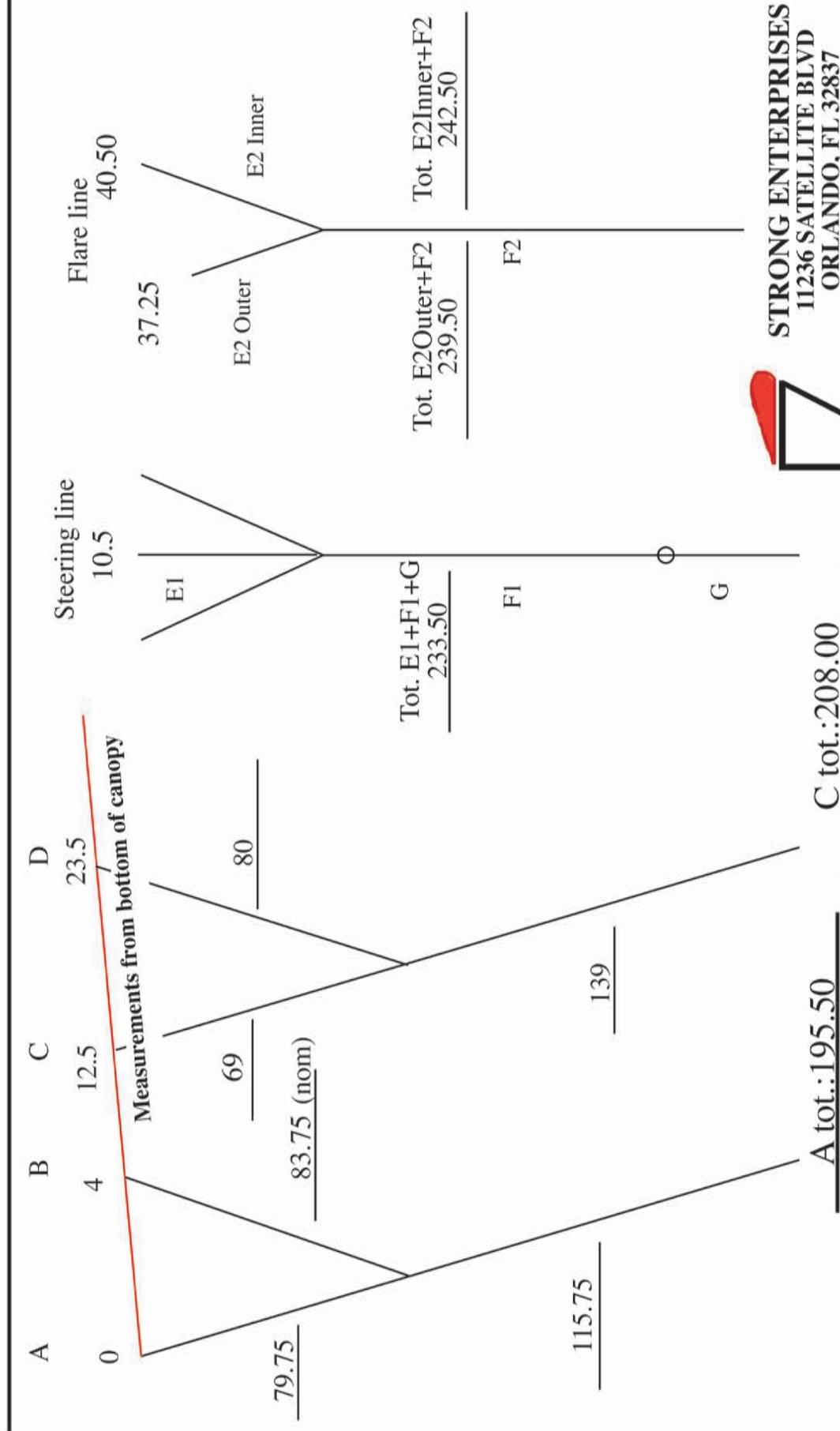
# SET 400 main canopy. Trim and line length, outer lines.

Canopy PN 411540

Ribs no. 1,2,3,8,9,10.

Measurements are installed on canopy.

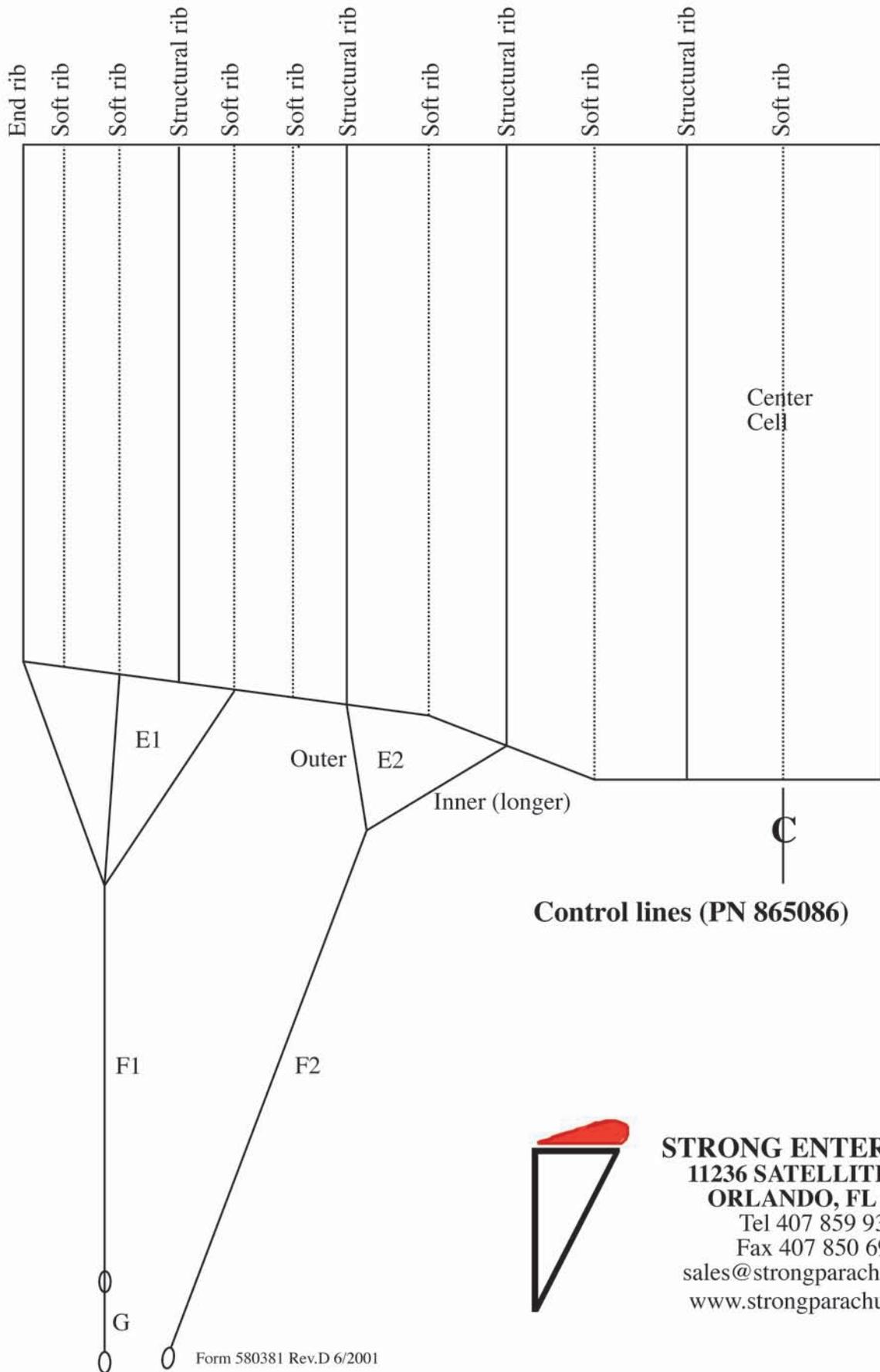
Trim over A-line (0-point) with brakes set.



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# Control line attachment SET 400



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# Line installation SET 360 main canopy

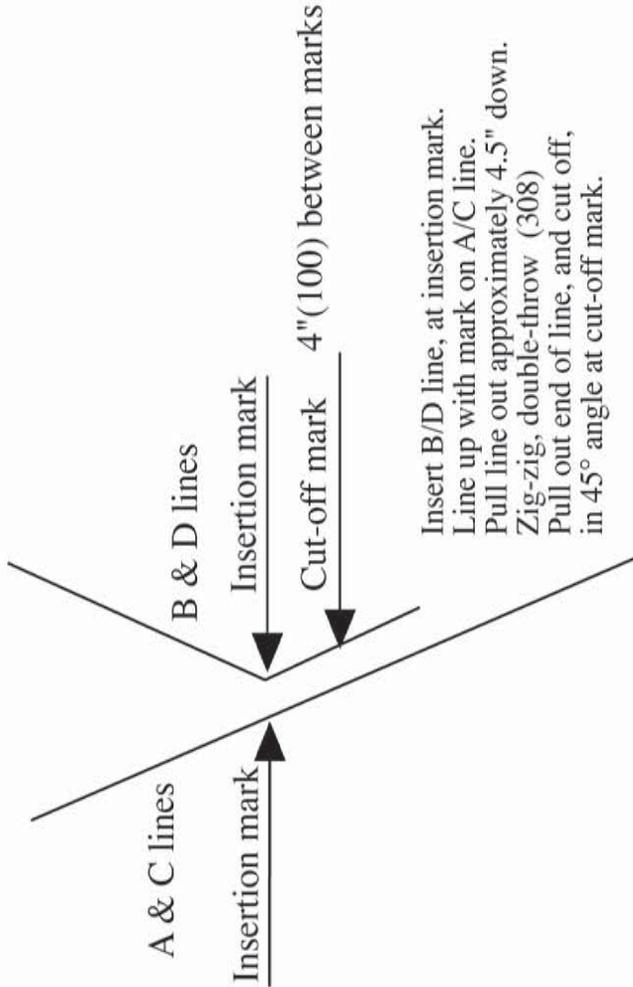
Canopy PN 411536

Line set PN 865327 (1500 Spectra@lines)

Color codes on suspension lines:

- A- Green
- B- Blue
- C- Black
- D- Red

## Suspension lines SET 360

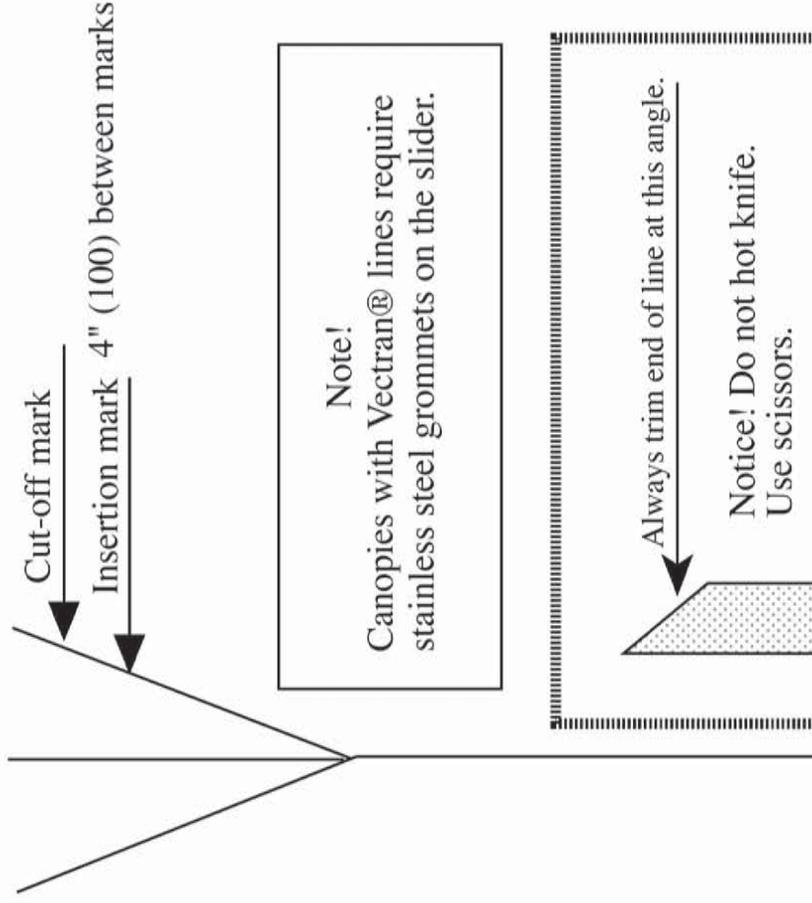


Insert B/D line, at insertion mark.  
 Line up with mark on A/C line.  
 Pull line out approximately 4.5" down.  
 Zig-zig, double-throw (308)  
 Pull out end of line, and cut off,  
 in 45° angle at cut-off mark.



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## Control lines SET 360 E1 and E2 (two uppers)



Note!

Canopies with Vectran® lines require stainless steel grommets on the slider.

Always trim end of line at this angle.  
 Notice! Do not hot knife.  
 Use scissors.

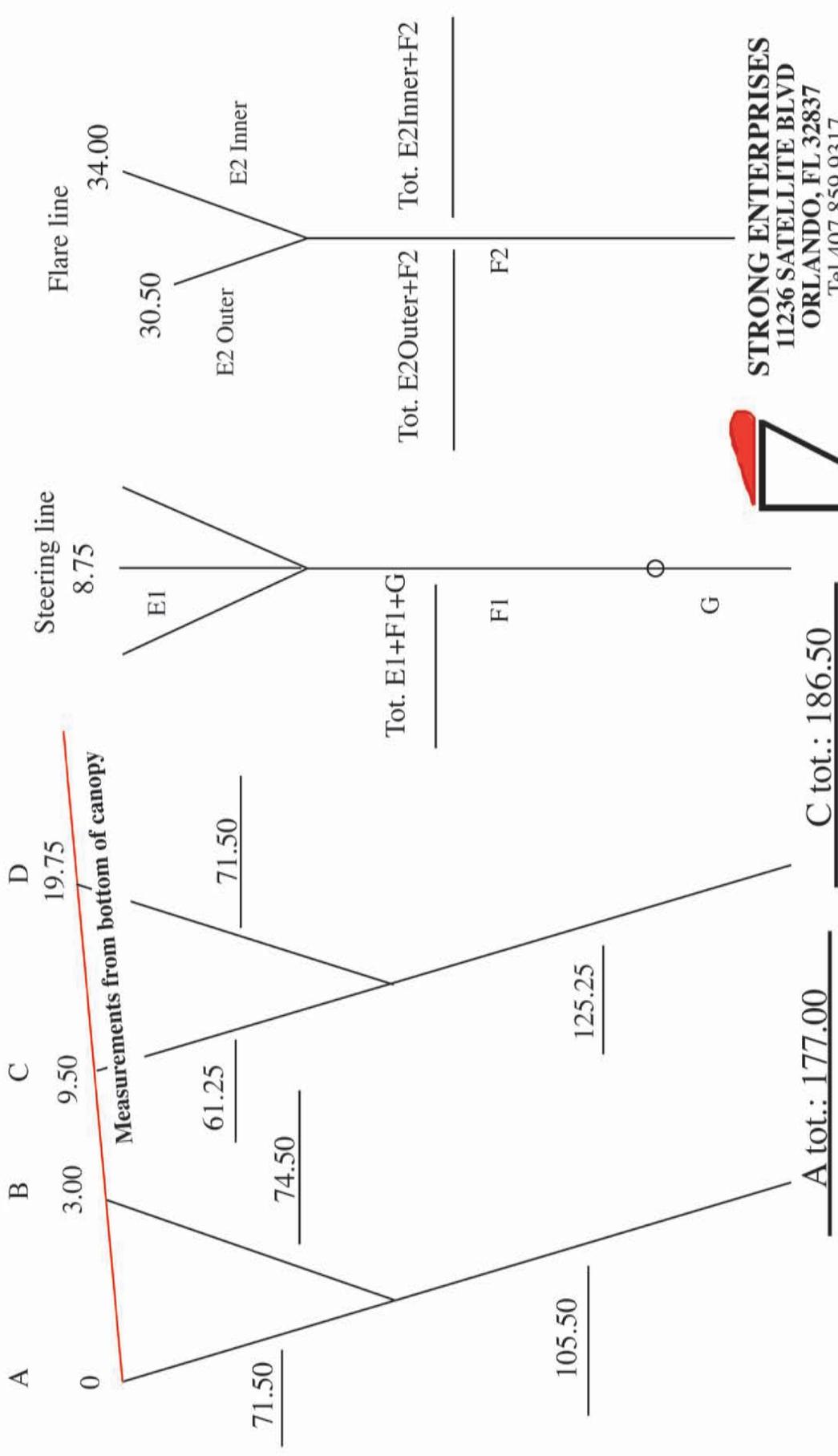
# SET 360 main canopy. Trim and line length, outer lines.

Canopy PN 411536

Ribs no. 1,2,3,8,9,10.

Measurements are installed on canopy.

Trim over A-line (0-point) with brakes set.



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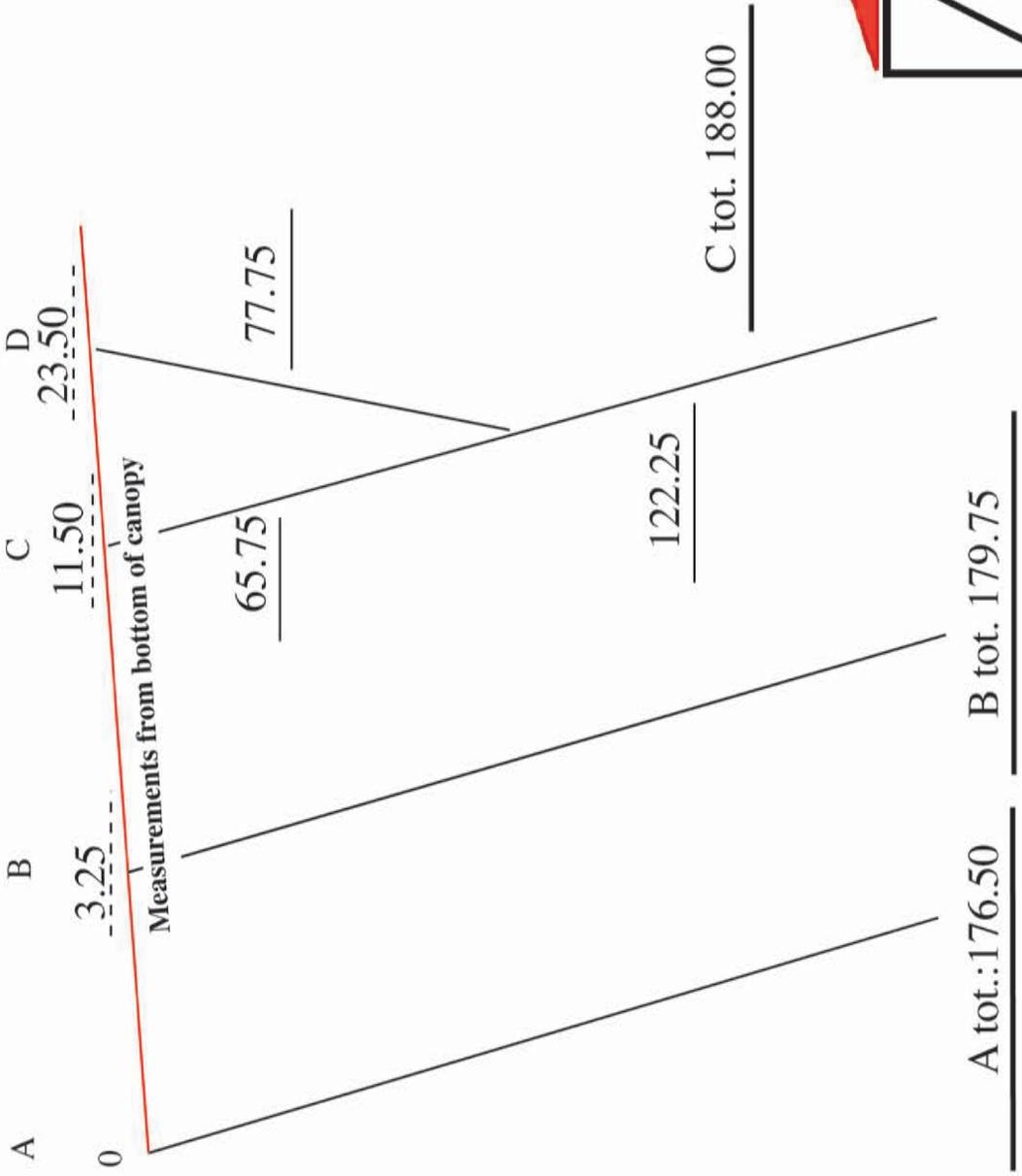
# SET 360 main canopy. Trim and line length, inner lines.

Canopy PN 411536

Ribs no. 4,5,6,7.

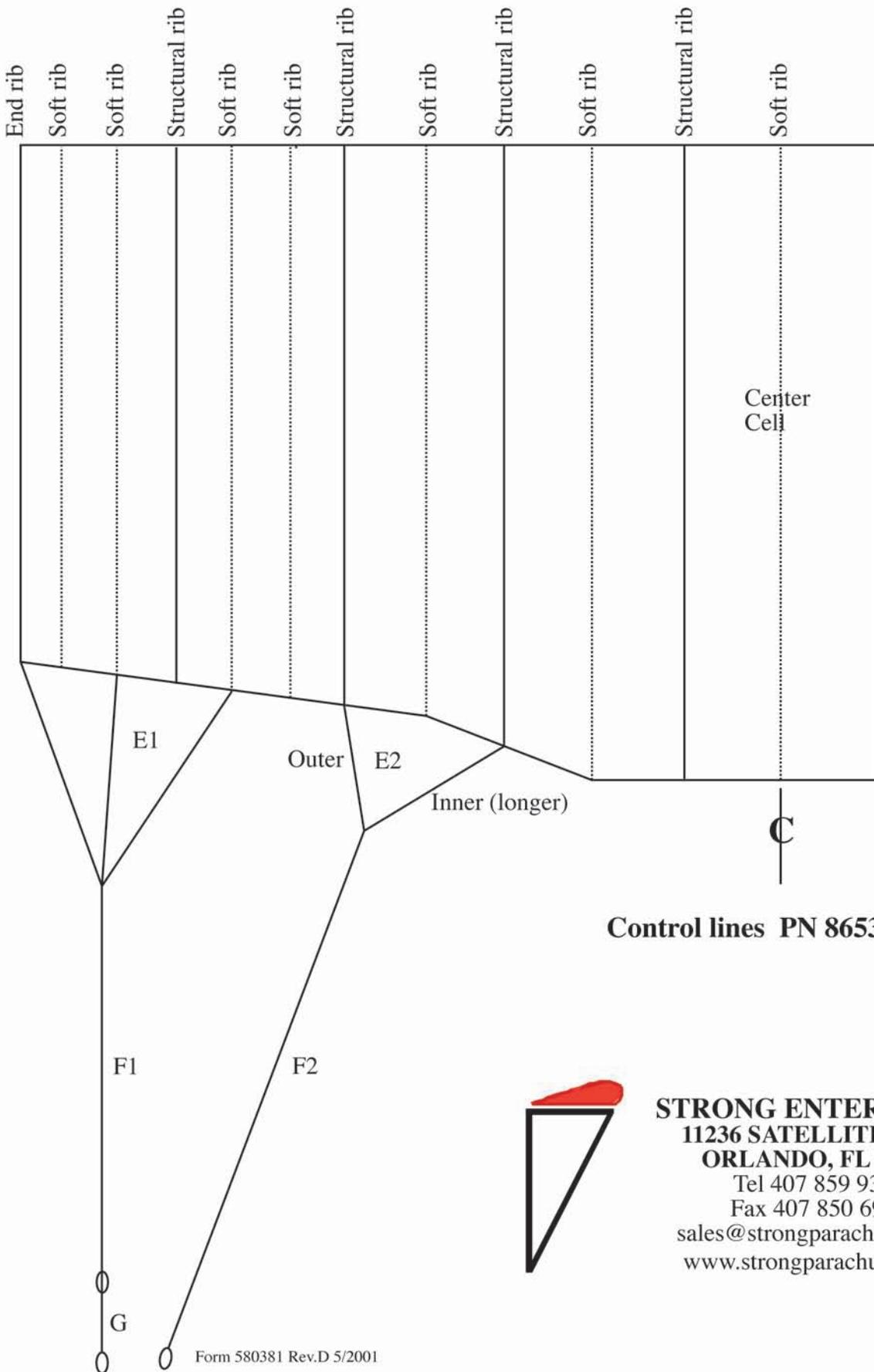
Measurements are installed on canopy.

Trim over A-line (0-point) with brakes set.  
Trim measurements underlined with line.



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# Control line attachment SET 360



**Control lines PN 865327**

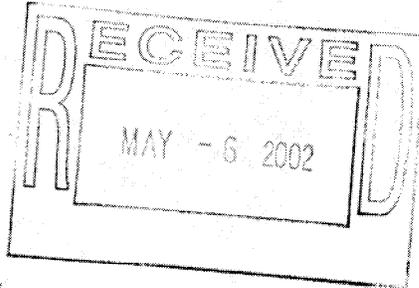


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U.S. Department  
of Transportation  
**Federal Aviation  
Administration**

Small Airplane Directorate  
Atlanta Aircraft Certification Office  
One Crown Center  
1895 Phoenix Boulevard, Suite 450  
Atlanta, GA 30349



May 2, 2002

Mr. Edward Strong  
Strong Enterprises  
11236 Satellite Blvd.  
Orlando, Florida 32837

Dear Mr. Strong:

This is in response to your April 4, 2002 letter requesting authorization to upgrade the placard speed range of the Master Reserve Canopy from 130 knots to 175 knots. The revised placard is shown on Drawing 280304, Revision B, dated April 24, 2002, submitted by your letter of April 24, 2002.

Based upon the data submitted we approve the increase in the placard speed range as shown on Drawing 280304, Revision B. This placard is approved for installation on the Master Reserve Canopy, p/n 430085. A stamped copy of the drawing is provided for your files.

We remind you that your responsibilities as a holder of a TSO authorization are outlined in 14 CFR, subpart 21.3 and 14 CFR, part 21, subpart O. Any design change made to the TSO'd item must be forwarded to this office as outlined in 14 CFR, part 21.611, with minor change submittal intervals not to exceed six months.

The Aerospace Engineer for this authorization is Don Young, telephone number (770) 703-6079. The Technical Information Specialist is Lorraine Bush, telephone (770) 703-6044.

Sincerely,

for Curtis A. Jackson,  
Associate Manager,  
Atlanta Aircraft Certification Office



U.S. Department  
of Transportation  
**Federal Aviation  
Administration**

Central Region  
Atlanta Aircraft Certification Office  
1075 Inner Loop Road  
College Park, Georgia 30337

FEB 27 1985

Mr. Edward Strong  
President  
Strong Enterprises  
11236 Satellite Blvd.  
Orlando, Florida 32809

Dear Mr. Strong:

This is in response to your July 31, 1984, request for Federal Aviation Administration (FAA) authorization to identify the Strong Enterprises' Dual Hawk Tandem System, Part Number 1165-4, in accordance with the requirements of Federal Aviation Regulation (FAR) Part 21, Subpart O, Technical Standard Order (TSO) C23b.

We find your Statement of Conformance, dated July 31, 1984, and your Quality Control Manual, dated July 1981, acceptable.

The following data, submitted with your July 31, 1984, letter will be retained on file for this authorization:

1. Statement of Conformance, dated July 31, 1984.
2. System Drawing for Hawk Tandem System, dated July 31, 1984.
3. Drop Test Summary Sheet, dated July 31, 1984.

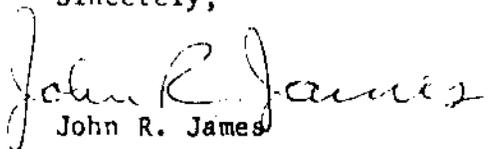
Effective this date, you are authorized to identify the Strong Enterprises' Dual Hawk Tandem System, Part Number 1165-4, with the applicable TSO markings required by FAR 21.607(d).

This authorization is not transferable to another person or location and is effective until surrendered, withdrawn, or otherwise terminated by the Administrator.

Your responsibilities as a holder of a TSO authorization are outlined in FAR 21, Subpart O and FAR 21.3.

The TSO Specialist for your program is Jerry Boutwell, telephone (404) 763-7407.

Sincerely,

  
John R. James

Manager, Atlanta  
Aircraft Certification Office



Edward Warren: First American Aloft

