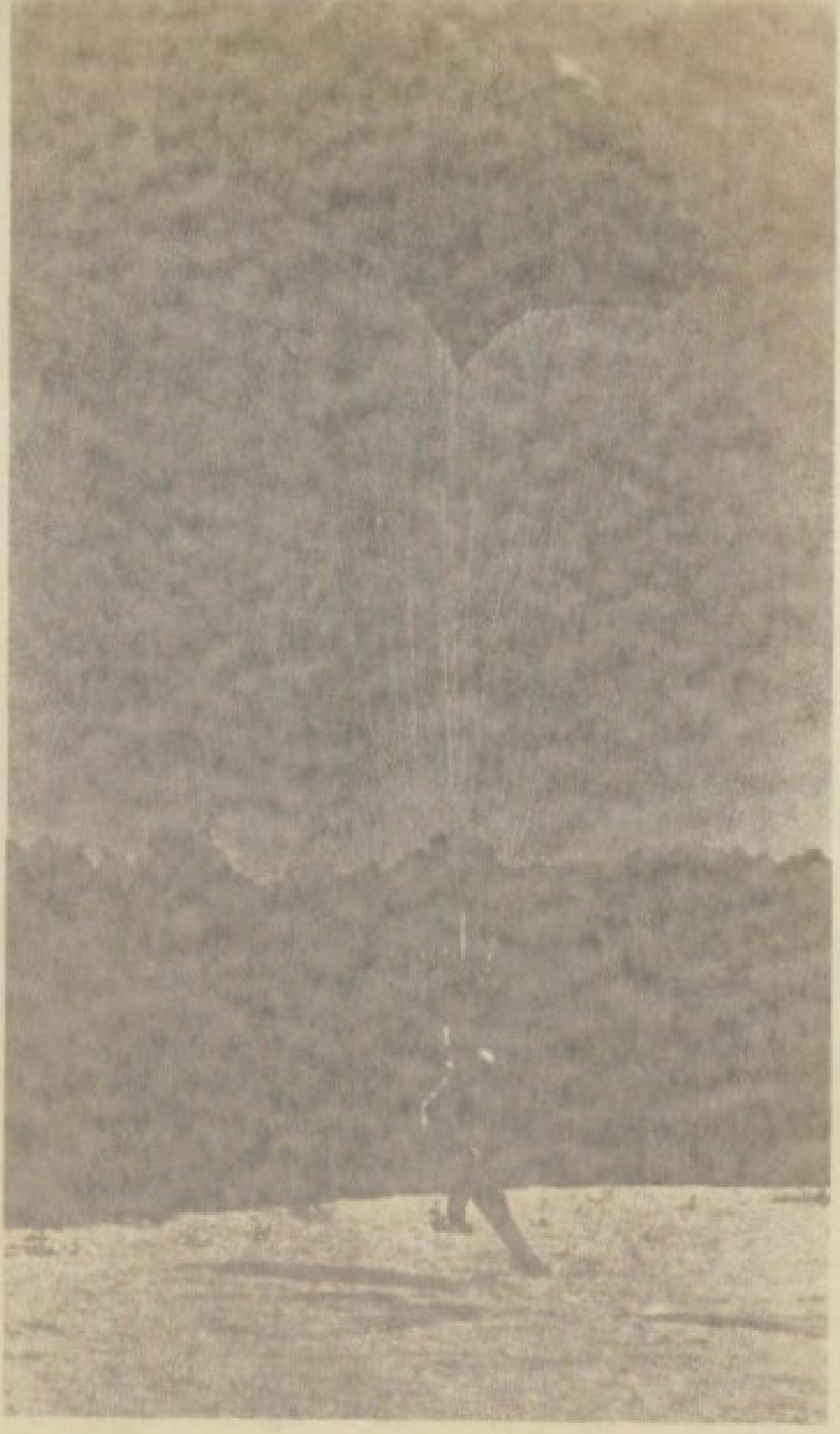


Para-Plane®
Flight Manual

PARA-FLITE Incorporated

CAUTION

The Para-Plane is an ultra high performance gliding parachute device with unique flight and handling characteristics. A thorough understanding of these characteristics is imperative for safe and effective flight. In the hands of an inexperienced or unprepared parachutist, the Para-Plane could be quite dangerous.

As a Para-Plane owner, please be very cautious about who you allow to jump it. Everyone who does jump the Para-Plane should be familiarized with its handling characteristics. A thorough personal check-out by a competent Para-Plane owner is highly recommended.

Although it has high performance characteristics, the Para-Plane is an extremely safe and reliable parachute, provided that it is operated in accordance with the instructions in this manual. The Para-Plane is intended for use only by experienced parachutists.

331 Cherry Hill Blvd. ■ Cherry Hill ■ New Jersey 08034 ■ (609) 667-8243

PARA-PLANE* FLIGHT MANUAL

Table of Contents

Illustrated by Alec Itenson

Cover Photo by Charles Mack

Back Cover and Text Photos by Jerry Irwin

Para-Flite Inc. wishes to acknowledge the helpful contributions made by Mr. Alec Itenson and Mr. Ed Francis in preparation of this manual.

*Pat. Pending (Reg. Trademark)

INTRODUCTION TO THE PARA-PLANE

The early work and basic principles of ram air inflated fabric devices must be credited to Domina Jalbert of Boca Raton, Florida, who was responsible for the creation of the Jalbert "Multi-Cell" configuration for tethered kites and parachutes.

The Para-Plane is an advanced aerodynamic deceleration system developed expressly for sport parachuting. In its present form, it is undoubtedly one of the most advanced, reliable, and maneuverable sport parachute systems in production. Any comparison with the standard-setting greats of the sport, such as the TU Lopo and the Paracommander is not only unfair, but virtually impossible because of the vast differences in flight principles and characteristics.

The Para-Plane, by Para Flite, Inc., represents the introduction of one of the most modern developments in the high performance gliding parachute field. The Para-Plane design is based on a new, efficient, aerodynamic inflated, fabric airfoil wing shape which has minimum aerodynamic drag. It provides excellent wind penetration features, with a controlled forward gliding speed in the range of 30 miles per hour; yet, it can be flown under precise control at all intermediate speeds down to nearly 5 m.p.h. Proper landing techniques allow for "full-flared" landings with feather light touchdown, possible under nearly all wind conditions.

Two very important proprietary developments by Para Flite have advanced the state of the art of high performance ram air gliding parachutes to the point where practical sport use is now feasible.

The Para–Plane's unique (patent pending) configuration is based on the concept of direct attachment of the suspension lines to the lower surface of the wing. This eliminates the bulk and extra drag produced by external load distributing members inherent to other ram inflated paraglider designs. This "direct attach" method of carrying the payload produces an extremely efficient and aerodynamically "clean" high-glide configuration. It also provides the very responsive turning characteristics with low control forces which are essential for good sport parachuting accuracy.

Para-Flite's successful application of the radically new and effective Pilot Chute Controlled Inflation System (Patent Pending) provides a unique and proven solution to the otherwise intolerable high opening shock problems inherent to all of the ram air category of high performance paragliders. This entirely new concept is based on the dynamic interaction between the drag forces exerted by the pilot chute acting against the canopy opening forces in such a manner as to precisely control and regulate the progressive exposure of the Para-Plane's surface area during employment. Simply stated, the drag forces exerted by the pilot chute during deployment are transferred through the mechanics of the system in such a way as to progressively retard the otherwise explosive inflation rate of the canopy.

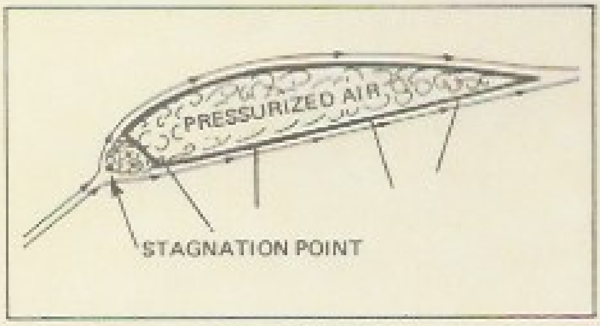
This pilot chute drag transfer (Patent Pending) system was designed and developed by Steve Snyder Enterprises, Inc., and is now licensed exclusively to Para-Flite, Inc., for use with the Para-Plane. This reefing method has demonstrated remarkable reliability throughout the entire development and proof test program and promises to offer opening reliability as good as or better than existing parachutes now in use.

PARA-PLANE* THEORY OF FLIGHT

The Para-Plane is an aerodynamically stiffened, fabric airfoil which generates lift due to its forward flight through the air. Its airfoil attitude is maintained by the relative lengths of the suspension lines such that the leading edge of the canopy is slightly lower than the trailing edge portion.

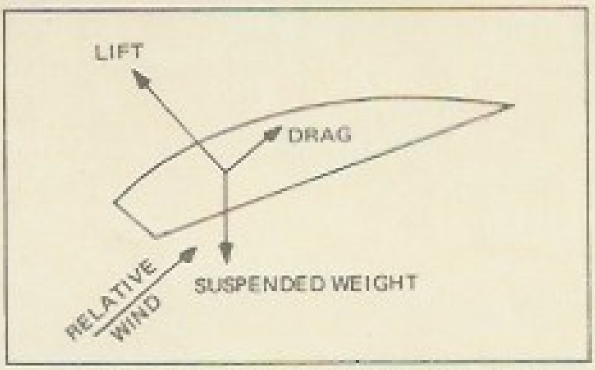
Therefore, the airfoil shaped surface of the Para-Plane is forced to slide or "plane" (hence the name Para-Plane) on the air similar to a glider in descending flight. The Para-Plane's wing generates lift in the same manner, due to the reduced pressure of the air flow over the curved upper surface.

The leading edge of the Para-Plane is "open", or physically missing. However, internal air pressure causes a small amount of stagnant air to be pushed ahead of the Para-Plane. The focal point of this stagnant air acts as a true leading edge, deflecting the relative air above and below the airfoil surfaces.



RAM—INFLATION

Drag, which acts in a direction parallel to the Relative Wind, is the only force tending to retard the forward motion of the Para-Plane through the air. Gravity plus the resultant sum of these aerodynamic forces on the upper surface acts to help "pull" the Para-Plane through the air, thus contributing to the flat glide angle.

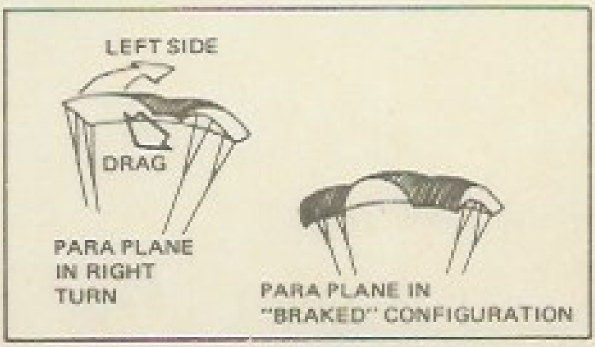


FORCES ACTING ON PARACHUTE IN FLIGHT

Application of brakes on the Para-Plane causes the trailing edge to be deflected downwards, creating additional drag and a loss of gliding speed. This also produces a proportionate loss in "generated" lift, resulting in a steeper descent angle. As full brakes are reached, the Para-Plane ceases to generate dynamic lift; the result being a somewhat increased rate of descent which is associated with a nearly vertical descent angle. Depressing the controls beyond "full brakes" will cause the Para-Plane to enter a stall.

Differential application of brakes (one side only or one side more than the other) produces unbalanced drag forces at the trailing edge resulting in a yaw turn towards the side with the highest drag.

Because the slow side generates less lift it tends to drop slightly resulting in a shallow banking action much like an airplane. This bank angle will steepen as the toggle displacement is increased.



DESIGN AND CONSTRUCTION

The Parafoil is an advanced aerodynamic flexible glider, the construction being of a "multi-cell" configuration, which, when inflated, creates a pressurized semi-rigid wing with upper and lower surfaces and an airfoil shape. The cells are formed by wing ribs, which, in flight, help retain the correct airfoil camber. The 1000 lb suspension lines are attached to cascades of 750 lb line which attach directly to load carrying ribs. These load-carrying ribs are so designed that the load is evenly distributed along the chord of the canopy without causing distortion of the shape of the airfoil.

The Para-Plane is constructed of 1.5 oz. calendered and treated ripstop nylon with a 2-5 c.f.m. porosity. Construction consists of 15 rib sections sewn between upper and lower surfaces, forming a true airfoil. Eight of the ribs have special internal reinforcements for direct line attachment at the lower surface of the canopy. This arrangement provides a very even load distribution for proper airfoil shaping and provides an extremely aerodynamically smooth, or "clean" gliding wing surface.

This "dragfree" lower surface contributes to good control response and lower control loads.

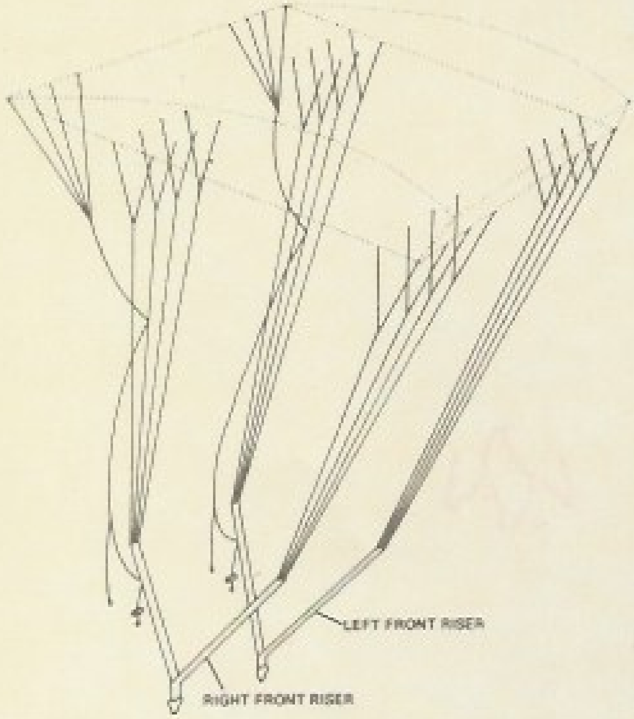
PHYSICAL SPECIFICATIONS

Wing Span	19.5 ft.
Wing Chord	(approx.) 9.5 ft.
Wing Area	(approx.) 200 sq. feet
Suspended Weights	120-250 lbs.
Canopy Material	1.5 oz. ripstop nylon, calendered - 2-5 c.f.m. porosity
Line Test Strength	A and B lines . . 1000 lbs.
	Upper . . . . 750 lbs.
	Steering . . . . . 750 lbs.
Lauching Device	Deployment Bag
Pilot Chute	Two MA-Is

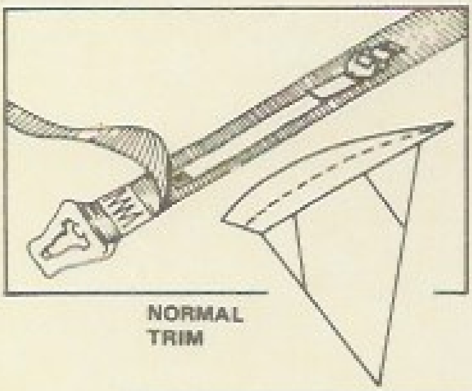
PERFORMANCE SPECIFICATIONS

	RATE OF DESCENT	SPEED RANGE
Glide	14 - 18 f.p.s.	25-30 m.p.h.
50% Brakes	16 - 20 f.p.s.	12-18 m.p.h.
75% Brakes	18 - 22 f.p.s.	10-12 m.p.h.
100% Brakes	20 - 22 f.p.s.	0-5 m.p.h.
Stall	22 - 26 f.p.s.	0- unstable flight
Full Glide to Flared Landing		2-5 f.p.s. (With proper technique)
Glide Ratio (Lift over Drag)		3:1 (approx.)
Turn Rates		
Full Glide		4-6 sec.
After one revolution		3-4 secs.
Maximum Bank Angle Capability		75 (approx.)
Stall Turn		1.5 sec. - (180°)

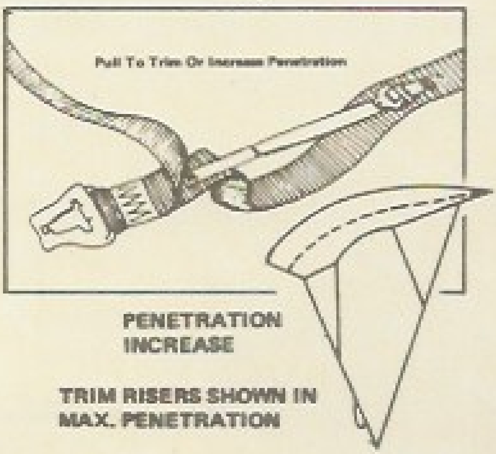
COMPONENT PARTS



PARA-PLANE RISER RIGGING & SUSPENSION LINE DIAGRAM

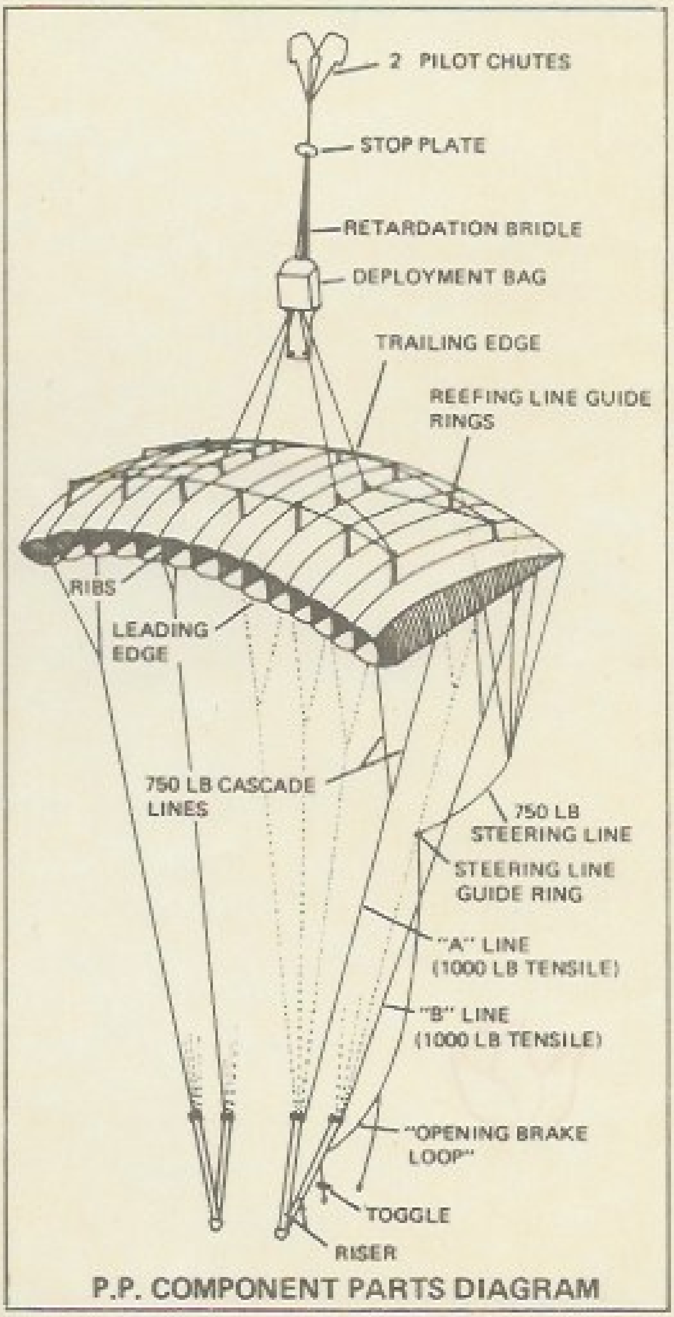


NORMAL TRIM



PENETRATION INCREASE

TRIM RISERS SHOWN IN MAX. PENETRATION



P.P. COMPONENT PARTS DIAGRAM

PARA-PLANE DEPLOYMENT SYSTEM

Pilot Chute Controlled Reefing System.

Para-Flite's successful application of the radically new and effective Pilot Chute Controlled Inflation System *(Patent Pending) provides a unique and proven solution to the otherwise intolerably high opening shock problems which are inherent to all of the ram air category of high performance paragliders. This entirely new concept is based on the dynamic interaction between the drag forces exerted by the pilot chute acting against the canopy opening forces in such a manner as to precisely control and regulate the progressive exposure of the Para-Plane's surface area during deployment. Simply stated, the drag forces exerted by the pilot chute during deployment are transferred through the mechanics of the system in such a way as to progressively retard the otherwise "explosive" inflation rate of the canopy.

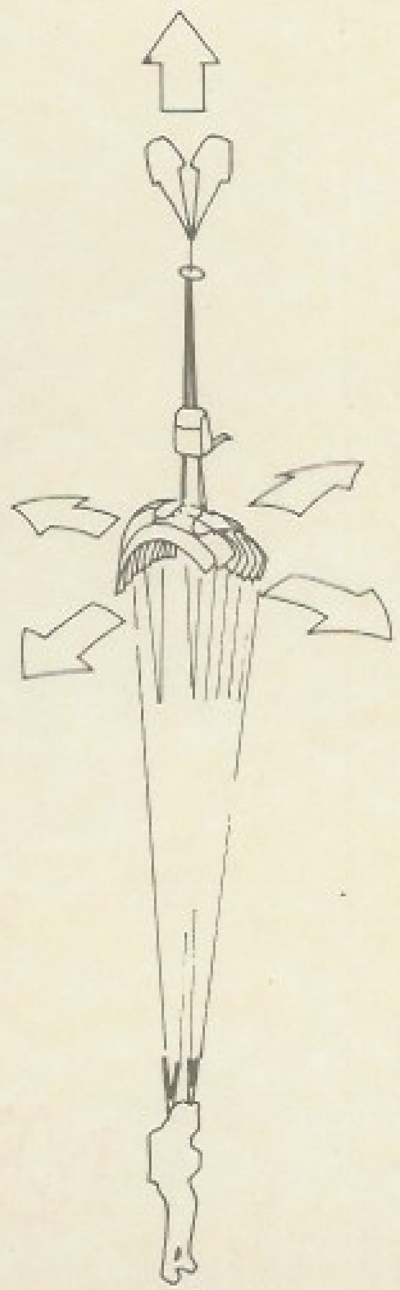
This pilot chute drag transfer (patent pending) system was designed and developed exclusively by Steve Snyder Enterprises, Inc. and is now licensed solely to Para-Flite, Inc. for use with the Para Plane. This reefing method has shown remarkable reliability throughout the entire development and proof test program and promises to offer opening reliabilities as good or better than existing parachutes now is use.

In other parachutes, the sole function of the pilot chute is to extract the bag or sleeve assembly from the container. On completion of the extraction, it ceases to function usefully.

With the Para—Plane System, the pilot chutes serve two purposes:

1. They extract the bag assembly in the usual manner.
2. They maintain a specific amount of drag and retard the inflating forces acting on the canopy.

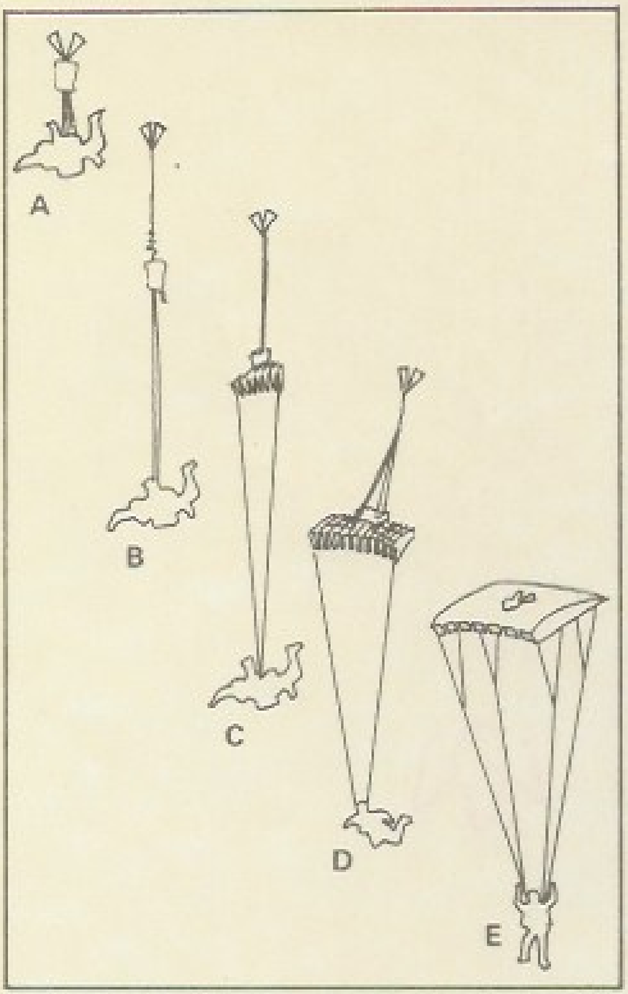
The nylon bridle routed along the upper surface of the Para-Plane acts like a drawstring on a tobacco pouch held closed by a tension force, which, in the case of the Para-Plane, is the drag exerted by the pilot chutes.



INFLATION FORCES

THE PARA-PLANE* DEPLOYMENT SEQUENCE

PCR (Pilot Chute Controlled Reefing)



DEPLOYMENT SEQUENCE

A. The twin pilot chutes extract the bag assembly from the container.

B. The suspension lines are played out and the bag locking flap opens. At this point the suspension line locking stow releases the reefing lines from their stowed position allowing the pilot chutes to extend them to their full length.

C. Canopy inflation begins and forces the bag clear of the canopy.

D. Tension in the retardation bridle, applied by the pilot chutes, controls the expansion rate of the canopy.

E. The canopy is fully inflated. Both pilot chutes and bridle line are seated on the top surface of the canopy.

The drag of the PCR system is directly proportional to the deployment velocity and, therefore, provides the correct amount or restrictive force to the canopy at any particular opening speed. Other mechanical timing or pneumatic/hydraulic delay devices cannot provide this unique velocity sensing system. Nor can they offer the reliability required for this important parachute function.

NOTE: Do not modify the retardation system in any manner. TWO standard coilspring pilot chutes must be attached directly to the retardation bridle. Without sufficient pilot chute drag, the inflation sequence cannot be slowed. Too much drag will prevent correct inflation.

PARA-PLANE* FLIGHT CHARACTERISTICS

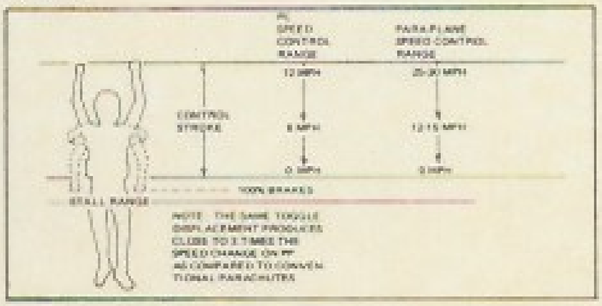
Before jumping a Para-Plane it is absolutely imperative that the parachutist has a working knowledge of the flight capabilities and limitations and that he fully understands the handling techniques required. It cannot be overemphasized that the Para-Plane is an advanced, high performance deceleration device and that in the hands of an inexperienced jumper, or one who is unaware of its handling techniques, it is, by virtue of its high performance potentially dangerous.

The Para-Plane canopy configuration is basically a wing section constructed out of fabric and, therefore, a very basic knowledge of aerodynamics is necessary in order to better understand the flight characteristics and handling techniques of the vehicle.

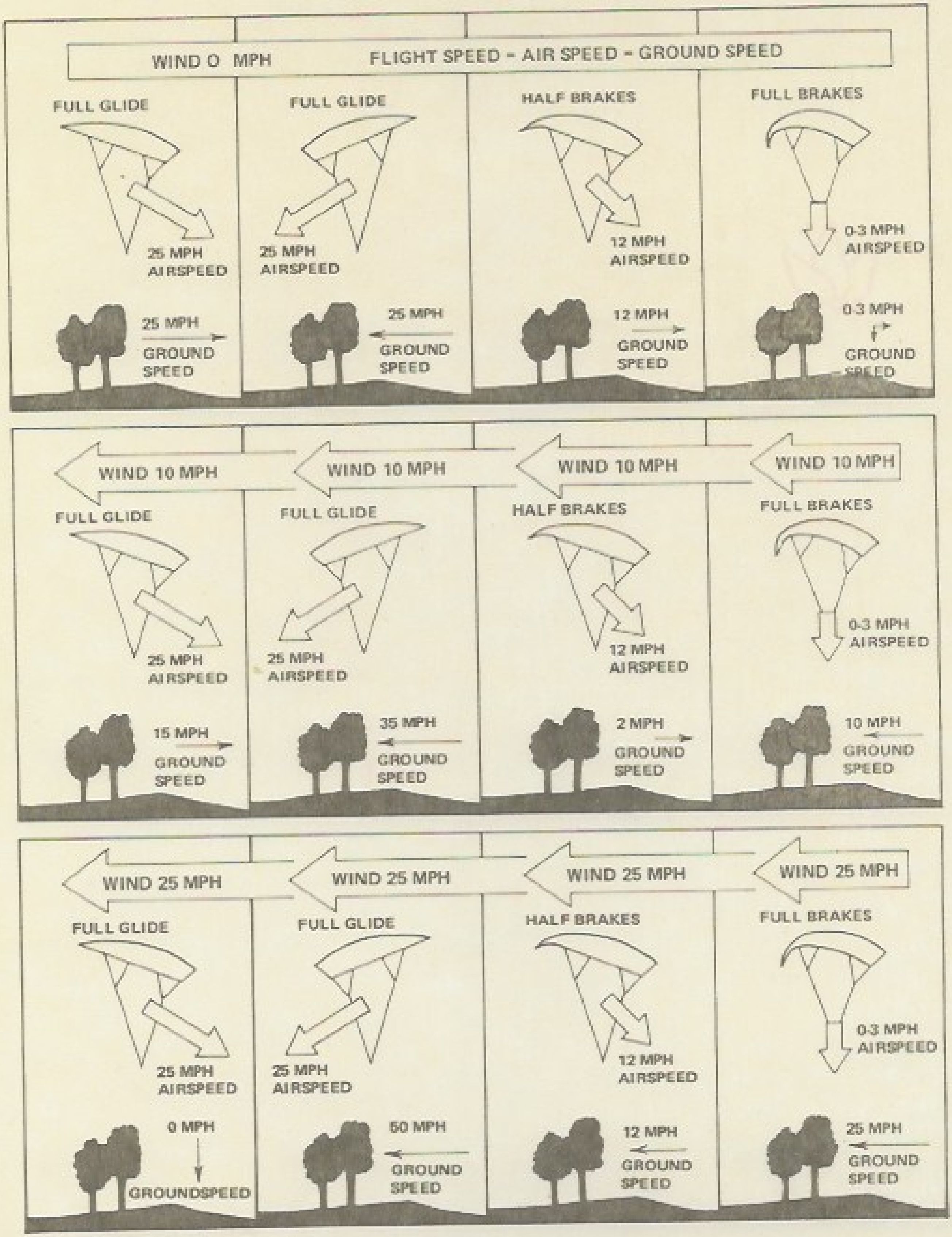
The Para-Plane "planes" or glides on and through the air at about 25 to 30mph. It always flies at this speed except when brakes are applied. This speed that the parachute flies at is called air-speed and whether one flies cross-wind, or down wind or up wind, this airspeed remains the same. The only variation one gets when flying up wind or down wind, is a change in ground speed, which is, by many jumpers, mistaken for a change in air-speed. Wind only affects ground speed and has no effect whatsoever on airspeed. It is important for the Para-Plane jumper to understand the difference between the two.

> The Para-Plane moving with and through a mass of air is much the same as a boat moving with and through a mass of water (river). If a speed boat has a constant forward speed of 25mph this is comparable to the airspeed of the PP. If this speed boat is in a river that flows at 25mph the same conditions exist as if you were jumping your P-P in about 25mph winds. If you point the boat down stream you will be moving through the water at 25mph, but your speed relative to the river bank would be 50mph. If you turn the boat up-stream you would still be moving through the water at 25mph but your speed relative the river bank would be zero. (Facing the PP into a 25mph wind would also yield a zero ground speed.)

The airspeed on your P-P is controlled with the control lines. Control is like a conventional parachute via toggle line and knob. The significant difference being that 50% of toggle motion on a PC will reduce airspeed by about 6mph, 50% toggle motion on the P-P will cause a reduction of about 14mph. The PP has the same control motion (arms length) as conventional parachutes but controls nearly 3 times the forward airspeed and this makes any PP control motion 3 times as effective and sensitive as the control of conventional parachutes.

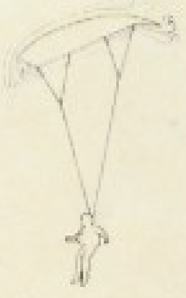


One of the characteristics of the P-P immediately apparent is that of high wind noise. You will realize that the noise is not caused by undue vertical velocity, but by the high forward airspeed. This can be used as an "air speed indicator". Reduction in the wind noise level should be a warning that you're approaching the stall point. There is an added dimension in P-P control above and beyond the conventional - not only are the positions of the toggles critical, but also the rate of motion from one position to the other. As a general rule all fast and generous (more then 25%) application of both toggles causes the airspeed to reduce rapidly and the P-P will decelerate to the stall range. (it should be noted that the P-P will stall at about 0-3mph air speed, but ground speed at this point can be still quite high depending on the wind). Due to the high penetrating ability of the P-P it is often difficult to determine wind direction without the aid of a wind sock, streamer or smoke. All P-P landings are made facing into the wind to minimize ground speed.


WIND O MPH
FLIGHT SPEED = AIR SPEED = GROUND SPEED
FULL GLIDE
25 MPH AIRSPEED
25 MPH GROUND SPEED
FULL GLIDE
25 MPH AIRSPEED
25 MPH GROUND SPEED
HALF BRAKES
12 MPH AIRSPEED
12 MPH GROUND SPEED
FULL BRAKES
0-3 MPH AIRSPEED
0-3 MPH GROUND SPEED
WIND 10 MPH
FULL GLIDE
25 MPH AIRSPEED
15 MPH GROUND SPEED
WIND 10 MPH
FULL GLIDE
25 MPH AIRSPEED
35 MPH GROUND SPEED
WIND 10 MPH
HALF BRAKES
12 MPH AIRSPEED
2 MPH GROUND SPEED
WIND 10 MPH
FULL BRAKES
0-3 MPH AIRSPEED
10 MPH GROUND SPEED
WIND 25 MPH
FULL GLIDE
25 MPH AIRSPEED
0 MPH GROUNDSPEED
WIND 25 MPH
FULL GLIDE
25 MPH AIRSPEED
50 MPH GROUND SPEED
WIND 25 MPH
HALF BRAKES
12 MPH AIRSPEED
12 MPH GROUND SPEED
WIND 25 MPH
FULL BRAKES
0-3 MPH AIRSPEED
25 MPH GROUND SPEED

FULL GLIDE

With hands off the P-P will glide at about 25 to 30mph. The rate of descent will be about 14 to 18 fps. Wind noise will be very noticeable. P-P will fly very steady and straight. If you experience a turn to either side it will mostly be due to uneven harness adjustment. The trim tabs on the front risers can be used to eliminate the turn. These tabs can also be used to increase the P-Ps penetration, by pulling both of them down simultaneously. This should however be avoided until your confidence and experience on the P-P has been increased.



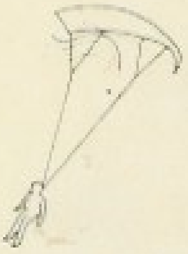
HALF BRAKES

From full glide depress both toggles simultaneously and slowly to about shoulder level or slightly below. At this point the P-P will be gliding at 12 to 18mph and descending at 16 to 20fps. When braking from full glide, initial toggle pressure will be high until the half brake position is reached. This is due to the fact that the high forward speed makes deflecting the trailing edge difficult. Braking is effected by altering the air flow along the lower surface of the wing. This is accomplished by distorting the trailing edge in much the same manner as flaps on an airplane. As the forward speed decreases, there will be a noticeable reduction in wind noise. Once the jumper has become accustomed to the wind noise, he will find it an useful aid in the indication of air speed.

FULL BRAKES

Under normal flight conditions, the fully braked attitude will be reached by depressing both toggles slowly to approximately waist level. A reliable indication of a fully braked P-P will be the lack of almost all wind noise. In this attitude, the direction of travel will be nearly vertical. The forward speed will be about 5mph or less and the rate of descent will be about 22 to 26fps. The P-P is very stable and its direction is controllable in the 75% to 85% braked condition. Any further braking may result in some loss of directional control.

STALL—STEADY STATE



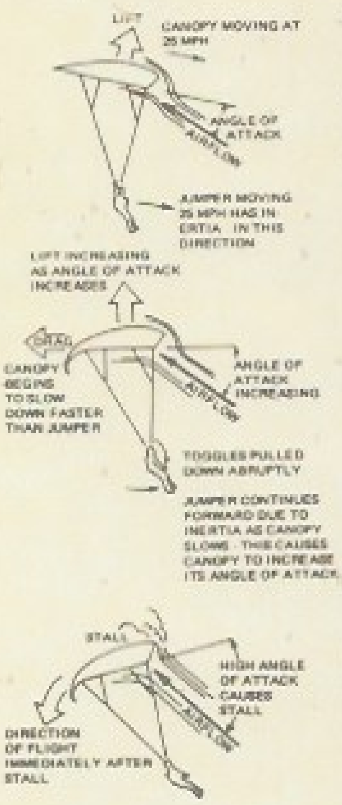
Steady State
Stall Entered
From Full Brakes

A stall (steady state) will be induced if both toggles are depressed 2 to 3 inches past the fully braked position. In this attitude the airfoil loses its efficiency as a lifting device. The forward speed goes to zero and the jumper will experience a slightly weightless feeling as the P-P gently rocks backward. Caution: No stalls should be performed below 1000 feet AGL.

Otherwise the P-P may attempt to fly backwards or turn off to one side or the other. RECOVERY from this type of stall is accomplished by raising both toggles smoothly to the 75% or 80% braked condition. The P-P will accelerate smoothly out of the stall range.

CAUTION: Never release the toggles completely or let them up abruptly. If the toggles are released in such a manner, the P-P will surge forward leaving the jumper trailing behind on slack lines. NO stalls should be performed below 1000' AGL.

STALL—DYNAMIC



The dynamic stall is initiated by the jumper making an abrupt displacement of the toggles, causing additional drag to be placed on the canopy. The canopy slows down rapidly while the jumper, due to his inertia, reacts much slower causing him to swing out in front of the canopy.

The jumper oscillates forward, causing the angle of attack to be artificially increased. This new angle of attack yields a high amount of lift for a very short period of time followed by an abrupt loss of lift or "stall" of the canopy. The canopy stalls due to the loss of forward air speed. Because the trailing edge has been deflected substantially downward — the P-P now attempts to fly backward if no corrective measures are taken.

Recovery from the dynamic stall is properly accomplished by the "double clutching" method. Let up the toggles to no higher than the 75% braked position, otherwise the canopy may surge too far forward leaving the jumper behind; the same condition exits here as entering the dynamic stall — that is, the canopy will accelerate much faster than jumper. From the 75% braked mode depress both toggles to the 85-95% brake position and then slowly ease up to any desired glide mode. You will find that the P-P will recover very fast and accelerate smoothly out of the stall.

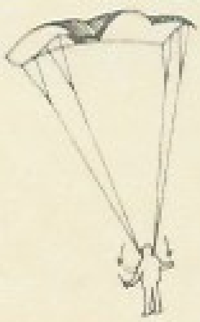
Dynamic stalls below 1000' AGL should be avoided.

TURNS–FULL GLIDE

Turns from full glide are quite responsive, but due to the high forward speed the turns will encompass a wide arc, such as an aircraft when turning. Toggle pressure in this mode is the highest (slightly higher than PC) due again to the high forward speed. These turns are made by depressing either toggle leaving the other toggle up near the keeper. In this type of turn the P-P will bank somewhat because the side that the toggle is pulled down on is producing more drag and less lift than the other side. The further the toggle is depressed the steeper the bank angle. In any bank angle greater than 10 degrees from the vertical, it will be noticeable that the P-P will pick up an additional increase in the rate of descent due to the loss in lift resulting from the bank angle.

SPIRAL TURNS

Spiral turns are basically the same as turns from full glide but maintained for more than 360 degrees of rotation. If one toggle is held at waist level or so, the P-P will begin diving in a spiral. The first turn will be fairly slow and the bank angle somewhat shallow, with both the turn and the bank angle increasing rapidly if the spiral is maintained. It is possible to attain bank angles of 75° and diving speeds up to 60mph. Increasing the turn rate beyond the steep spiral will cause excessively fast diving speeds and should therefore be avoided. No spirals should be executed below 1000' AGL.



TURNS–50% BRAKES

Turns from the 50% braked condition are made by further depressing either toggle. Canopy response in this mode is much quicker and control line loads are much lighter than full glide. Banking in these turns are minimized, resulting in almost flat turns desirable for accuracy approaches.

TURNS–75-100% BRAKES

When flying in this mode the jumper should be keenly aware that he is operating very near the stall range. By pulling either toggle he may cause that side of the canopy to stall. Therefore, turns are made by slightly raising the opposite toggle (raise left toggle for right turn and right toggle for left turn). This is done to keep the P-P from stalling. Response in this type of turn is reasonably fast. There is little or no banking and the resulting heading changes are very flat. Control line loads are light.

STALL TURNS

If the P-P is flying in the 75 to 100% braked condition and either of the toggles is depressed further, a stall turn will result. Stall turns produce a very fast pivoting canopy motion to the depressed toggle side. The stalled side of the canopy will start flying backward. The stalled side generates very little lift and the rate of descent will increase. Stall turns should never be used by the jumper and he should be very careful not to enter into one below 1000' AGL. To recover from a stall turn, simply ease up the toggle on the stalled side until the canopy stops rotating. It is important that all control motions be slow and smooth because the canopy can be over controlled very easily during the recovery.

FLARED LANDINGS

The flared landing is a carefully controlled, dynamic stall, that is, timed so that the jumper touches the ground when the P-P develops a high amount of lift, due to the artificial angle of attack change.

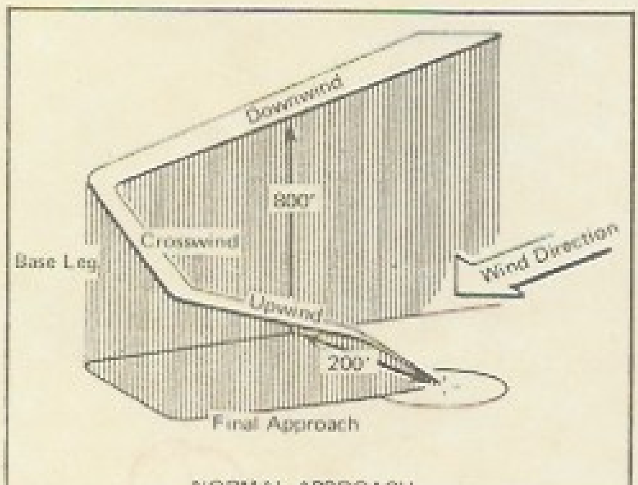
This is just an instant prior to the stall and the jumper should be very careful not to flare too high. Flare landings, just like all P-P landings are made into the wind and should start at an altitude of 100', or higher. Face into the wind and make sure you have plenty of room ahead; ease up on both toggles all the way, allowing the air speed to build up. At 10' to 15' altitude slowly depress both toggles downward; time this movement so that the toggles reach the 100% braked position at touch down. The flared landing when properly executed, practically eliminates both horizontal and vertical velocities for a short time. The jumper should remember that the P-P has to have air speed in order to flare, the more air speed the better the flare. If the P-P has been slowed down prior to the flare attempt, depressing both toggles further will only result in a stall. If on a misjudged flare attempt (too high) the P-P enters a dynamic stall, dynamic stall recovery should be initiated. Do not lift the toggles any higher than the 75% brake position. Flare landings in high winds do not require as much toggle deflection as in mild winds.

LANDING

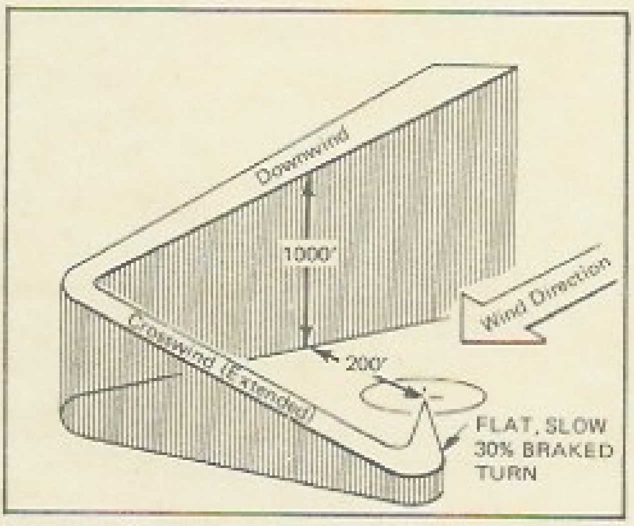
The P-P can be landed safely without flaring. After facing into the wind at an altitude no lower than 100', depress both toggles to about the 50% brake position. The rate of descent will be like a conventional parachute and the ground speed will depend on the wind but will not be uncomfortable. Do a conventional Parachute Landing Fall.

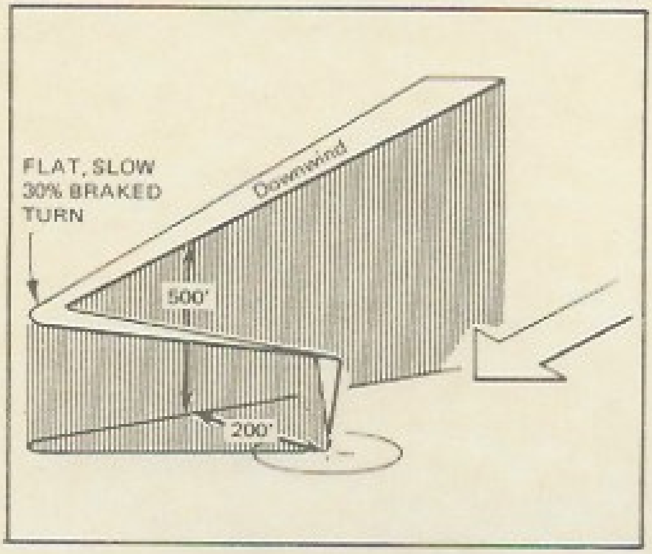
LANDING APPROACHES

Non Precision Approach To A Landing Area: Recommended for approaches to a target area with flared landing touchdown. The most satisfactory landing approach is one similar to standard **aircraft** landing approaches. That is, to fly downwind, past the target at an altitude of about 1000', while approximately 200 feet to one side, at 25% - 50% brakes. At some point downwind, a gentle 90° turn will begin the base leg. Then, at no less than 500', make a final turn toward the target area upwind. Descent and glide are now controlled through proper braking techniques in order to bring the jumper down in the target area. Excess altitude can be "traded off" by making shallow "S" turns while on the final approach; or, "Excess altitude" can also be lost by extending the base leg and turning in on the final approach at an angle to the wind line. If there is insufficient altitude to make the complete landing approach, the base leg can be cut short. The final approach, again, is at an angle to the wind line.



NORMAL APPROACH





NOTE: Sharp turns or hook turns should not be made on the final approach.

ACCURACY LANDING APPROACHES

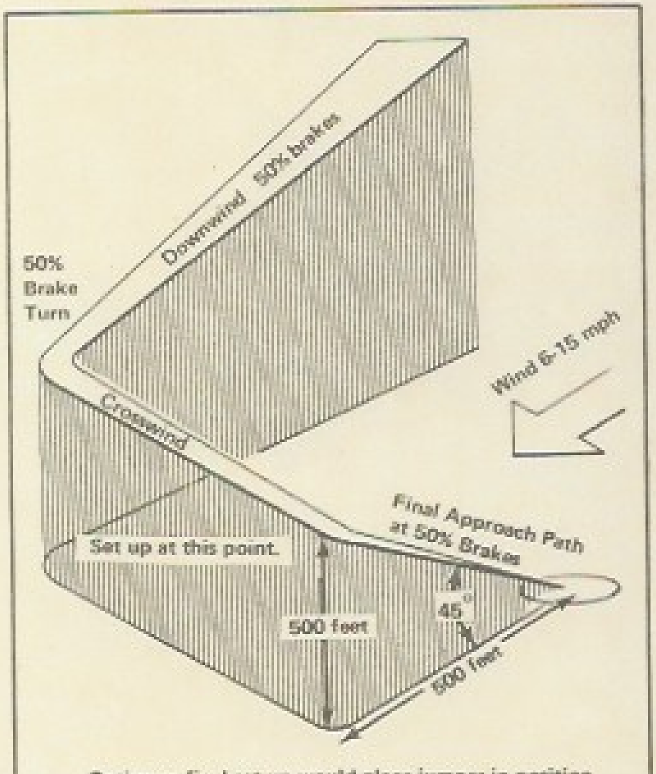
Caution: Do not attempt precision accuracy until at least twenty-five jumps on the Para-Plane have been logged.

Final Approach For Precision Accuracy:

For accuracy landings, the Para-Plane should be turned on to the upwind final approach from the base leg while flying at 50%-75% brakes at an altitude of about 500 feet.

For average or medium wind conditions, this final turn should be made about 500 feet behind the target.

For higher winds set up closer to the target. For light winds, set up further out for a flatter approach.



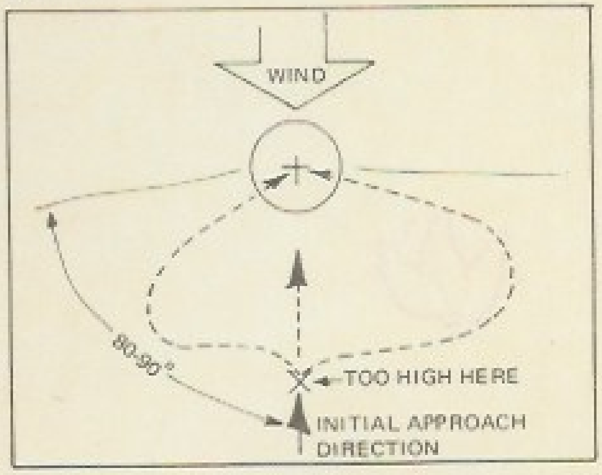
Optimum final set up would place jumper in position for a final glide approach at 45° at 50% brakes.

A very steep approach angle can be achieved through the application of brakes. Easing up on the brakes will extend the approach angle.

Depending on wind condition, the final approach can be varied from vertical to a very flat angle.

The optimum angle for an accuracy approach is 45 degrees. If the ground winds are 20mph or less you may exit over the target. Important information about the target approach can be learned by using brakes and observing your motion relative to the target while at higher altitudes.

In mild wind conditions you can be as much as 80 to 90 degrees off the wind line without causing any serious effects on your accuracy approach. The higher the ground winds the closer you should be to a straight upwind approach.



Caution: When near the ground in turbulent air, the Para-Plane should not be flown at or near full brakes as an unexpected gust might induce a stall.

INDOCTRINATION JUMPS

Recommended Maneuvers for Initial Jumps: The initial Para-Plane jumps should be oriented towards familiarization with the handling characteristics. Do not be at all concerned with precision accuracy until at least twenty-five jumps have been completed. Also, until completely familiar with the Para-Plane, it is not advisable to jump it into tight target areas.

It is recommended that several familiarization jumps be made with an opening altitude of 5000' - 7000', and that the opening points be adjusted accordingly. This higher jump altitude will give the new owner time to "learn" some of the flight characteristics of the canopy.

Spotting: About the only time the P-P system can be treated casually is in regard to spotting. To be practical, all previous spotting techniques apply - but the P-P allows a much greater margin of error. Under most conditions the P-P can even be spotted down-wind of the target.

The spot for conventional parachutes can be used, or, if desired the P-P jumper can take it out 2 or 3 times as far.

OPENING: Body position for opening can be flat and stable or a slightly head high position commonly used with conventional parachutes. Do not open in a delta or tracking position.

After opening check the canopy for proper inflation. The pilot chutes should not be visible. If they are trailing behind the canopy, center them by easing the P-P into a mild dynamic stall (or steady state stall).

The P-P may sometimes open up with one of the leading edge corners rolled under. If this occurs pull both toggles to approximately the 75% brake position and the corner should roll out.

In the event the jumper experiences a broken control line, complete directional control can be maintained by steering with the rear risers. The landing flare maneuver can also be accomplished by careful manipulation of the rear risers. Special care should be taken not to start the flare above 10 to 15 feet.

On the first jump, be sure to try and practice the following:

1. Turns from full glide.
2. Application of brakes 25%-50%-75%-100% brakes. Note the feeling of deceleration and the diminishing wind noise.
3. Steady state stalls — Enter the stall mode smoothly from full brakes — practice recovery. Learn to recognize stall symptoms.
4. Turns from half brakes.
5. Landing approach.
6. Flared landings.

Note: Refer to the respective chapters for instructions on how to properly accomplish the above maneuvers.

On the second, third and fourth jumps, practice the maneuvers listed for the first jump, with the addition of the following:

1. Turns at 75% brakes.
2. Turns at full brakes.

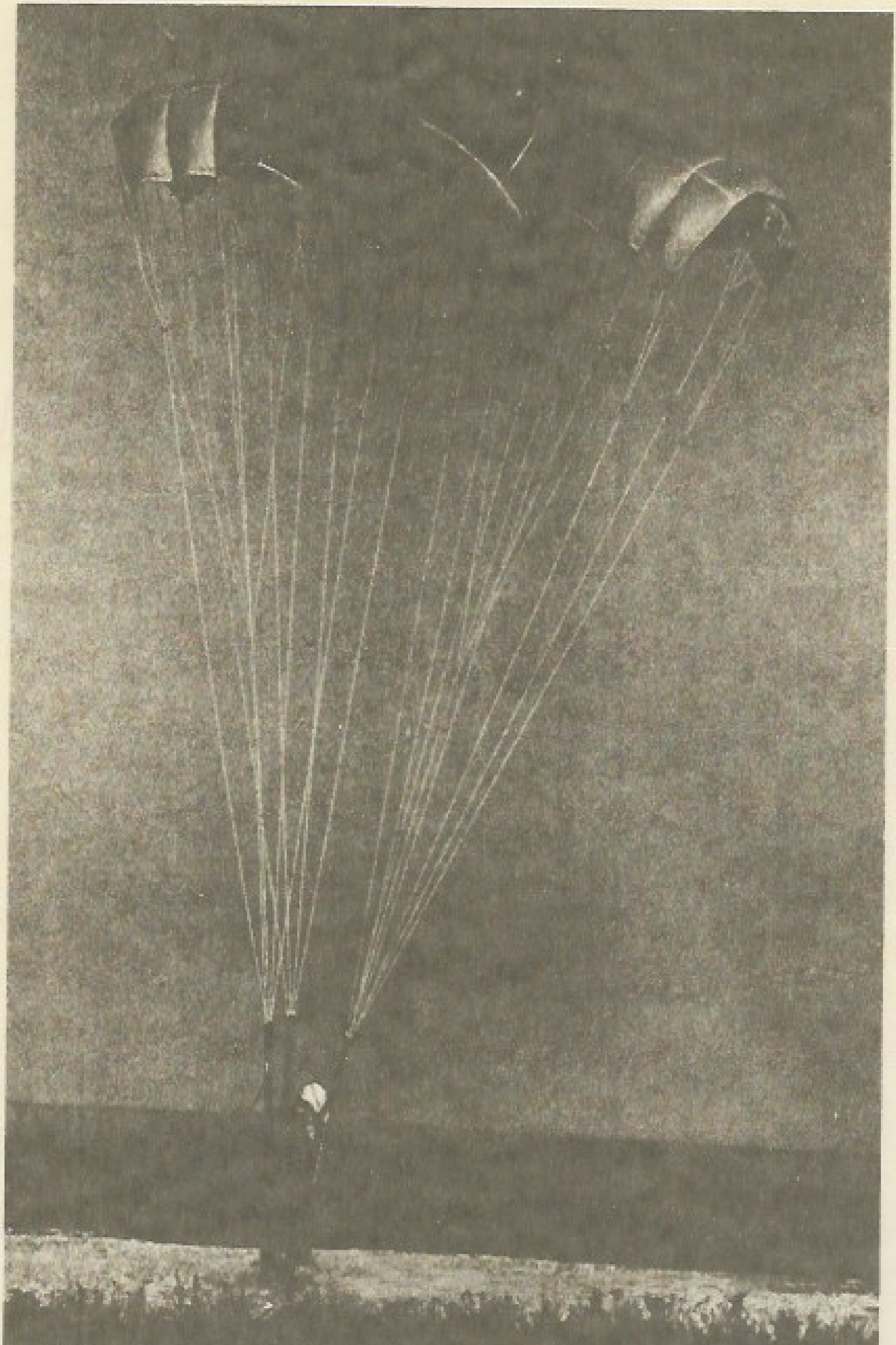
Considerable practice at flying 75%-100% brakes is essential for good Para-Plane familiarity. It is highly desirable to practice stalls and stall recovery on every jump while at fairly high altitude.

NEVER TO BE BROKEN FLIGHT RULES

The Para-Plane is an ultra high performance gliding parachute with unique flight and handling characteristics. Regardless of the parachutist's experience with conventional parachutes, the following cautionary procedures must not be ignored. Serious injury could otherwise result.

- Initial Para-Plane jumps should be oriented towards familiarization with the handling characteristics. DO NOT attempt precision accuracy until at least twenty-five jumps have been completed. It is also not advisable to jump it into tight target areas until completely familiar with the Para-Plane.
- When attempting precision accuracy, DO NOT attempt salvage 360° turns. The Para-Plane loses altitude rapidly when turning. Sharp turns or hook turns should not be made on final approach.
- NEVER release the toggles completely or let up abruptly past the 75% brake position. If the toggles are released in such a manner, the Para-Plane may surge forward and begin a dive towards the ground, leaving the jumper trailing behind on slack lines.
- When recovering from a steady state stall, DO NOT double clutch the toggles higher than the 75% brake position.
- Never apply additional toggle tension when turning at or near full brakes as this will cause that side of the canopy to stall. An uncontrolled spiral turn and loss of altitude will result.
- Increasing the turn rate beyond the steep spiral range may cause excessively fast diving speeds that should be avoided under all circumstances. DO NOT SPIRAL BELOW 1000 FT.
- In turbulent conditions avoid flying the P-P at or near 100% brakes. Sudden gust loads could induce a stall.
- Never change the rigging of the P-P. If changes are necessary consult Para-Flite Inc. at 609-667-8243.
- The Para-Plane jumper must always maintain a surveillance of all other parachutists in the air. High speed collisions are a hazard.
- DO NOT begin the flared landing above 20 feet. This could result in a dangerous stall.
- If after opening, you experience difficulty in control due to the pilot chutes interfering with the control of suspension lines, or if you see anything out of the ordinary, do not waste time; consider exercising your emergency procedures immediately.

NOTE: The Para-Plane's stall point will vary, from day to day with variations in atmospheric conditions. The stall point will also vary from jumper to jumper due to the changes in suspended weight. It is adviseable, to check where the stall point is on every jump shortly after deployment.



PACKING INSTRUCTIONS

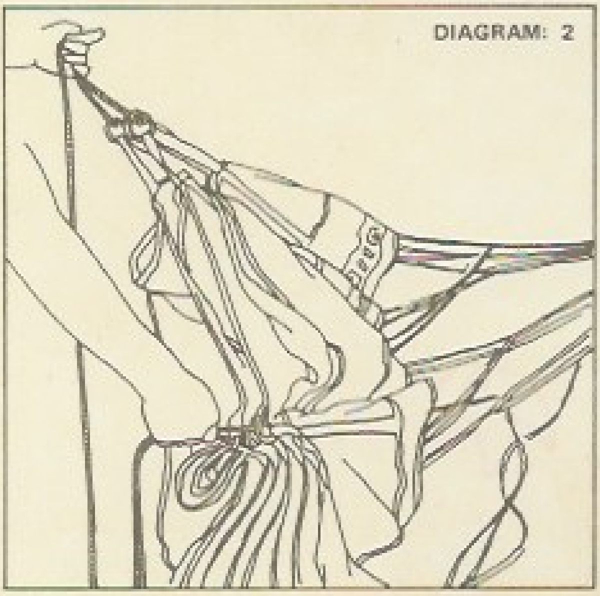
These instructions are intended for those already experienced in the packing of sport parachutes. Due to the many novel innovations in the Para-Plane assembly, no deviations from these instructions should be made. Nor should there be any modifications made to the Para-Plane assembly or parts of it.

DIAGRAM: 1

LAYING OUT THE PARA-PLANE.

STEP 1. Lay the Para-Plane out on the ground with the open container facing up. Anchor the harness to the ground. (Diagram 1)

DIAGRAM: 2



STEP 2. Stand at the top surface of the canopy, facing the pack tray. Pick up the retardation bridle with both hands and pull tension. The canopy will bunch up much in the same fashion as a tobacco pouch with a tightened drawstring. (Diagram 2)

STEP 3. Follow the bridle to the ring tab attachments on the canopy. Notice that the bridle and the ring tabs will divide into two main groups of seven tabs on each side. There are also two sub-groups with two tabs apiece inbetween. (Diagram 3)

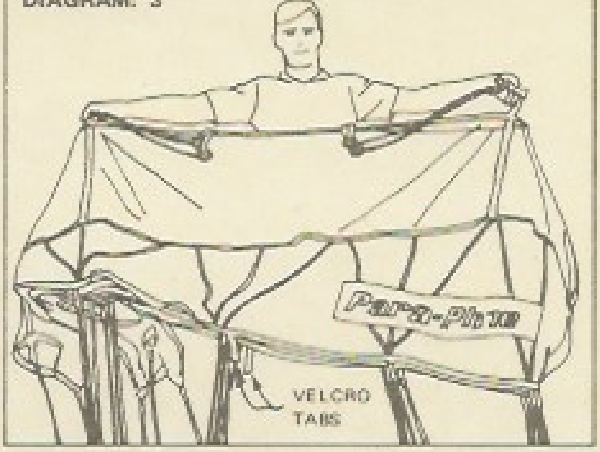
(a) With the left hand, grasp the entire forward main tab group. These are the ring tabs closest to the nose of the canopy (7 longest tabs). The nose is identified by the open intakes. Another identifying mark is the Para-Plane name tape which is stitched on the side of the canopy near the nose. (Diagram 3)

(b) With the right hand, grasp the entire aft main tab group. These are the ring tabs closest to the trailing edge of the canopy. The trailing edge can be identified by the control/steering lines which are attached directly to it. (Diagram 3)

(c) With each hand on the ring tab groups, lift the entire canopy off the ground. (Diagram 3)

(d) With a brisk motion, stretch your arms wide apart. This action will stretch the canopy out. The individual cells will now be basically pleated and hanging down from your outstretched hands. (Diagram 3)

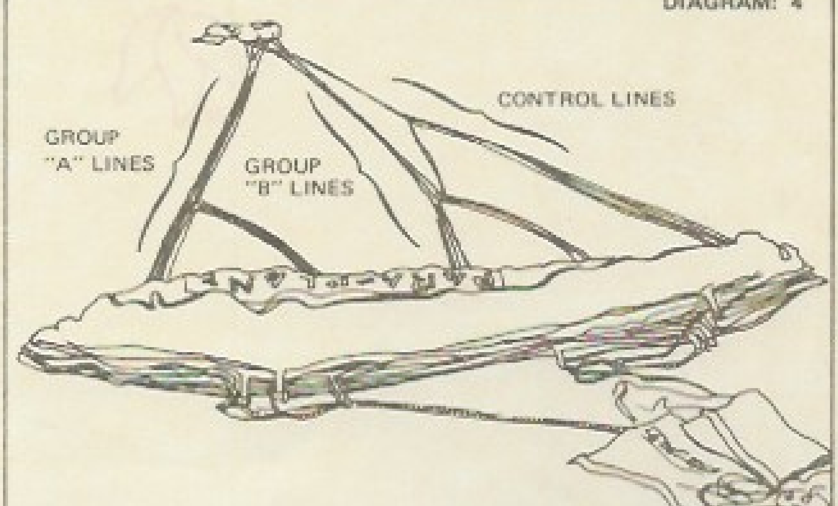
DIAGRAM: 3



(e) Keep your arms outstretched, and the canopy taut. With a slight flapping motion, shake the canopy. The pleated cells will fall neatly into place, and with the exception of the nose section and the trailing edge, the pleats will be dressed. (Diagram 3)

(f) With your arms still outstretched, flip the canopy up and away from you and lay it down on the ground. While doing this, be sure to maintain tension on the lines. (Diagram 3)

DIAGRAM: 4



STEP 4. The canopy should now be lying on its left side, with the right side facing up. Dress the pleats at the nose section and at the trailing edge. (Diagram 4)

NOTE: It does not make any difference which side the canopy is layed out on. It is really a matter of personal preference. In this respect, the packing instructions show the canopy layed out on its left side.

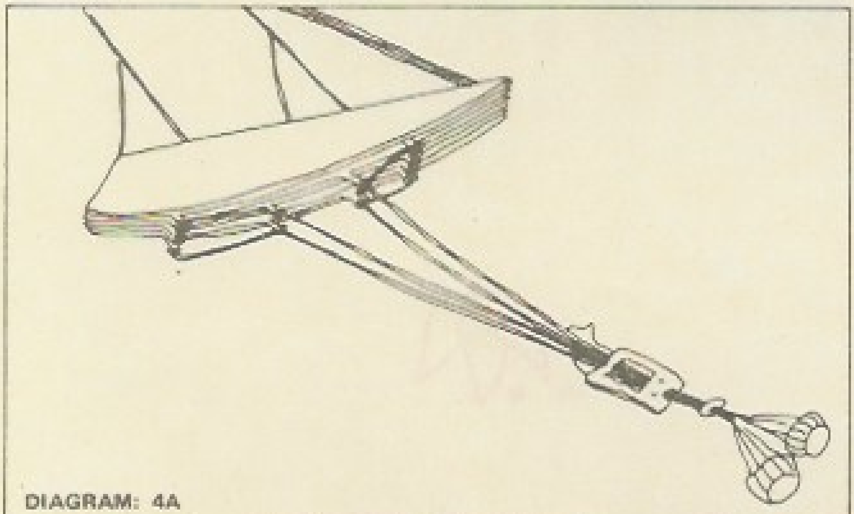


DIAGRAM: 4A

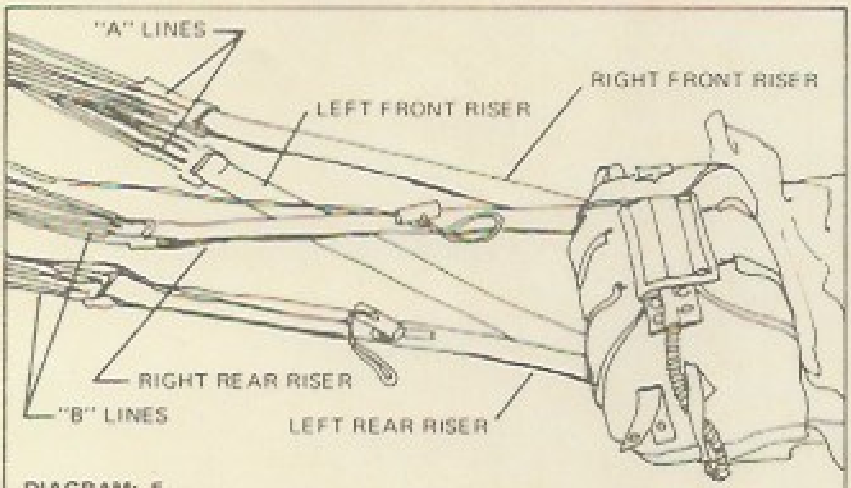


DIAGRAM: 5

LINE CONTINUITY CHECK.

(Refer Also To Riser & Suspension Diagram, Page 7)

1. Pick up the four right "A" lines at the canopy attachment points. Check to see that they run directly to the right front riser without any twists or entanglements. The outboard "A" line runs to the outside of the front riser.

2. Lay the right "A" lines aside and pick up the four left "A" lines at the canopy attachment points. Check to see that they run directly to the left front riser without any twists or entanglements.

The outboard "A" line runs to the outside of the front riser.

3. Lay the canopy back down on its side. Pick up the outboard "B" line. It should run directly to the outside of the rear riser.

4. Check that the control lines are correctly routed to the back of the rear risers. The lines are now cleared.

STEP 4A.

Make sure retardation bridle is correctly routed as shown in Diagram 4A.

STEP 5. LINE CHECK PROCEDURE.

Line entanglements on the Para-Plane are a rare occurrence and are usually the result of the jumper stepping through a line after landing. Thus, a line check under normal packing conditions consists of a quick glance along the lines towards the risers.

(a) Look at the "A" lines. These are the lines at the nose end of the canopy. They should run directly to the front risers without any twists. (See Diagrams 4 & 5)

(b) Look at the "B" lines. These are the aft lines and they should run directly to the rear risers without any twists. (See Diagrams 4 & 5)

(c) If there are any twists, simply flip the pack/harness assembly over.

(d) Check the steering/control lines. They should run without obstruction from the trailing edge to the back of the rear risers. (Diagram 4)

If there is any doubt at all about the routing of the lines, or if there is a line entanglement, a continuity check must be made.

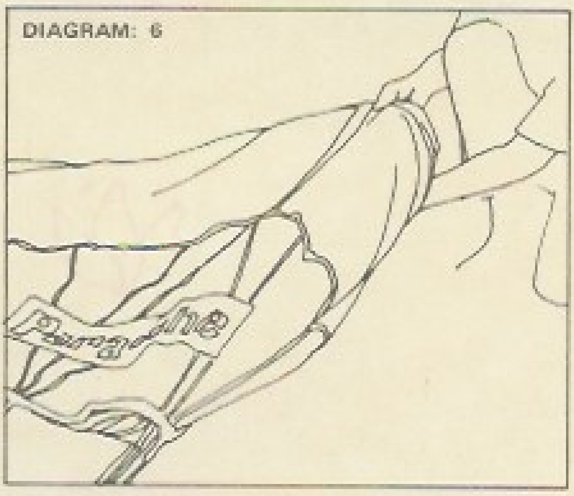


DIAGRAM: 6

STEP 6. S-FOLDING THE CANOPY (See Diagrams 6 & 6a)

(a) Grasp the nose pleats at the upper portion of the top leading edge. Fold the nose section under, while pulling tension on the "A" lines.

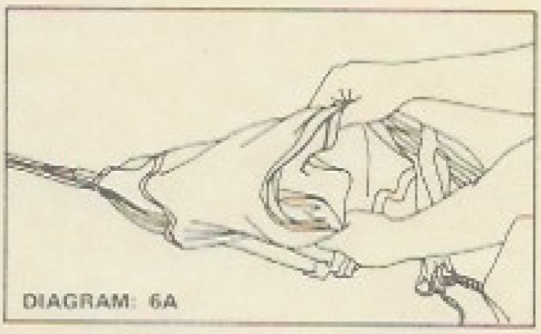


DIAGRAM: 6A

(b) Kneel at the nose of the canopy, facing the trailing edge along the length of the canopy.

(c) Grasp the lower surface at the second group of line attach points with the left hand and the upper surface with the right hand as shown. (Diagram 7)

(d) While pulling tension on the lines, fold the canopy towards you, making an S-fold approximately the width of the deployment bag. (Diagram 7)

(e) Ensure that the ring tabs are aligned in the center of the fold. (Diagram 7)

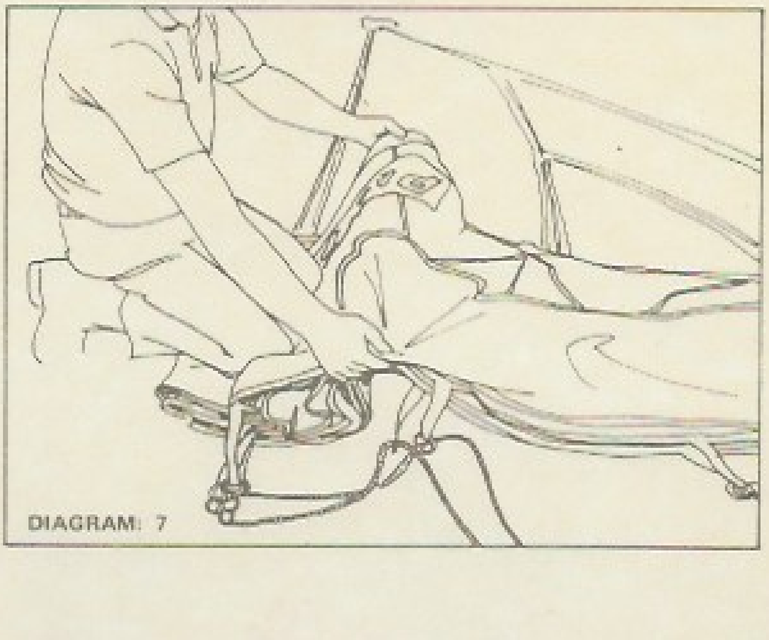


DIAGRAM: 7

(f) Hold the fold in place by kneeling on it, and form another fold in the same manner. Make sure that there is tension on the lines. (Diagram 8)

(g) Continue S-folding the canopy until the trailing edge is on top. (Diagram 9)

DIAGRAM: 8

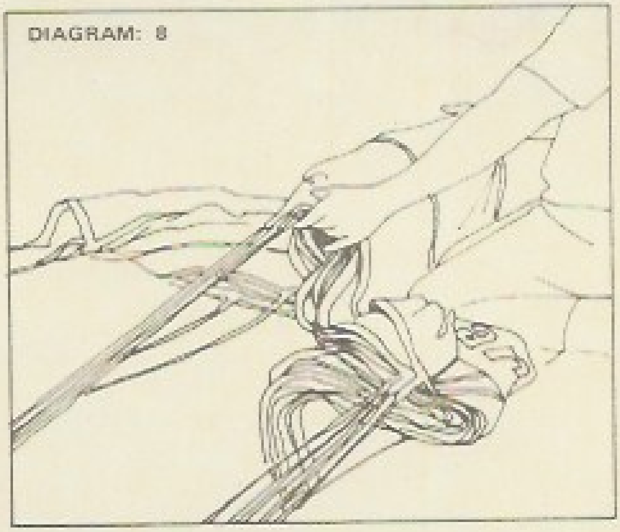
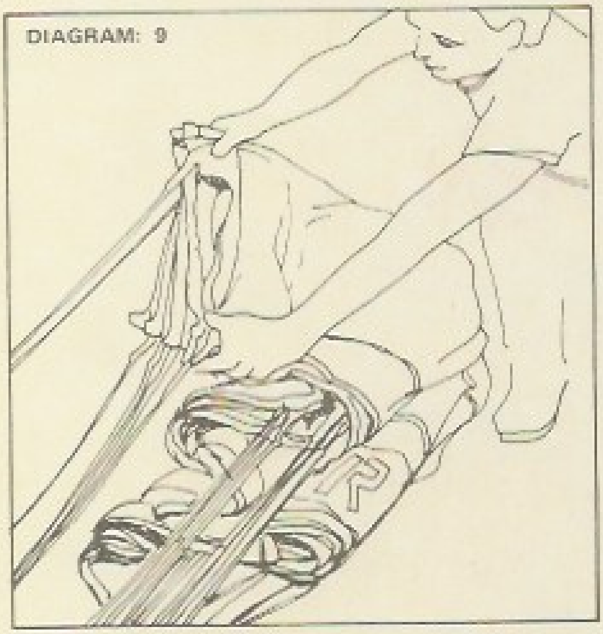
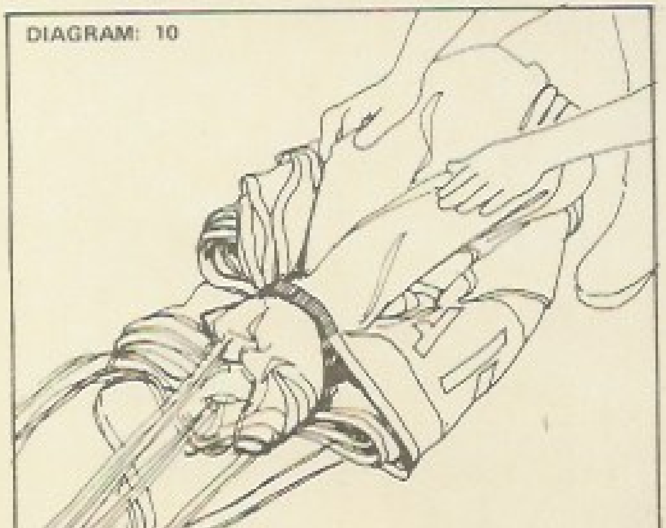


DIAGRAM: 9



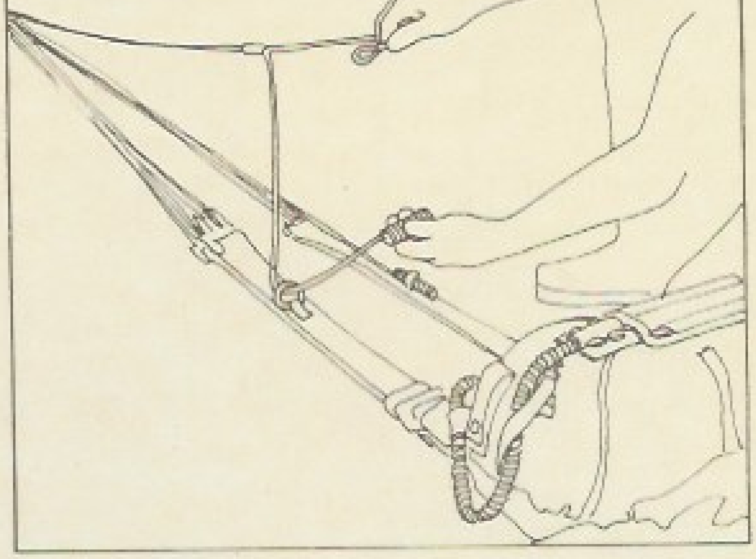
STEP 7. Pick up the trailing edge pleats in both hands and place in the center of the folded canopy. (Diagram 9)

DIAGRAM: 10



(a) Locate the two short Velcro tabs located at the lower edge of each outside tip rib at the 3rd line attach points. Connect the Velcro trailing edge strap over the material of the trailing edge above the control lines. (Diagram 10)

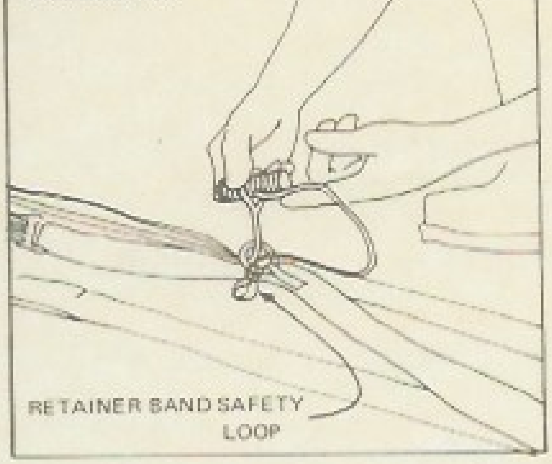
DIAGRAM: 11



STEP 8. ATTACHING THE DEPLOYMENT BRAKES. (Diagrams 11, 12, & 13)

(a) Thread the brake loop through the toggle ring and slip it over the end of the toggle. (Diagram 12)

DIAGRAM: 12



(b) Retain the toggle with a stowing elastic attached to the toggle ring. This eliminates the possibility of a premature brake release during inflation. (Diagram 13)

(c) Stow the excess control line slack in the elastic band attached to the rear riser connector link. (Diagram 13)

(d) Repeat the process for the other toggle.

DIAGRAM: 13

STEP 9. ALIGNING THE RING TABS. (Diagram 14)

(a) Release the harness tie-down.

(b) Align the two main ring tab groups. Both should be even. Pull the lower group with low tabs up until all rings same height.

(c) Separate the two main groups and push the canopy material down and away from the ring tabs. This is done in order to eliminate the possibility of canopy burns. (Diagram 14)

(d) Separate the sub-groups and push the material down and away from the ring tabs. (Diagram 14)

(e) Fold the material back along the sides to form a "V" away from the ring tabs. (Diagram 14a)

STEP 10. PLACING THE CANOPY IN THE DEPLOYMENT BAG. (Diagrams 15, 16 & 17)

(a) Spread the bag retaining strap and make sure that the retardation bridle is correctly routed on top of the strap. (Diagram 15)

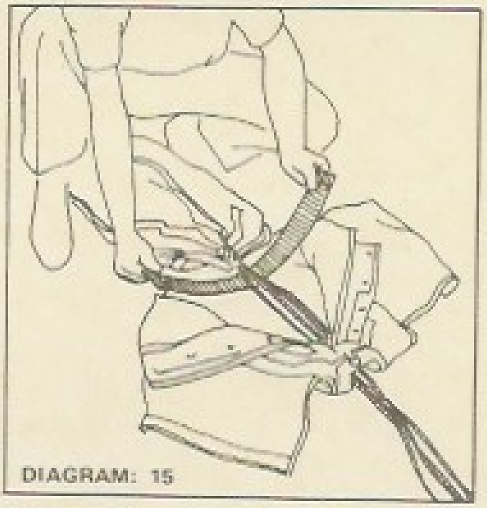


DIAGRAM: 15

(b) With tension held on the bridle line, pull the bag down over the canopy as far as it will go. Be sure that the nose section which is on the bottom is tucked in properly. (Diagram 16)

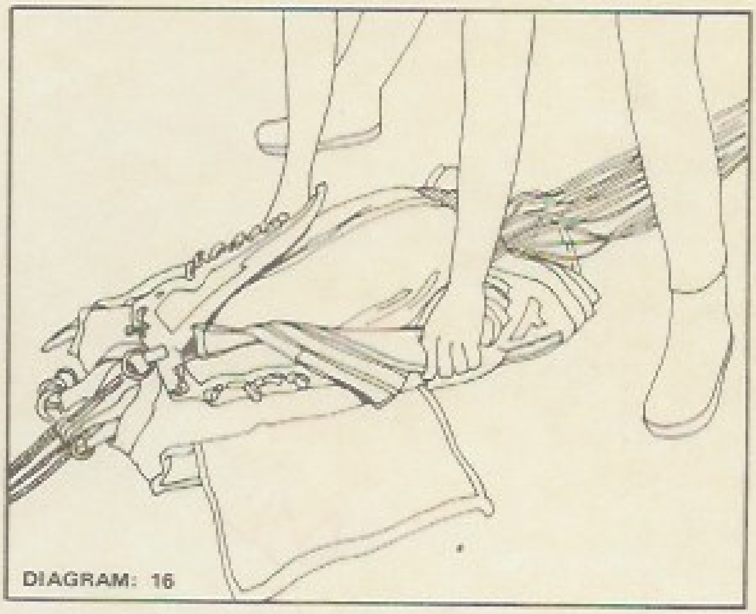


DIAGRAM: 16

(c) Lock the bag retainer strap around the top of the canopy and the retardation bridle as shown. (Diagrams 17 & 18)

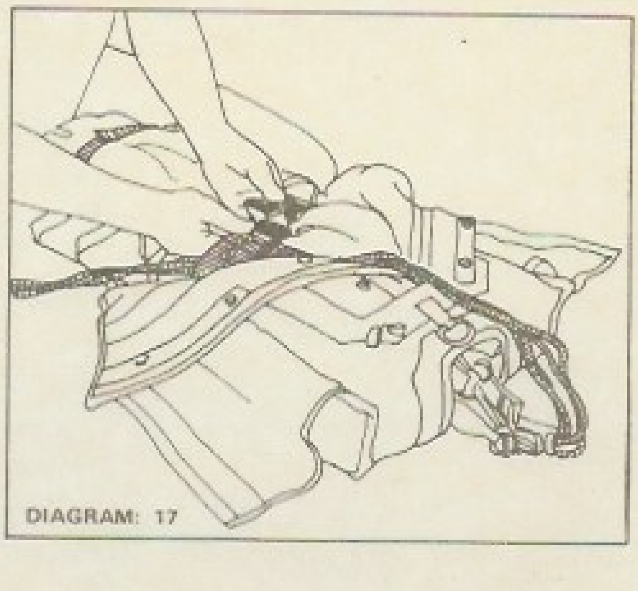


DIAGRAM: 17

DIAGRAM: 18

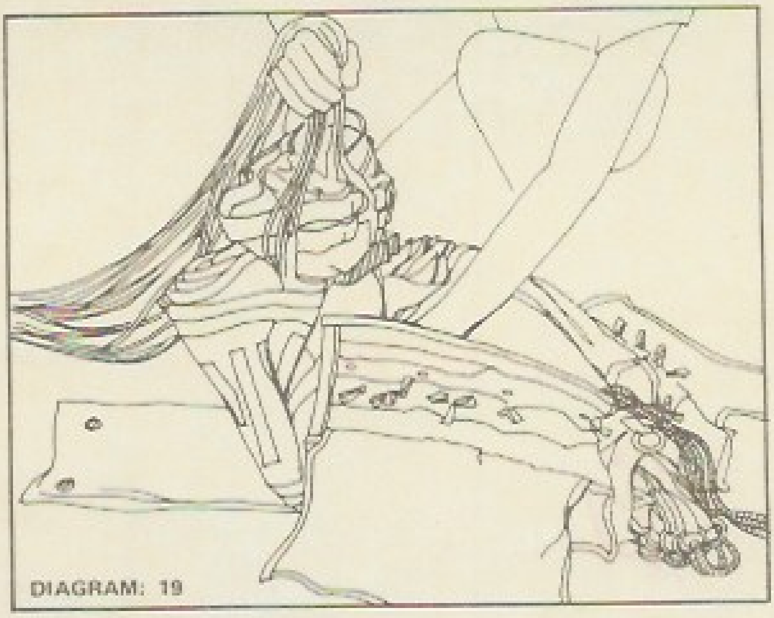


DIAGRAM: 19

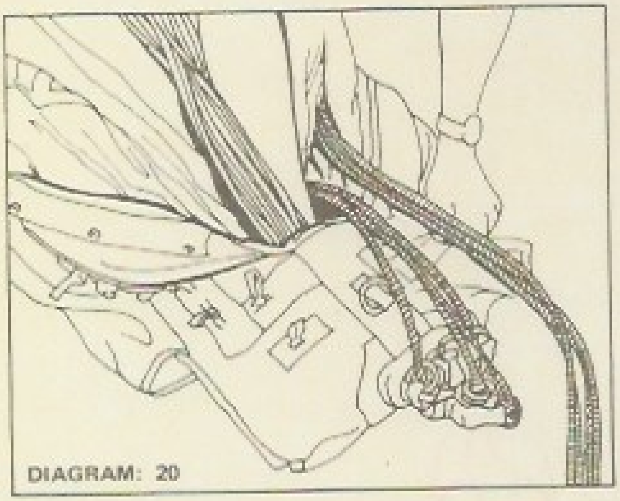
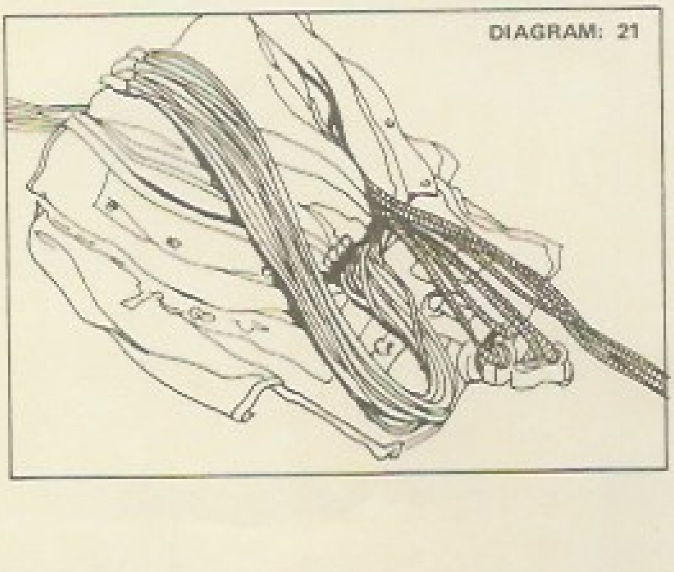


DIAGRAM: 20

(d) Pull the slack out of the bridle lines so that all the rings are pulled towards the bag retainer strap. Make two (2) locking stows to hold bag retainer strap closed, as shown in Fig. 18. Route the bridle lines to the left side of the bag so that they will not interfere with the canopy fold over. (Diagrams 19, 20 & 21)

DIAGRAM: 21



(e) Grasp the suspension lines near the canopy material and S-fold the canopy back into the bag. In doing so, place a hand on the bag retainer strap to prevent it from being accidentally unlocked. (Diagrams 20 & 21)

STEP 11. CLOSING THE DEPLOYMENT BAG. (Diagrams 22 & 23)

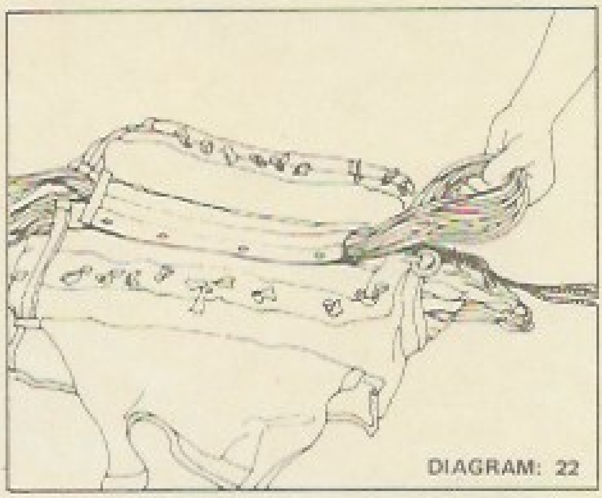


DIAGRAM: 22

(a) Before closing the Velcro flaps, route the suspension lines out the top of the flap and form a loop with the lines. (Diagram 22)

(b) Route the lines back into the bag.

(c) Close the Velcro flap and lock it with the snap fasteners. (Diagram 22)

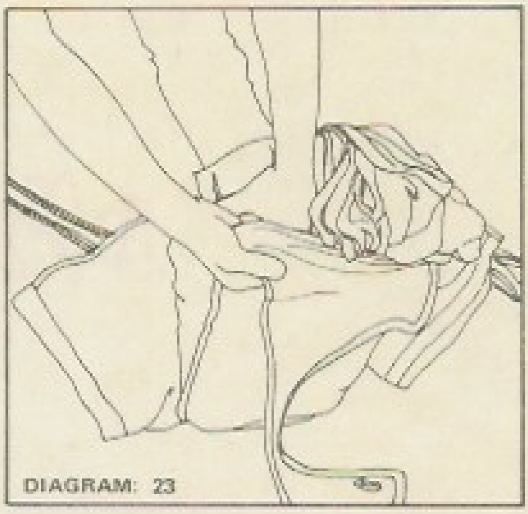


DIAGRAM: 23

(d) Stand the bag up on end and roll the excess material into the bag. (Diagram 23)

(e) Turn the bag over on its side and check to ensure that the Bag retainer strap is not unlocked. If the sides of the bag are slightly pinched in, the strap is in place and properly locked.

STEP 12. STOWING THE RETARDATION BRIDLE. (Diagram 24)

Stow the retardation bridle in the stowing elastics on the top loops. Leave 36" of bridle unstowed from the last stow to the knot on the stop plate to act as a pilot chute bridle cord. (Diagram 24)

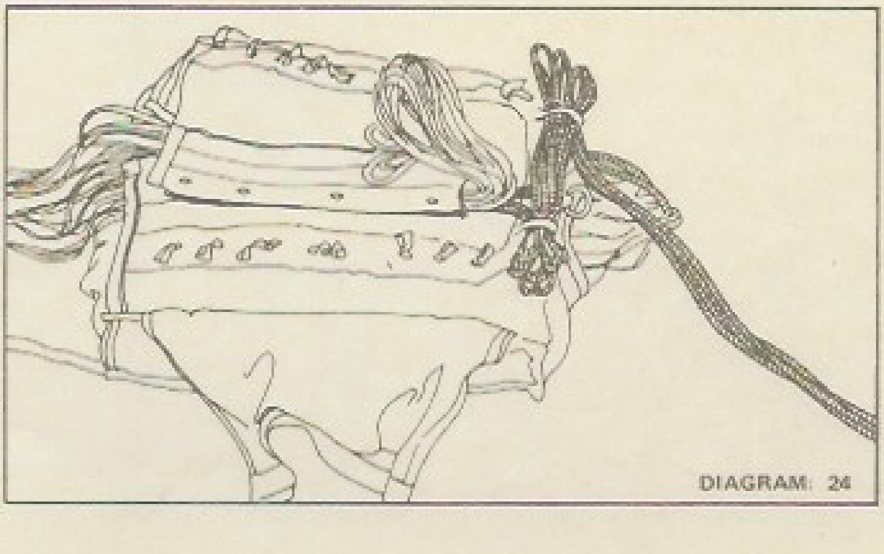
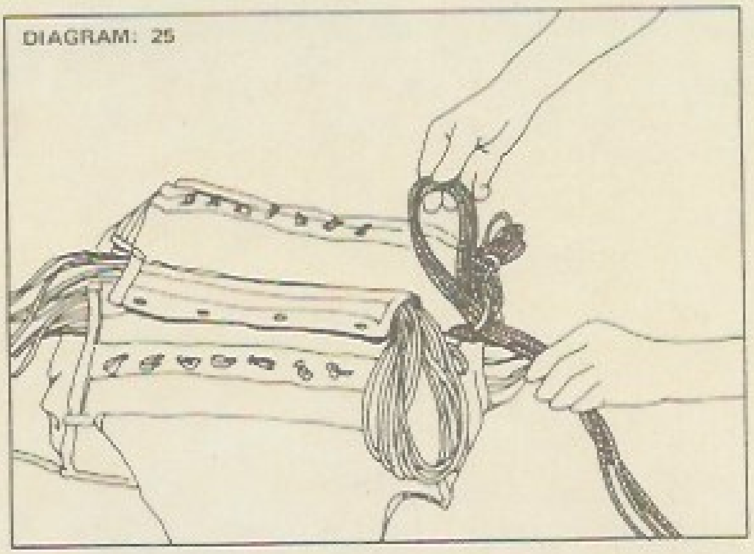


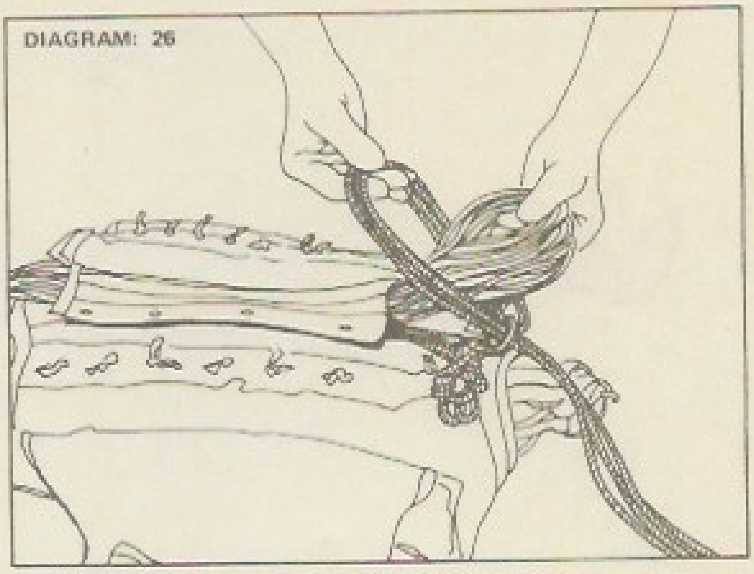
DIAGRAM: 24

STEP 13.
FORMING THE LOCKING STOW.
(Diagrams 25, 26 & 27)

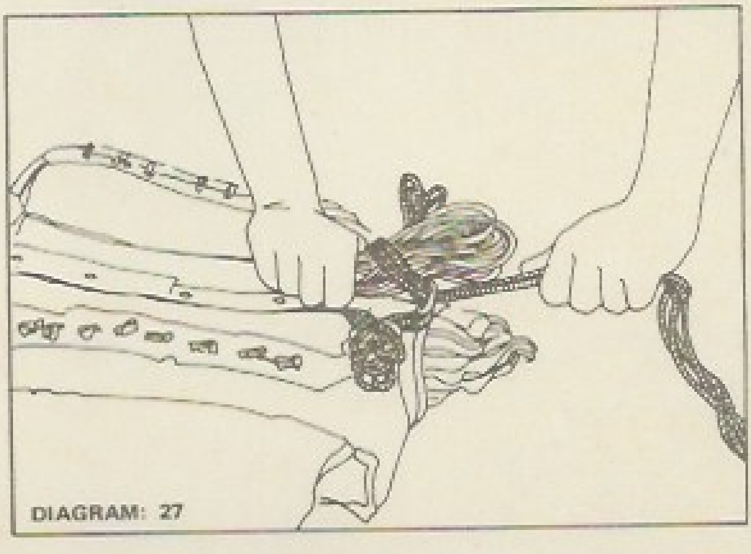
(a) Route the bridle through the metal ring on the bag from the top and form a loop. (Diagram 25)

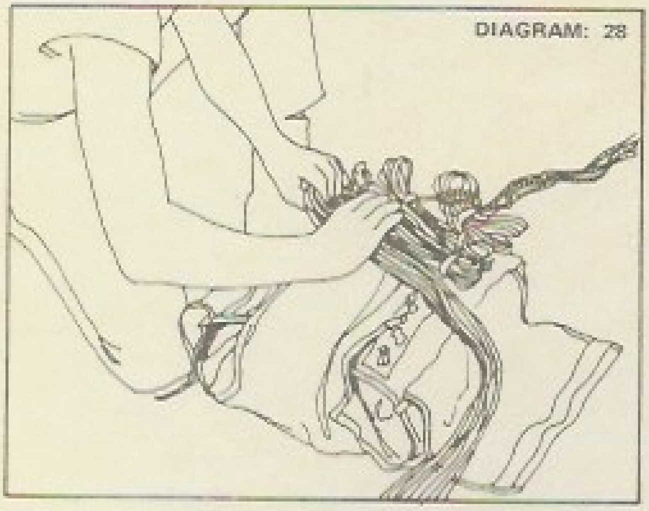


(b) Pass the loop formed by the suspension lines through the loop formed by the bridle. (Diagram 26)



(c) Pull on the bridle and tighten the locking stow. (Diagram 27)

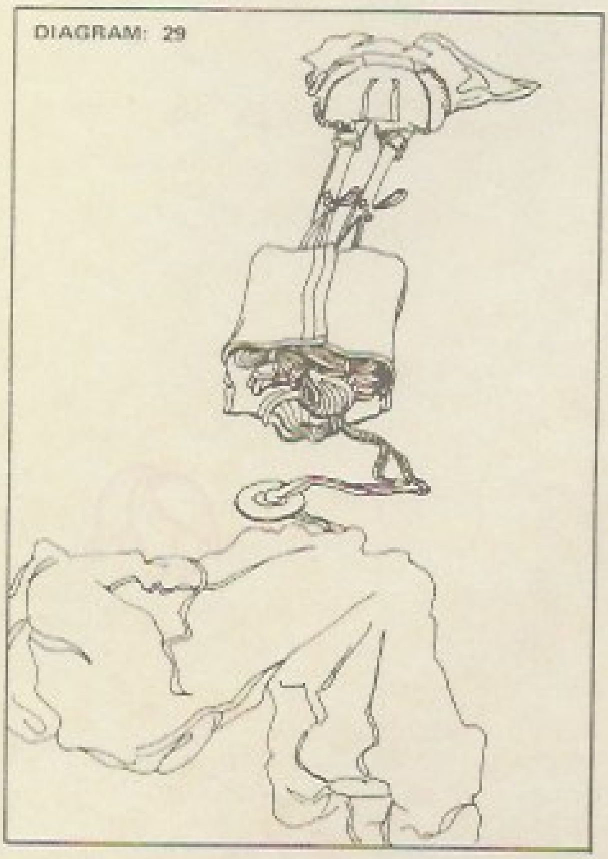




STEP 14. STOWING THE SUSPENSION LINES. (Diagram 28 & 29)

(a) The suspension lines can now be stowed in the normal manner. (Diagram 28)

(b) Close the outer flaps on the bag. (Diagram 29)



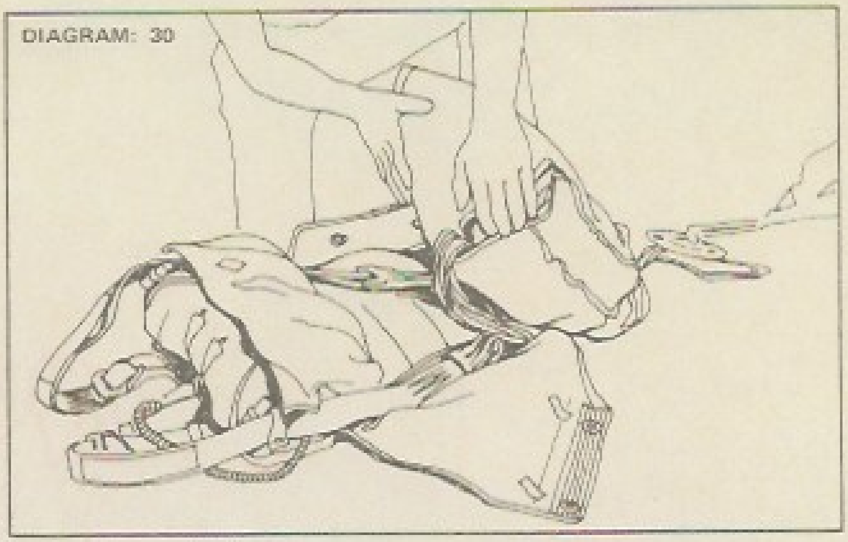


DIAGRAM: 30

STEP 15. PLACING THE BAG ASSEMBLY INTO THE CONTAINER. (Diagram 30)

(a) The bag assembly is lifted straight back and placed in the container with the stowed suspension lines down. (Diagram 30)

(b) Place the twin pilot chutes and stop plate in the container.

(c) The container is now closed in the normal manner. (Diagram 31)

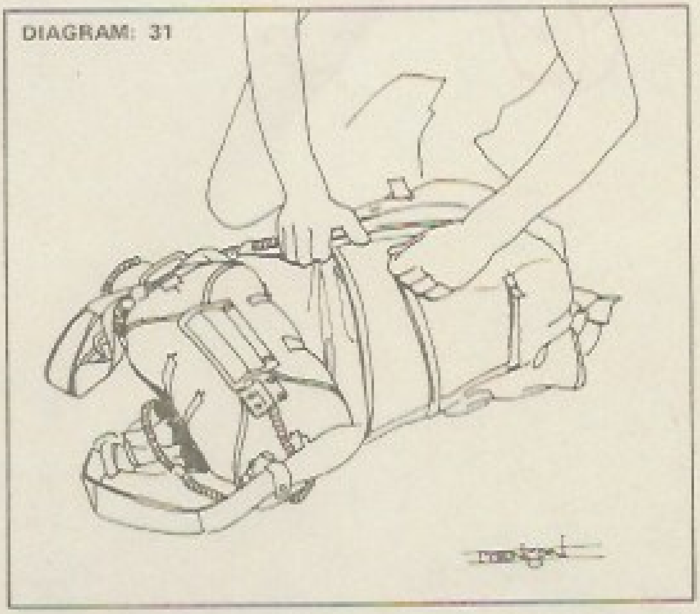


DIAGRAM: 31