

Butler Parachute Systems

SMART

Small-unit Modular Aerial Re-supply Technology

CHUTE

Roanoke, Virginia USA



OPERATIONS MANUAL

MANUAL OVERVIEW

The information contained in this manual will provide you with the basic information you need to assemble and use your SMART CHUTE™ aerial delivery system. In addition, this manual also contains tables to assist you with your airdrop planning, and suggested airdrop procedures. Should you have any questions, please feel free to contact us for assistance.

This manual does not cover all the possible situations that may arise. Remember, there is no substitute for common sense.

SMART CHUTE™ COMPONENTS

Prior to assembling your SMART CHUTE™ air delivery system, make sure you have all of the required components: 1. Correct size barrel, 2. Barrel sling, 3. Connector link (various types), 4. Parachute assembly (canopy, riser, deployment bag, and container).



PLANNING YOUR AIRDROP

YOUR OVERALL PLAN

Several factors must be considered when planning an aerial supply; many supply drops have failed because a seemingly minor detail was overlooked. Plan your drop in detail, then take a good look at your plan again. Have you missed anything? For example, a supply drop in 1991 was delayed because an item to be dropped did not fit through the aircraft door. A simple oversight, but a costly oversight nonetheless.

First and foremost are your aircraft capabilities. What is its maximum payload? Will your airdrop items fit into the cargo area? Will your required fuel load allow you to carry all of your supplies in one lift? And, yes, will your airdrop bundles fit through the door? Basically, take a good look at your aircraft; can it support your requirements?

Second, what are you planning to drop? Will it fit into the barrel you have selected and does it fit within the maximum weight of the parachute? How fragile is it? Are you going to be dropping it in water? If so, you can not exceed the maximum displacement of your barrel.

Finally, comes the human factor. The barrel weight may be below maximum recommended weight, but will your aircrew be able to move it around inside the aircraft and perform the drop? If not, you need to add an extra crewmember, and their weight will need to be subtracted from your aircraft's available payload capability. 150 pounds is about the most one person can safely handle in flight and control at the door.

ORGANIZING AND IMPLEMENTING YOUR DROP

Prior to deciding what to place in each barrel you plan to drop, first determine what rate of descent is required. Bulk food (grain, etc.) and clothing can tolerate nearly any impact under 30 ft/sec provided the container is appropriate for such an impact. Machinery and electronics (pumps, generators, radios, etc.) should generally be dropped at 15 ft/sec or less (on land). Use the table on page 5 to determine the rate of descent at various weights for each of the canopies in the SMART CHUTE™ system.

After determining what gross weight/parachute combination will produce your desired rate of descent, you can now determine the amount of cargo for each barrel. Keep in mind, however, that the gross weight must include the weight of the empty barrel, the barrel sling, the parachute, and any padding you might need to protect your cargo.

If possible, use any soft items that are being dropped (such as blankets) to pad the remaining items in the barrel. Also, after packing your airdrop items into the barrels, fill any remaining space with padding; items that are allowed to move around may become damaged during landing.

CALCULATING YOUR SMART CHUTE™ BARREL WEIGHT

BARREL WEIGHT LIMITATION EXAMPLE:

In this example you have been tasked to airdrop the following supplies in support of hurricane relief efforts:

- | | |
|----------------------------|-----------------------------|
| 1. Blankets (26 lbs.) | 4. Trash bags (4 lbs.) |
| 2. Plastic tarps (11 lbs.) | 5. Paper plates (3 lbs.) |
| 3. Rope (15 lbs.) | 6. Emergency radio (3 lbs.) |

You have a 30 Gallon SMART CHUTE™ barrel with sling, a 24.5' Medium Duty LoPo Canopy, and desire a 15 ft/sec rate of descent due to the emergency radio you will be dropping.

Utilizing the tables on pages 5 & 6, compute your barrel weight limitations.

Under LIMITATIONS:

- Enter the type of parachute canopy you are using.
- Enter your desired rate of descent.
- Refer to the Rate of Descent vs. Weight table on page 5. By entering the table at the 15 ft/sec line and following it across to where it intersects with the 24.5' LoPo line, you will find that the Maximum Gross Weight will be 100 LBS. Enter 100 in row "C".

Under COMPONENT WEIGHTS:

- Enter your empty barrel weight (Table #3) in row "D".
- Enter your barrel sling weight (Table #4) in row "E".
- Enter your parachute weight (Table #1) in row "F".
- Enter the weight of any padding you will use in row "G".
- Total rows "D" through "G" and enter the total in row "H".
- Subtract row "H" from row "C" and enter the amount in row "I". This amount is the maximum cargo weight that can be placed in the barrel to achieve a 15 ft/sec rate of descent.

Under CARGO WEIGHTS:

- Enter the description and weight of each item to be dropped.
- Add the weight of all the items.
- As long as the TOTAL CARGO WEIGHT is less then the MAXIMUM CARGO WEIGHT you will not exceed your desired rate of descent.
- Adding the TOTAL CARGO WEIGHT to the TOTAL COMPONENT WEIGHT will give you your TOTAL LOADED BARREL WEIGHT. Mark each barrel with the total weight.

LIMITATIONS		
A.	Parachute Canopy:	24.5 lopo
B.	Desired Rate of Descent:	15
C.	Maximum Gross Weight:	100

COMPONENT WEIGHTS		
D.	Barrel Weight (Empty)	13
E.	Barrel Sling Weight:	1
F.	Parachute Weight:	7
G.	Padding:	0
H.	TOTAL COMPONENT WEIGHT:	21

I.	MAXIMUM CARGO WEIGHT: (Subtract H from C)	79
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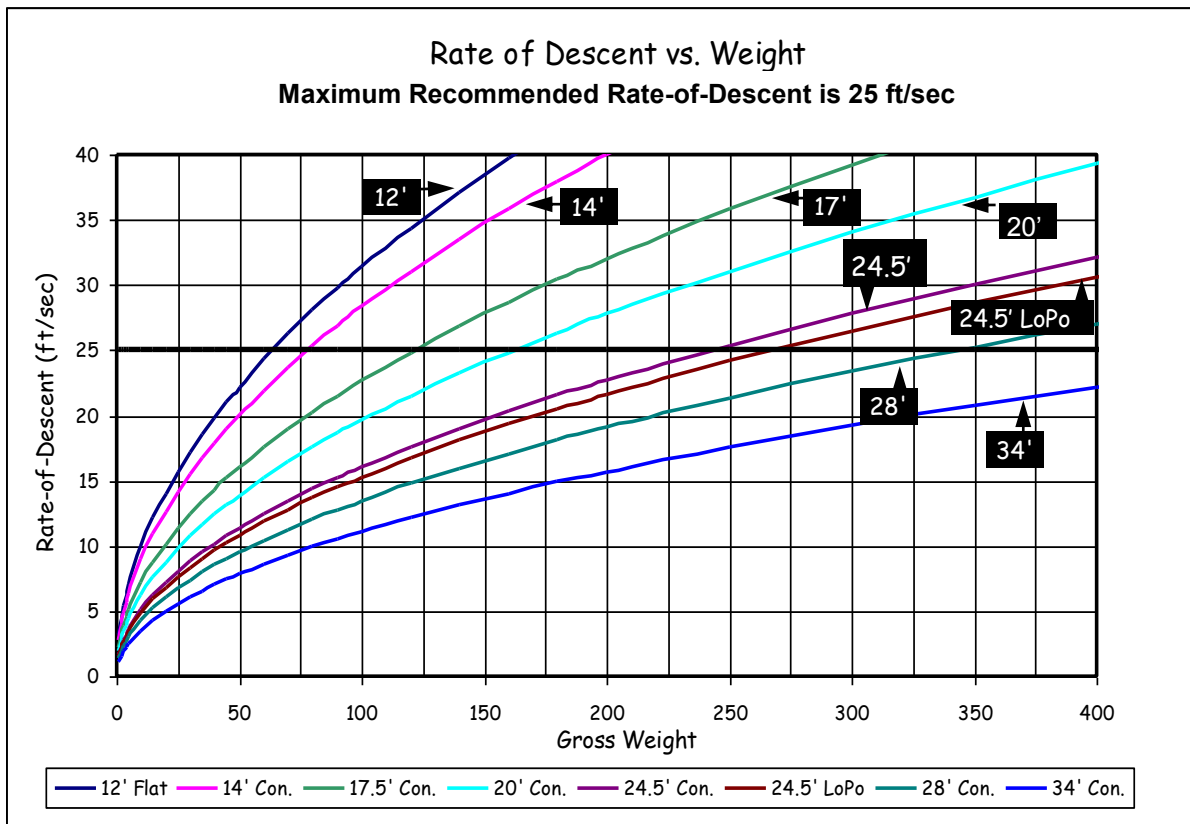
CARGO WEIGHTS		
ITEM #	DESCRIPTION	WEIGHT
1	Blankets	26
2	Plastic Tarps	11
3	Rope	15
4	Trash Bags	4
5	Paper Plates	3
6	Radio	3
7		
8		
9		
10		

TOTAL CARGO WEIGHT:	62
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TABLE # 1

Canopy Trade Name	Average Canopy Weight	P/N	Maximum Rec. Weight
12' Medium Duty Flat Circular Cargo Canopy	3.3 lb.	3120	64
14' Medium Duty Conical Cargo Canopy	3.5 lb.	3123	78
17.5' Medium Duty Conical Cargo Canopy	4.1 lb.	3117	122
20' Medium Duty Conical Cargo Canopy	5.3 lb.	3121	162 lb.
24.5' Medium Duty Conical Cargo Canopy	6.4 lb.	3116	243 lb.
24.5' Medium Duty LoPo Conical Cargo Canopy	6.4 lb.	3119	268 lb.
28' Light Duty Conical Cargo Canopy	6.7 lb.	3109	322 lb.
28' Medium Duty Conical Cargo Canopy	7.8 lb.	3110	322 lb.
34' Medium Duty Conical Cargo Canopy	10.0 lb.	3124	475 lb.

TABLE # 2



MAXIMUM RECOMMENDED DEPLOYMENT SPEEDS FOR ALL CANOPIES IS 130 KTS

TABLE #3

BARREL SIZE	VOLUME	EMPTY WEIGHT	BOTTOM DIAMETER	TOP DIAMETER	HEIGHT	FRESHWATER DISPLACEMENT
14 GAL	1.8 FT ³	8 LB.	12.9"	14.0"	26.0"	116 LB.
30 GAL	4.0 FT ³	13 LB.	17.1"	19.1"	29.5"	249 LB.
55 GAL	7.3 FT ³	21 LB.	19.8"	22.1"	38.0"	456 LB.

TABLE #4

SLING SIZE	SLING WEIGHT
14 GAL	1.8 LB.
30 GAL	2.4 LB.
55 GAL	2.8 LB.

ASSEMBLING THE SMART CHUTE™ SYSTEM

INSTALLING THE BARREL SLING

1. Remove the sling from bag and lift by the intersection of the bottom cross straps. With the sling properly oriented (THIS SIDE OUT markings on the outside), position the sling over the inverted barrel and begin sliding the sling over the barrel.



2. Continue placing the sling over the barrel, ensuring the webbing is not twisted and the vertical webbing is straight.



3. With the intersection of the bottom cross strap centered on the bottom of the barrel, position the rest of the sling into place on the barrel.



4. Place barrel right side up, let the sling fall to the floor, and remove the barrel lid. You are now ready to load your airdrop items into the barrel.



PREPARING THE SMART CHUTE BARREL FOR DROP

1. After replacing the barrel lid and locking clamp, pull the barrel sling back towards the top of the barrel and thread the long cross strap through the adjuster on the short cross strap.



2. Thread the long cross strap through the adjuster and pull the cross strap tight.



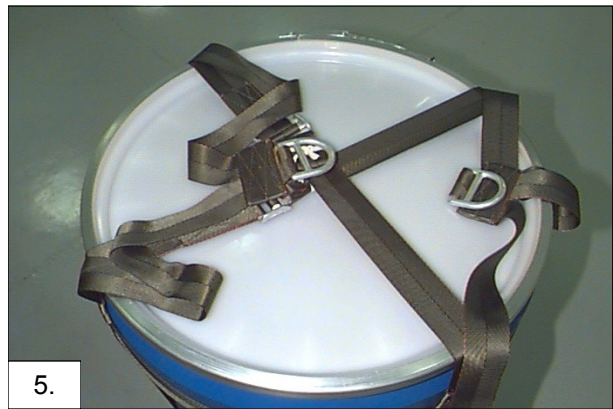
3. Attach the other cross strap in the same manner as the first.



4. "S" fold the excess cross strap and tie in place with 80 lb cotton tape. You may also secure the ends with duct tape (100 MPH tape) or other suitable means.



5. Bring one of the barrel sling extensions up and place the "D" ring in the center of the barrel.



6. Leaving the "D" ring in position, "S" fold the barrel sling extension on top the the cross strap.



7. Tie the "S" folded sling extension with 80 lb cotton tape, duct tape (100 MPH tape), or other suitable means.



8. "S" fold the other half of the sling extension and tie in place.



9. Repeat steps 7 & 8 with the other sling extension. You are now ready to attach the parachute.



10. Place the connector link onto the "D" ring on the end of the parachute riser.

NOTE: Connector links styles may vary.



11. Pass both of the barrel harness "D" rings through the connector link and close the link.

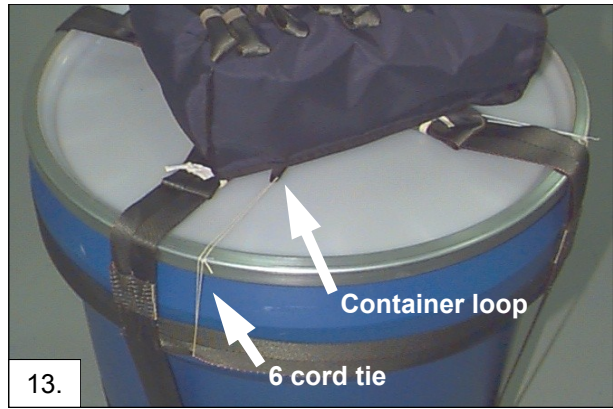
WARNING: FINGER TIGHTEN ONLY!
The person on the ground might not have a wrench.



12. Position the parachute on top of the "D" rings.



13. To prevent shifting of the parachute during handling, the container may be tied to the barrel sling with lightweight cord, such as cotton 6 cord. Route the cord through the loops on the bottom of the container and around the sling webbing. NOTE: This cord must be of a light enough weight so as to break during the parachute deployment.



This barrel is now ready to be dropped. Be sure to mark the total barrel weight where it is clearly visible.

PERFORMING THE DROP

Prior to loading the aircraft, perform an airdrop preflight inspection:

1. Inspect the door opening for any sharp edges that could possibly cut the static line during deployment. Either file the edges smooth or cover with numerous layers of duct tape.
2. Determine your static line attachment point. In most cases, you can attach the static line to the same rings that are used for seat belts. However, if no seat belt rings are available, the static line may be attached directly to the aircraft frame. **WARNING: DO NOT USE THE PILOT SEAT FRAME AS AN ATTACHMENT POINT!**
3. Determine the correct static line length. The SMART CHUTE™ system utilizes a dual length static line that allows the static line clip to be positioned at either 10 or 15 feet. During deployment, the deployment bag must not be able to reach any control surfaces. Measure the distance from your static line attachment point to the aircraft's rear control surfaces. If it is less than 15 feet, the static line clip **MUST** be positioned at 10 feet. Note: If using the 10 foot position, the remaining 5 feet of the static line may be cut off if desired.
4. Determine the cargo tiedown points. After loading, the airdrop items must be secured to prevent shifting inflight.
5. Determine the order of loading to comply with any aircraft Center of Gravity limitations.
6. Ensure any required equipment is on board. As a minimum, you should have two Wind Drift Indicators (streamers) and a hook knife to cut the static line if needed. A bailout parachute for the Pilot(s) and Loadmaster is recommended.
7. Load the aircraft and secure all cargo. Remember, if making multiple passes, the first barrel out will be the last to be loaded.

CALCULATING YOUR CARP

Due to various wind conditions at different altitudes, it is highly unlikely that an airdrop bundle released directly over the intended Point of Impact (PI) will in fact land on the PI. Therefore, prior to making an actual drop, you must first determine the Computed Airdrop Release Point (CARP). A "Streamer Pass", in which a 20 foot long streamer (available from BPS) is thrown from the aircraft prior to the actual drop, will help determine your CARP. Note: Most of the equipment combinations offered in the SMART CHUTE™ Airdrop System can be safely dropped at 300' to 500' AGL. However, keep in mind the total operational situation – don't fly up a box canyon, for example.

1. Heading into the wind, fly directly over the desired PI at the desired drop altitude.
2. As you pass directly over the PI, throw the streamer from the aircraft and notify the Pilot "Streamer Away." Upon hearing the "Streamer Away" call, the Pilot must begin a left or right turn to allow you to keep the streamer in sight as it floats towards the ground. **DO NOT LOSE SIGHT OF THE STREAMER!**
3. Watch where the streamer lands on the ground (it descends approximately 18 ft/sec). Visualize an imaginary line from that point extending through the PI. Follow that imaginary line the same distance past the PI as the streamer landing point was prior to the PI. That will be your CARP. An airdrop bundle released at this point should land on or near your desired PI. For example, if the streamer lands 150 yards short and 30 yards to the right of the desired IP, the CARP will be 150 yards past, and 30 yards to the left of the IP. See Figure 1.

4. Keep in mind, if you are making multiple passes to drop your cargo, that if the wind speed or direction make any major changes, you must recalculate your CARP. Also, should the first bundle not land where you desire, adjust your CARP as needed.
5. After making the streamer pass and calculating your CARP, the actual drop passes should be flown with the aircraft headed over the streamer landing point and the IP. See Figure 2.

Figure 1.

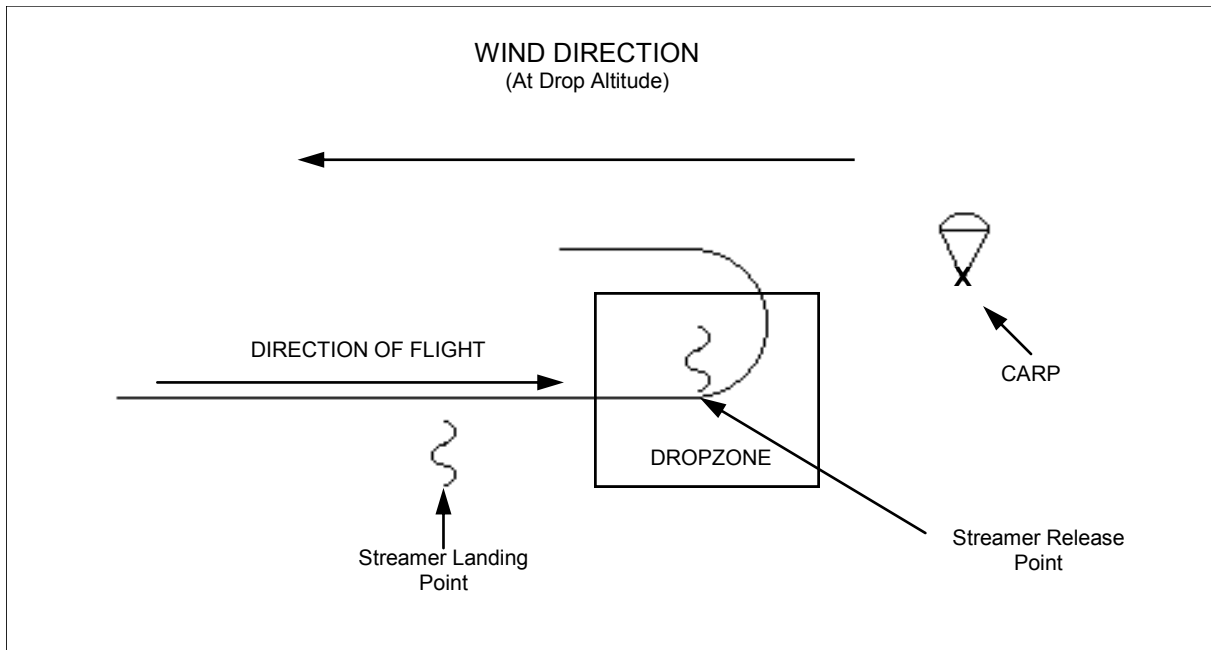
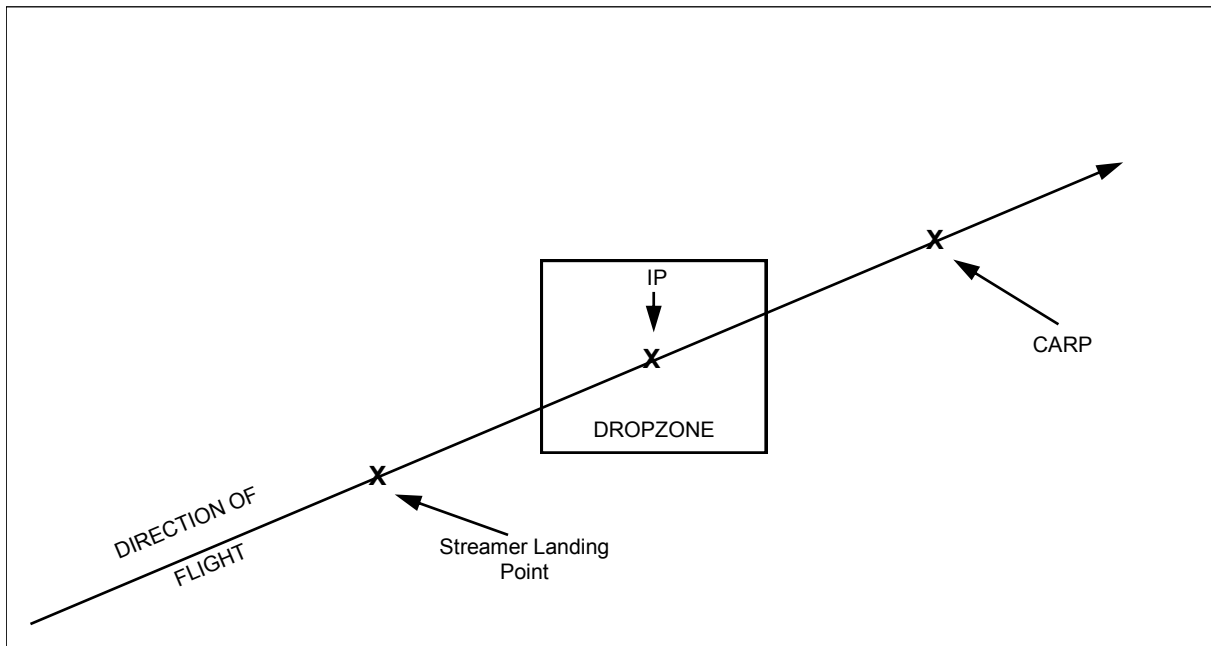


Figure 2.



INFLIGHT DROP PROCEDURES

After calculating your CARP, determine who will call the release, and prepare the first barrel for drop:

1. Remove all tiedowns from the barrel to be dropped, reposition the barrel near the aircraft door, and attach the static line to the static line attachment point..
2. Open the aircraft door (if required) and position the barrel in place for the drop. **WARNING: DO NOT POSITION THE BARREL IN PLACE PRIOR TO ATTACHING THE STATIC LINE!**
3. Maintain positive control of the barrel at all times near the open door.
4. Notify the Pilot that you are ready for the drop pass.
5. Push the barrel clear of the aircraft as you pass over the CARP (either visually, upon notification from the Pilot or Ground Controller).
6. After the barrel is clear of the aircraft, pull the static line and deployment bag back inside. Disconnect and stow the static line, and prepare the next barrel for drop (if required).
7. Using the landing point of the previous drop, adjust your CARP as needed.
8. Upon completion of all drops, close the aircraft door, and secure any loose items.

LIMITATIONS	
A.	Parachute Canopy:
B.	Desired Rate of Descent:
C.	Maximum Gross Weight:

COMPONENT WEIGHTS	
D.	Barrel Weight (Empty)
E.	Barrel Sling Weight:
F.	Parachute Weight:
G.	Padding:
H.	TOTAL COMPONENT WEIGHT:

MAXIMUM CARGO WEIGHT:
(Subtract H from C)

CARGO WEIGHTS		
ITEM #	DESCRIPTION	WEIGHT
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

TOTAL WEIGHT:

LIMITATIONS	
A.	Parachute Canopy:
B.	Desired Rate of Descent:
C.	Maximum Gross Weight:

COMPONENT WEIGHTS	
D.	Barrel Weight (Empty)
E.	Barrel Sling Weight:
F.	Parachute Weight:
G.	Padding:
H.	TOTAL COMPONENT WEIGHT:

MAXIMUM CARGO WEIGHT:
(Subtract H from C)

CARGO WEIGHTS		
ITEM #	DESCRIPTION	WEIGHT
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

TOTAL WEIGHT:

LIMITATIONS	
A.	Parachute Canopy:
B.	Desired Rate of Descent:
C.	Maximum Gross Weight:

COMPONENT WEIGHTS	
D.	Barrel Weight (Empty)
E.	Barrel Sling Weight:
F.	Parachute Weight:
G.	Padding:
H.	TOTAL COMPONENT WEIGHT:

MAXIMUM CARGO WEIGHT:
(Subtract H from C)

CARGO WEIGHTS		
ITEM #	DESCRIPTION	WEIGHT
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

TOTAL WEIGHT:

NOTES

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