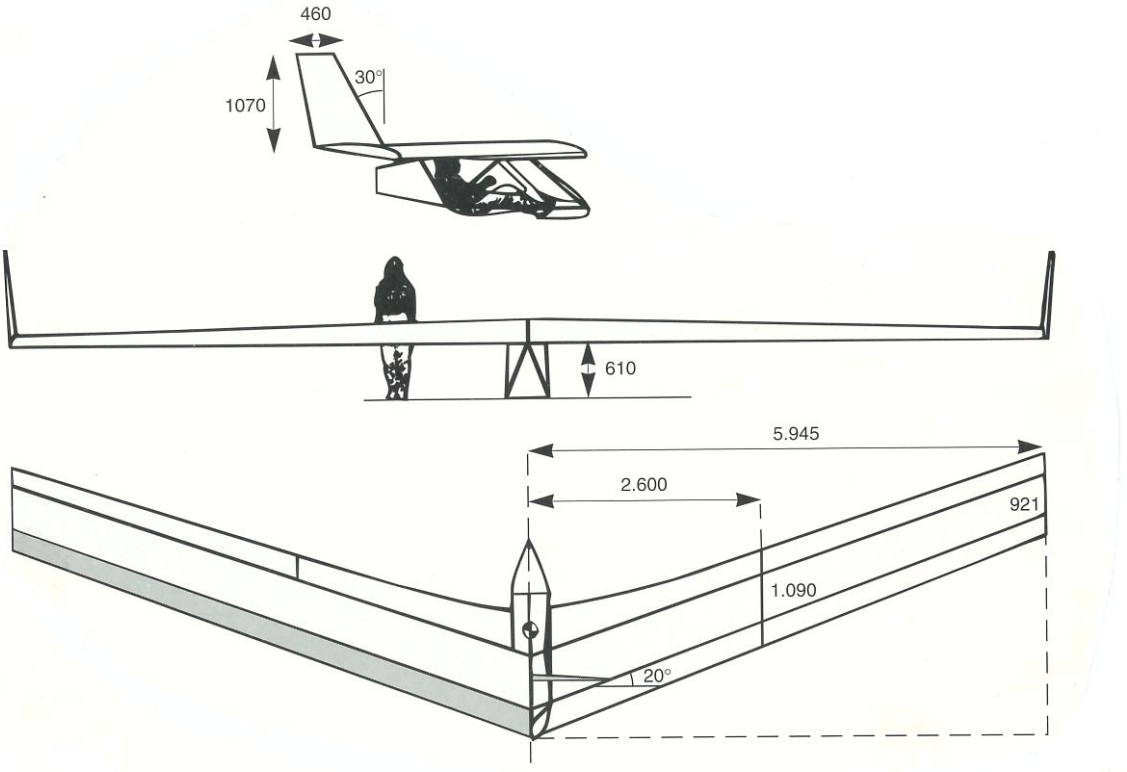
SWIFT

FLIGHT MANUAL



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INTRODUCTION

Congratulations, and welcome to the world of true high performance hang gliding. With ownership of a SWIFT comes handling and ease of control, sink rate, glide ratio, high speed glide, and glide slope control unparalleled in the realm of foot-launched flight. The SWIFT was developed as a rigid-wing hang glider that could truly be called a foot-launch sailplane. The SWIFT extends the performance envelope of hang gliding while allowing for very light control pressures and the ability to control glide slope for easier landing approaches. The SWIFT exhibits comfortable and predictable flight characteristics with the quality of materials and construction expected in an exceptional aircraft.

It is very important to treat your SWIFT with care, understanding, and respect to insure the glider receives the many hours of flying it deserves. It is therefore **essential** that this manual be read carefully and completely before assembly and flight. Control systems, preflight procedures, and periodic inspections must be understood and practiced. Nearly all of the features and parts of the SWIFT are different from other hang gliders on the market today. If there are questions that are not addressed in this manual or cannot be answered by your local dealer, please feel free to call or write the factory for additional information.

Flying a rigid wing glider with control surfaces like the SWIFT does not require any extraordinary skill on the part of the pilot, however, the SWIFT requires that the pilot learn and understand a different type of control system and its responses. It is strongly recommended that some basic instruction in conventional sailplanes be completed prior to flying the SWIFT. It is imperative that the pilot adheres to the placarded airspeeds. Unlike conventional flex wing gliders, the SWIFT is capable of flying significantly faster than its Vne (velocity never exceed). Flying the SWIFT faster than its Vne may result in structural damage or failure.

The performance and handling of the SWIFT will feel different, so caution must be used during the transition period to an unfamiliar glider. Patience and understanding are very important, and remember: "Better to be on the ground wishing you were in the air, than in the air wishing you were on the ground."

OPERATING LIMITATIONS / DISCLAIMER

Placards bearing test flight information and operating limits are located on the left wing trailing edge near the wing root. Care should be taken to note the operating limitations which are clearly stated on the flight operation placard and described below.

Flight operation of the SWIFT should be limited to non-aerobatic maneuvers, i.e. those in which the pitch angle will not exceed either 30 degrees nose up or nose down of the horizon, and in which the bank angle will not exceed 60 degrees. The SWIFT was designed for foot launched soaring flight. It was not designed to be flown tandem, tethered, or motorized. Operation in any of these modes may severely compromise the pilot's safety, and is strongly recommended against. The SWIFT will strongly resist spinning, and will tend to recover quickly from a spin once control pressures are relaxed without entering extreme attitudes or extreme loss of altitude.

Recommended pilot weight range: 120 - 220 lbs (54-100 Ks)

Stall speed @ max. recommended wing loading: 25 mph (40 kph)

Top speed @ min. recommended wing loading: 75 mph (120 kph)

Vne [Velocity (to) never exceed]: 75 mph (120 kph)

Load limits: +6 g's positive, -4 g's negative

A USHGA pilot rating of Intermediate (or foreign equiv.) or higher, or certified FAA glider pilot rating is required to fly the SWIFT safely after having completed basic transition training. Flight operation by unqualified pilots may be dangerous and is prohibited.

WARNING - The owner and/or operator must understand that, due to the inherent risk involved in hang gliding, even when practiced under ideal circumstances, hang gliding can result in accidents, serious injury, or death. You are reminded that you fly a hang glider at your own risk, and your acceptance and/or use of this product implies your agreement with this stipulation. Bright Star Gliders, Inc., its officers, employees, heirs, or assignees has no control over a pilot's use of his/her glider, either in transit, storage, or flight. Operations such as aerobatic maneuvers or erratic pilot technique may ultimately produce equipment failure. Bright Star Gliders, Inc. accepts no responsibility what ever for any mishap that may occur during the use of the glider, regardless of the results.

ASSEMBLY

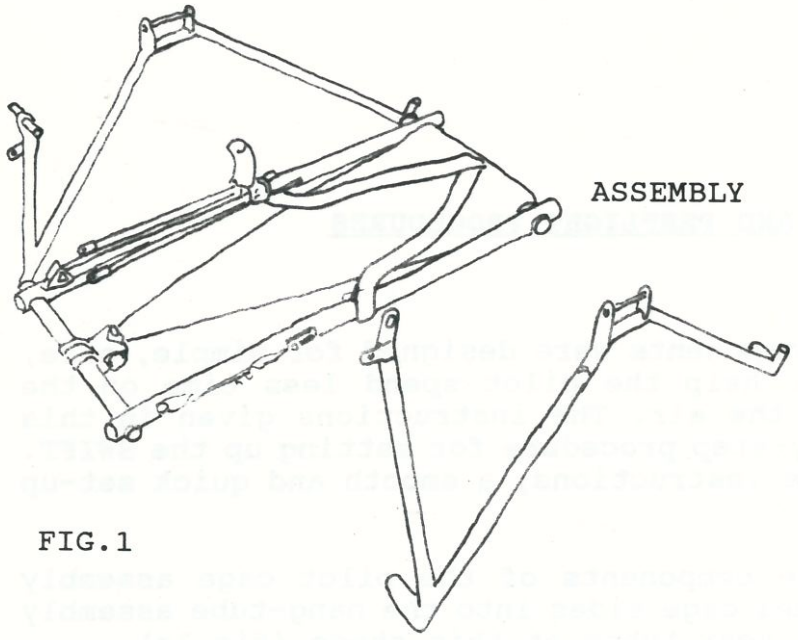

FIG.1

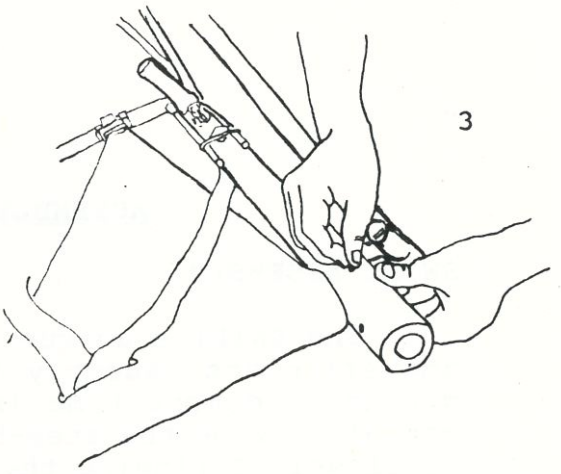

FIG.1a

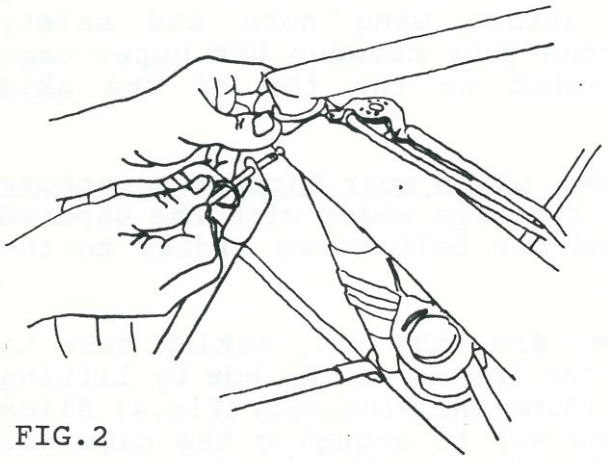

FIG.2

FIG.2a

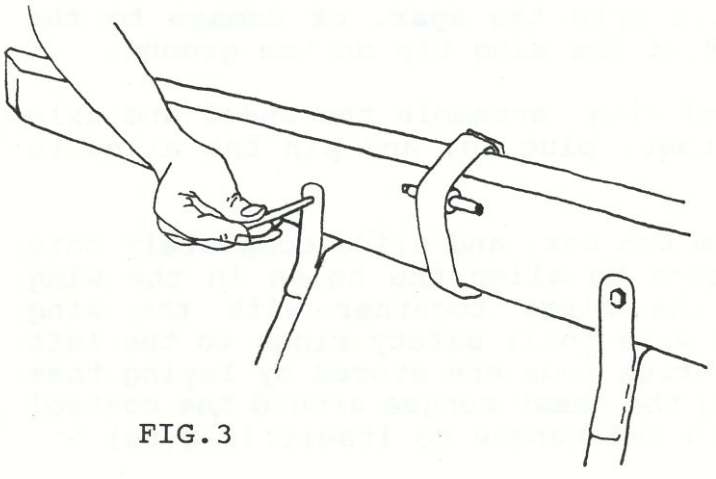

FIG.3

FIG.4

ASSEMBLY AND PREFLIGHT PROCEDURES

SWIFT ASSEMBLY

The SWIFT's unique components were designed for simple, safe, and efficient assembly to help the pilot spend less time on the ground, and more time in the air. The instructions given in this manual provide the step-by-step procedure for setting up the SWIFT. By closely following these instructions, a smooth and quick set-up can be assured.

1. Begin by removing the components of the pilot cage assembly from the box. Plug the steel cage sides into the hang-tube assembly (fig.1), pinning only the rear tubes at this stage.(fig.1a)

2. Feed the cage-front bolts up through the nose-skid arms (long arm first) and hang-tubes, and attach wing nuts and safety rings.(fig.2) Pin the top of the nose-tube between the upper cage front tabs, and velcro the foot-rest to the top of the skid arms.(fig.2a)

3. Remove the main spar from the box, slide spar through parachute bridle. Bolt the spar to the top of the cage sides with the tapered ends of the spar sweeping back, and the bolt holes closer to the bottom of the spar.(fig.3)

4. Carefully remove the upper wing from the box, making sure to avoid dragging the control rods on the inside of the box by lifting the trailing edge slightly while sliding the wing out.(fig.4) Slide the wing onto the main spar all the way to engaging the cage and spar locator pins into the root rib.(fig.4a) If the wing does not slide smoothly, wiggle the cage a bit or get some assistance until practiced. **Never force the wing onto the spar, or damage to the sparbox and wing may result.** Rest the wing tip on the ground.

5. Before attaching the second wing, assemble the wheel and axle halves. Lift the rear of the cage, plug in, and pin the axles to the hang-tubes.(fig.5)

6. Remove the second wing from the box, and slide completely onto spar and locator pins. Make sure to align the holes in the wing connector tangs.(fig.6) Pin the wings together with the wing connector pins that are stored with their safety rings to the left wing control rod. Note: The control rods are stored by laying them against the hang-tube, wrapping the chest bungee around the control rods and hang-tube, and hooking the bungee to itself.(fig.6a)

7. Once the wings are pinned together, hook-up, pin, and safety the control rods at the wing root. It is important to hook-up the flap and elevon controls at the hang cage before attaching the control surfaces. The ends of the control rods inside the wing

ASSEMBLY

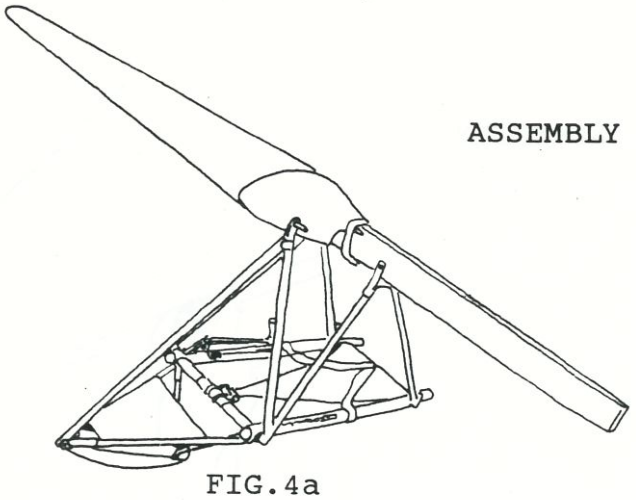

FIG.4a

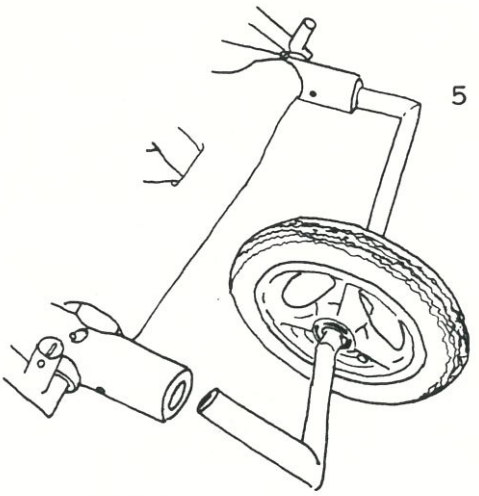

FIG.5

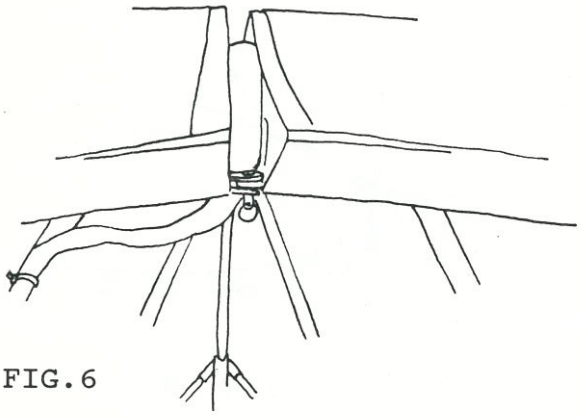

FIG.6

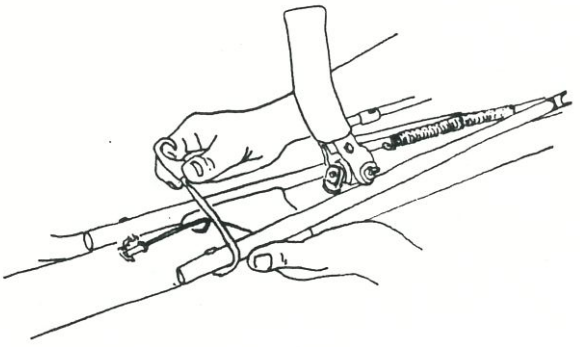

FIG.6a

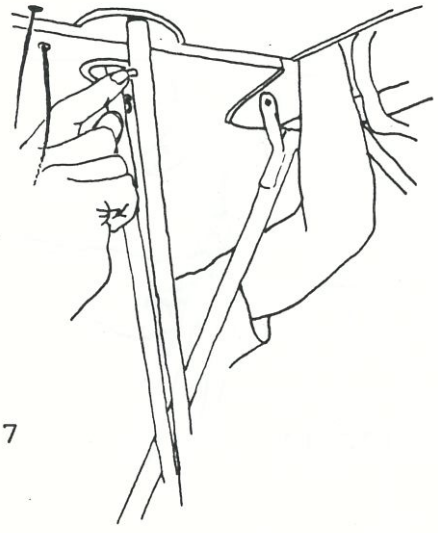

FIG.7

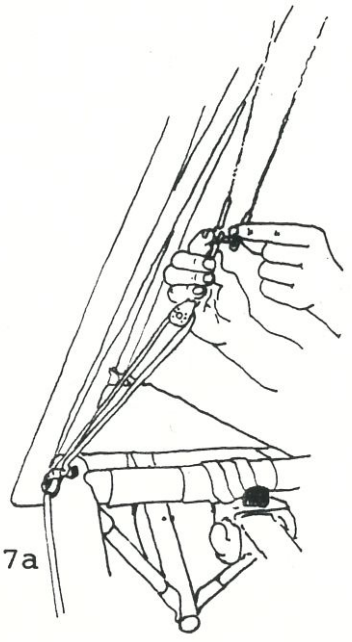

FIG.7a

ASSEMBLY

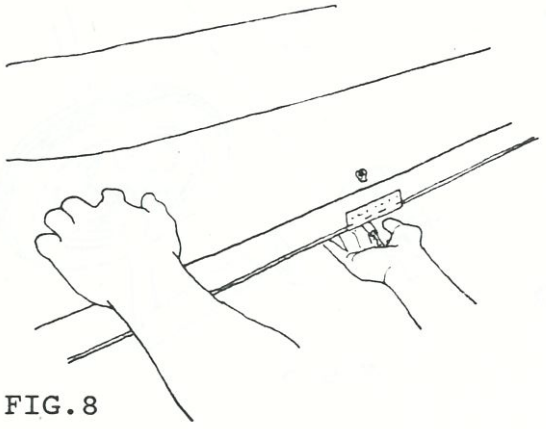

FIG.8

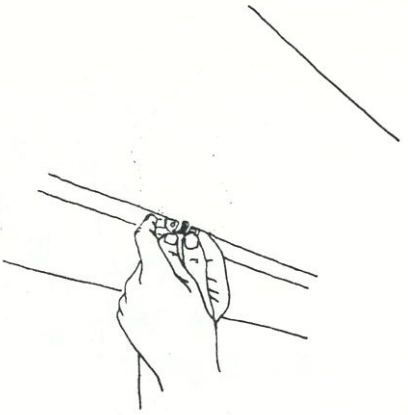

FIG.8a

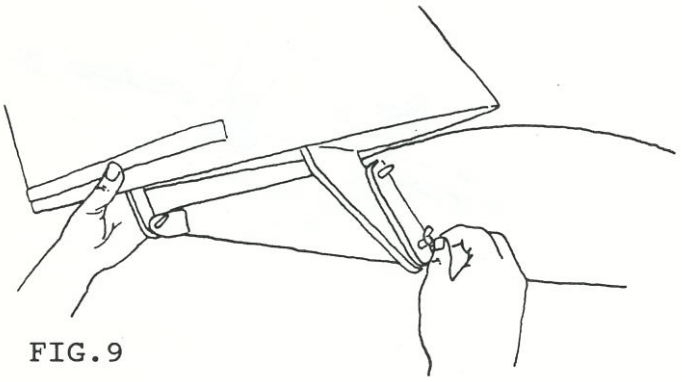

FIG.9

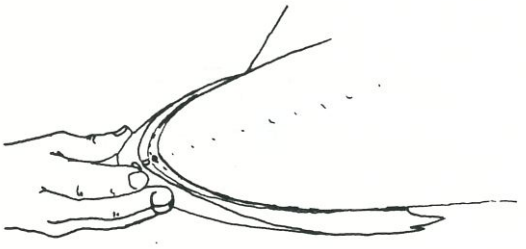

FIG.10

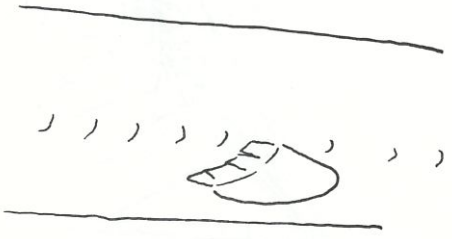

FIG.11

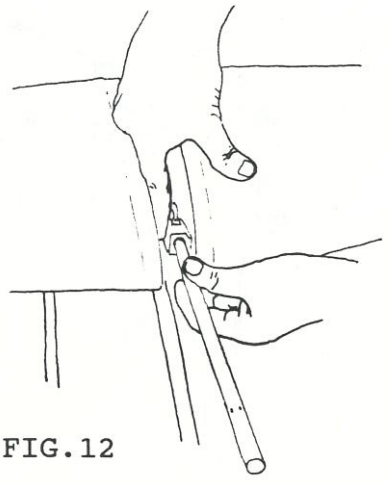

FIG.12

can be pulled down by reaching into the wing through the spar opening, and feeding them down.(fig.7) Pull down, and pin the flap cables to the flap control rope at the pulley.(fig.7a) Before hooking-up the flaps, "pull-on" 10-20 degrees of flap with the control rope. This will make hooking-up the flaps easier.

8. The flap push rods are engaged in the trailing edge for storage. Push and release to hook up.(fig.8) Hook up the flaps and elevons by flipping them over and pinning to the control rod ends.(fig.8a)

9. While removing the winglets from the box, carefully note how they are packed as they only fit in one way. Mount the winglets by removing the wingnut and safety, and lining up the winglet spar pins with the holes in the mounting spars on the wing tip. Slide the winglet forward engaging the pins fully, and attach the wingnut and safety.(fig.9)

10. The wingtip fairings are attached by sliding them over the winglet spars from front to back, snap into place, and press closed the velcro.(fig.10)

11. Velcro the vortilons to the leading edge with the flange angled towards the hangcage.(fig.11)

12. Extend the pitot tube forward, and velcro into place.(fig.12) Connect the airspeed indicator. Slide the nose cone over the pitot tube, and velcro into place.(fig.12a)

13. Mount the back-up parachute with the rocket pointed up and back. The firing cable should be routed under the parachute, and the handle assembly is clipped to the shoulder strap. Attach the parachute bridle to the cage bridle with the carabiner.(fig.13)

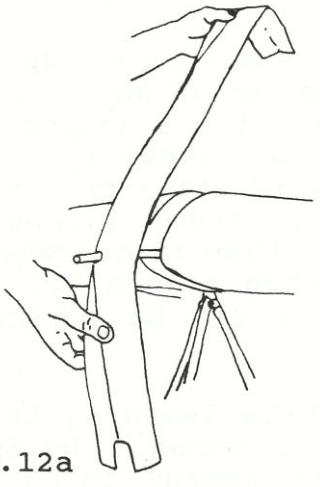

FIG.12a

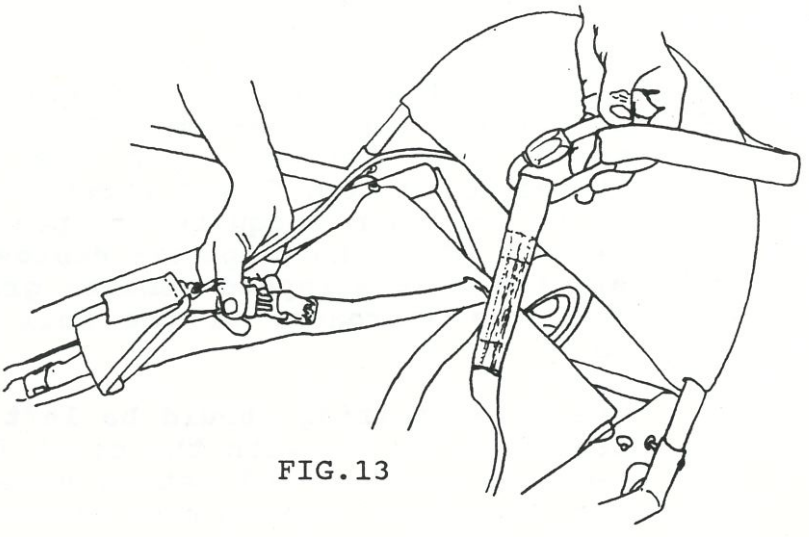

FIG.13

LAUNCHING, FLYING, & LANDING THE SWIFT

The SWIFT is the first true hybrid hang glider/sailplane that only utilizes weight-shift for minor trim adjustments. The controls of the SWIFT consist of elevons for pitch and roll, and flaps to adjust trim speed and glide slope. Operating the elevons is accomplished with a side-mounted control stick. Pilots trained on flex-wing gliders adapt easily to the use of stick actuated control surfaces when flying the SWIFT. Pilots with experience using a stick in other aircraft find the transition natural, but caution must be exercised when learning to fly any new glider, and especially with a glider as different as the SWIFT.

Moving the stick side-to-side actuates the elevons opposite to each other. When the stick is moved right, the right elevon goes up while the left elevon goes down, initiating a right turn. When the stick moves left, the left elevon goes up while the right goes down, initiating a left turn. Moving the stick forward and back actuates the elevons in unison, with forward stick resulting in down elevon pitching the nose down, and back stick raising the elevons and the nose.

Very simply, the control stick is moved right for right turns, and moved left for left turns; it's moved forward to speed up, and back to slow down. It is important to remember that the SWIFT will adverse yaw somewhat during turn initiation at slow speeds. Once desired bank angle is achieved, adverse yaw disappears. **Increasing airspeed is always the best way to increase control response.**

The flaps are controlled with a rope and clamcleat. Pulling the rope adds flap deflection and slows the wing while pitching the nose up slightly. Thorough knowledge of all the flight characteristics of the SWIFT at various flap settings is necessary in order to fly the SWIFT safely.

As the flaps are deployed, the nose of the wing goes up, and airspeed trims slower. With full flap deployment at 45 degrees, the SWIFT's trim speed drops 6-8 mph (9-13 kph) from the 0 degree flap trim speed. The tendency for the flaps to slow the wing necessitates using significant amounts of forward stick on landing approach to maintain adequate airspeed through the gradient and ground effect. **When the flaps are deployed more than 30 degrees, it is imperative that airspeed remains greater than 26 mph (42 kph) throughout the approach, or the roll response may be adversely affected.**

The pilot fairing should be left off while learning to fly the SWIFT. When flying with the pilot fairing attached, the SWIFT will speed up quicker and retain more of its energy throughout maneuvers. The pilot fairing also closes the gap between the flaps,

which generates more lift in ground effect. At least 10-12 landings following an approach should be performed without the pilot fairing before attempting to land with the fairing. Landing **without** the pilot fairing is easiest with 30-35 degrees of flap (less can be used in higher winds), because flair timing is less critical. Landing with the fairing calls for using additional flap deployment (up to 45 degrees in calm winds), to counter the reduced drag and closed-off center section.

Flap settings for various flight segments are as follows:

Launch:	20 deg. (to as little as 10 deg. in high wind)
Climbing:	10 deg. (minimum sink setting)
Best L/D:	0 deg. (uniform non-sinking air)
High Speed:	Reflexed (interthermal sink)
Landing:	35 deg. (without fairing)
	45 deg. (with fairing)

In addition to the flaps, the pilot's leg positions contribute to trim changes in the SWIFT. The SWIFT is designed to fly trimmed at a minimum sink speed of 27 mph (43 kph) with both feet on the back of the foot rest, and the flaps set at 10 degrees. By straightening one leg, the trim speed goes up several miles an hour. With both legs straight, the trim speed will be 7-10 mph higher than with both legs back, depending on the size and shape of the pilot.

RUNNING ON FLAT GROUND

Though the SWIFT is easy to fly, it requires the combined skills of hang gliding and sailplanes. All pilots, irregardless of prior experience, **must** practice flying the SWIFT from the training hill before attempting further foot-launched flight. **It is important to understand and remember that the SWIFT flies at a much lower angle of attack than other hang gliders.** Running the SWIFT on flat ground allows the transitioning pilot to acquaint themselves with the control system, without the distraction of flight.

After performing a thorough preflight inspection, and assessment of the current wind conditions, you are ready to begin. Getting in to the SWIFT in light winds is accomplished by releasing the seat mechanism, raising the back of the cage and rocking up onto the front skid, while letting one wingtip rest on the ground. The cage should be raised high enough to allow the pilot to hold it up with one hand while climbing in from underneath the cage. Once the shoulder straps are on, bend your knees and move forward in the cage until the glider can rock back while standing up (avoid LIFTING the nose with your back). A quick readjusting of position should have the glider balanced hands-off. A little practice goes

a long way.

The SWIFT was designed to respond quickly to control inputs. Once the basic control inputs are practiced, the pilot begins launching and landing from progressively higher on the hill. While practicing launch technique, it is important that the control stick is handled lightly to allow the glider to find the right angle of attack and fly off the hill.

FLIGHTS FROM THE TRAINING HILL

A good way to judge the proper angle of attack to use when launching on a slope, is aligning the hang tubes of the cage to parallel the slope. Once running has commenced, be sure to let the glider seek a trim angle of attack. There is a strong tendency to hold the glider on the ground with the stick during the run. Try to relax the stick hand while running, and let the SWIFT fly. Although the SWIFT has very mild stall characteristics, **launching with the wing stalled is extremely difficult** at best.

While flying the SWIFT from the training hill, the flaps should be set to 20 degrees. It is not necessary to adjust the flaps for landings on the training hill. The SWIFT may be landed with the flaps set to 0 degrees, but the glide in ground effect increases considerably and any extra airspeed is converted to altitude during the flair.

Landing the SWIFT requires a modified flair when compared to conventional flex-wing gliders. Pilots should avoid full-stop vertical descent flairs, as the weight of the glider is transferred instantly to the pilot through the shoulder straps. Landing with a smooth flair, culminating in a two or three step slow-down allows the weight of the glider to transition smoothly to the pilot.

Training hill flights should continue until the pilot has mastered smooth, strong, and consistent launches followed by safe landings on the feet before attempting high altitude flights.

5. HIGH ALTITUDE AND SOARING FLIGHT

When first flying the SWIFT from high altitude, pick a site with plenty of room on launch, and one that affords a long straight flight away from the hill to allow ample time and space to practice maneuvers. The SWIFT displays straightforward flight characteristics in all aspects of flight, yet demands the pilot be aware of certain distinct differences between it and other gliders currently in use. The wing span is more than 6 ft. (2 meters) longer than gliders of similar area, and requires awareness when flying close to other gliders, trees, and/or ridge. The additional span must also be accounted for at sites with restricted set-up and launch areas.

The SWIFT achieves minimum sink at 27 mph (43 kph), with minimum controllable airspeed at 20 mph (32 kph). When flying close to the hill, pilots should maintain 27-30 mph (43-48 kph) for safe control response. Pilots should be careful not to over control the glider in pitch, as response is light, and may seem accentuated by rapid acceleration of the glider due to its low drag. The glider will stall nose first in a controllable mush, without any tendency to drop a tip. The SWIFT is difficult to spin, and if spun will recover by itself after one revolution. Immediate spin recovery is achieved by pushing the stick forward and opposite the spin. Increasing airspeed is always the best way to increase control response.

Best glide speed is higher than on other hang gliders, and is achieved at 35 mph (56 kph) without the fairing and 38 mph (61 kph) with the fairing. The SWIFT retains a great deal more energy than other hang gliders, and is excellent at "dolphin flight" when flown with proper techniques. Refer to the airspeed indicator often in order to optimize the performance of the SWIFT throughout its broad speed range. Remember to perform all maneuvers for the first time with plenty of altitude and ground clearance.

LANDING

Landing the SWIFT is in some ways easier than on a flex-wing glider due to the addition of glide slope control through use of flaps. Always attempt to make landings with a long, straight final approach straight into the wind. An aircraft approach is recommended as it segments the stages of landing.

While on the downwind leg, flaps should be set to 20 degrees, unweight the seat (hold body up), and release the mechanism. On the base leg, pull flaps to 30 degrees while maintaining at least 27 mph (43 kph). When on final approach, set flaps for landing at 30-40 degrees, push stick forward to maintain plenty of airspeed, and lower legs down for landing. Round out smoothly by sliding body back while holding stick forward, and use stick to complete flair.

Practice flying the glider at various flap settings with plenty of altitude to become completely familiar with responses before trying it on landing approach. Releasing the flaps while on a steep approach is dangerous, as the glider will accelerate fast towards the ground. Always let the nose come up before releasing the flaps.

TRANSPORTATION

The SWIFT should always be transported in its box. The skins are very strong for their weight, but can be damaged if care is not taken to avoid sharp objects. If transporting without the box, be sure to protect the wings from puncture and crushing damage.

SWIFT Manual Addendum

PILOT FAIRING ASSEMBLY

Fairing Parts:

Kevlar fronts with doors (left and right)
Kevlar tailcone halves (left and right)
30 mil Lexan front piece (heavier material)
20 mil Lexan side panels (right with stick bubble cutout, left side flat)
20 mil Lexan overhead panel (with attached Dacron piece)
30 mil Lexan control stick bubble

*Note: It is easiest to assemble the fairing after the cage has been assembled, but before the wings have been put on.

Begin assembly by velcroing the Kevlar front halves together. Feed the front bungees through the pad eye and hook each bungee to the opposite side tab (so the bungees cross under the pad eye). Velcro the tailcone halves together, taking care to join them tightly in the back for a better overall fit.

Join the front and rear Kevlar sections. Hook the bungees to the grommets on the outside of the tailcone by crossing them in front of the wheel cutout. Slide the whole Kevlar assembly under the cage with the wheel through its cutoput in the tailcone. Finish assembling the rest of the glider with wings.

Velcro 30 mil frontpiece to nose of Kevlar and cage sides, making top edge flush with wing. Velcro control stick bubble into right side cutout. Attach side panels to Kevlar and cage.

When attaching the overhead panel of Lexan, the Dacron piece will be velcroed to the trailing edge of the wings at the root with the attached stickyback Vecro. The nose cone should be attached after the overhead piece to cover the front edge.

The SWIFT may be entered from underneath or by opening one side of the overhead piece oand climbing in from above. Make sure all Velcro is firmly attached or a panel could potentially blow off in flight. In warm weather it may be preferable to add snap-in adjustable vents to the side panels (available from any aviation supply).

When flying with the fairing on the SWIFT, allways remember that acceleration increases, and energy retention is much greater when landing. These will increase floating in ground-effect, and make it easier for a pilot to over speed the wing in a dive. Watch the redline speed.

Second Chantz

Aircraft Recovery Systems, Inc.

Filling and Use Instructions for the A.I.R. Deployed Recovery System

Caution!!! Even though the AIR deployed system is safer than the traditional explosive rocket, **TREAT THIS SYSTEM AS YOU WOULD ANY LOADED WEAPON !!!**

Step one: Find a SCUBA tank.

First, find a SCUBA tank that has between 2500 and 3000 psi pressure. **Do not go to a Scuba shop,** as they are not likely to want the liability of filling a parachute deployment device. There are literally millions of SCUBA divers in the world, and a few phone calls to your sporting friends should land you a fill tank to use. European SCUBA Tanks will need a DIN attachment to adapt to the yoke fitting supplied by Second Chantz.

Step two:

Remove the o-ring plug from the filling end of the rocket motor, using an Allen wrench. The o- ring plug is on the end of the device, not the side. Do not confuse the filling port with the burst valve plug on the side. Next, insert the yokes male o-ring fitting and hand tighten it into the female fitting on the rocket motor, making sure that its o-ring is seated. Do not use a wrench to tighten.

Next, place the yoke fitting onto the SCUBA tank, and hand-tighten the yoke knob, while making sure that the yoke is seated against the tanks' o-ring seal. Tighten the bleeder valve on the side of the yoke. Support the rocket motor so that all its weight is not on the yoke during this process.

Aim the system away from people in the area, and then crack the valve on the SCUBA tank. You will hear a hissing sound as the system pressurizes, and the rocket motor begins to fill. Filling is acomplished through a one way ckeck valve inside the system.

Important!!! When air compresses, it heats up rapidly. Make sure that you fill the rocket tank as slow as possible. We recommend a filling rate of 100 psi per 5 seconds.

Step three:

After maximum pressure is transferred to the rocket motor, close the tank valve, and back-bleed the filling attachment before removing the fitting. As you bleed the pressure from the yoke fitting, watch the pressure gauge on the rocket base and make sure that the system is not losing pressure through a rare check-valve leak. If it is, we recommend that you bump the system with pressure a few times until the check valve makes a better seal. This is a rare occurrence. After removing the fill attachment, inspect the check-valve seal by placing water into the fitting and watch for bubbles. Replace the o-ring plug as a future guarantee against leakage.

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Second Chantz

Aircraft Recovery Systems, Inc.

Draining the System for Airline travel.

Using a 1/2 inch socket or end wrench, crack open the burst valve on the side of the filling end of the rocket. Air will immediately hiss out of the fitting and drain in a few minutes. Do not remove the burst valve completely, as there is a nylon washer that can fall out. Leave about 100 psi in the system to help the check-valve ball remain on its original seat.

If your system is losing air pressure, determine where the leak is and try to tighten the fitting. If you can not stop the leak, return it to the factory for a free fix. Second Chantz will return it to you after one day in the factory.

Ground Testing Your Parachute System.

If you wish to deploy your system in a ground test, do so taking special care that your parachute is properly rigged, and that you deploy your parachute away from structure or people. Deployments should be aimed at a 45 degree angle up, down wind, with the bridle not attached to the harness. **Use gloves, ear and eye protection.** Soft ground will keep the rockets' nose cone from being damaged during the test. Please have the maximum allowable pressure in the system for best results. A successful deployment on the ground will give you more confidence in the system. Be aware that a system that is not properly secured to the harness can cause damage to the harness, or break free from the mount location. A deployment will send your parachute up to 100 feet away. **Second Chantz will not be responsible for any damage or injuries resulting from any type of tests or deployments.**

Warning!!!

Do not attempt to re-load the system yourself. The release mechanism must be re-built using Second Chantz Inc., approved parts, procedures, and trained personnel. It is not expensive to have us re-load your rocket...your life could depend on it!

For current quotes on reloads after use, please call the factory.

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In- Flight Emergency Deployments.

OK... You've attached your parachute correctly, you are familiar with it and feel comfortable with its mounting location and operation. **Go fly... But, keep this in mind:** Some day, it is highly likely that you will need to use a recovery system. No one can predict how or when you will need it, but here are the facts the we have derived from years of building emergency recovery systems for all aspects of aviation: **Most decisions to deploy a reserve parachute occur after the pilot has exhausted all other avenues of recovery.** Paraglider pilots are apt to try to recover their glider until they are very low to the ground. Many pilots have actually deployed "on impact" or just before, with the rocket motor carrying the parachute to full line stretch without time for a full inflation. This is sad for us to hear about. Sometimes the result has been tragic.

We ask this question: Is a low-save and the possible continuation of a nice flight, even in a heated cross-country competition, worth your life or a trip to the hospital? Think about it. Many times our system has saved a pilot with a spinning or collapsed Paraglider at or below 100 feet. Your decision to deploy your reserve when the time comes is important. **Don't mess around with your wing too long and lose track of the ground!!!**

WHEN IN DOUBT, "A.I.R. IT OUT..."

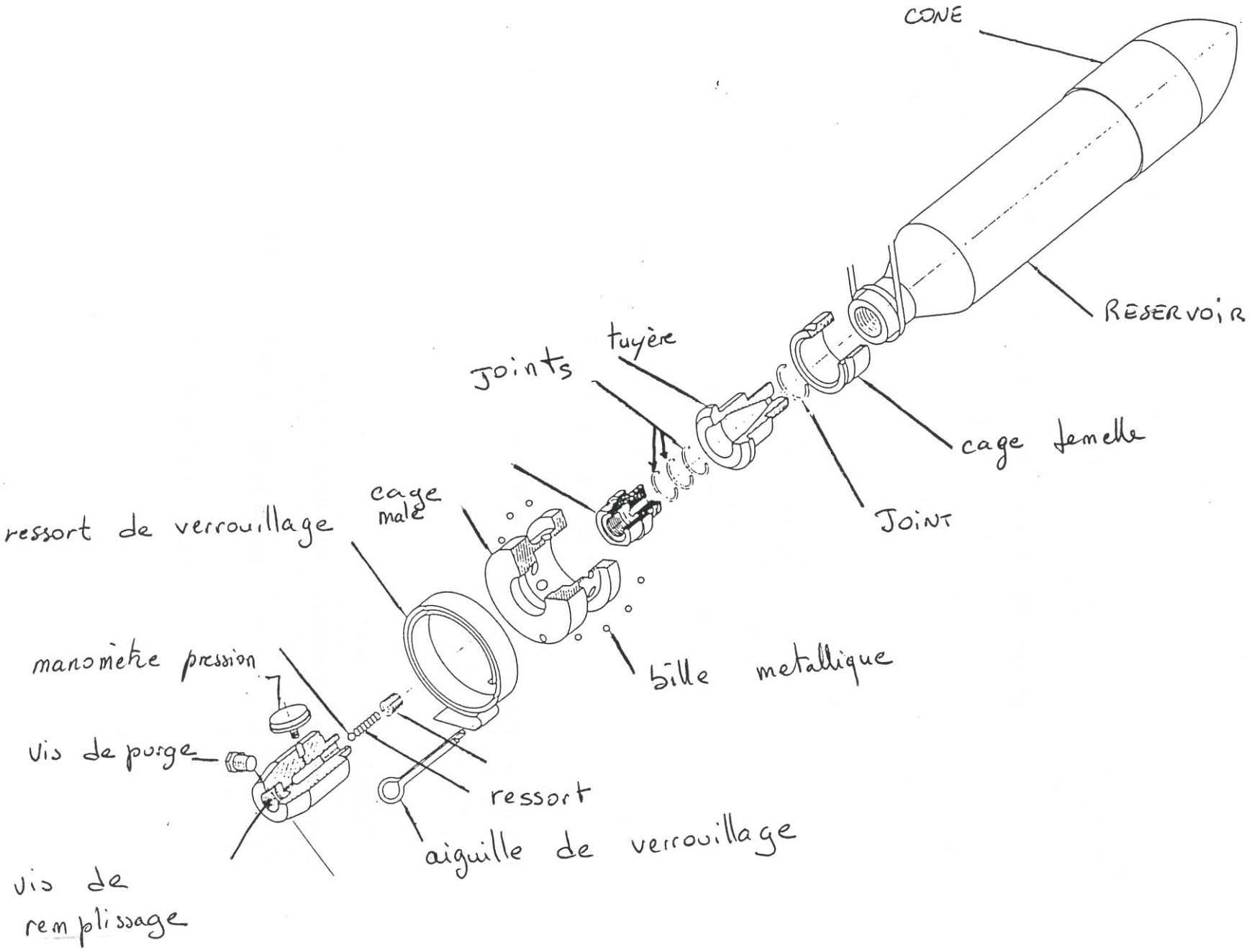
So, the moment of truth has arrived. Your wing is letting you down, fast. All control inputs are useless and the world is spinning in a blur... forget everything else and do this:

1. LOOK	Look for the activation handle.
2. GRAB	Grab the handle securely.
3. CLEAR	Clear the direction of deployment.
4. PULL	Pull the handle and make sure your arm is not in the way of the rocket.

Brace yourself for the opening-shock. Look at the reserve parachute to make sure that you are stable under it. Now comes the hard part. The LARA reserve parachute is a very low descent-rate canopy, and it will help stop your Paraglider from flying. Down planning of the Paraglider or spinning around the reserve is common and can be stopped if there is time. Start immediately pulling in the paraglider's riser on one side to stop the action. While you are doing this, be aware of the approaching ground and prepare for a PLF landing. (Parachute Landing Fall) Stand-up landings can be accomplished if your timing is right. **Always fly with a hook-knife in case of a windy landing.**

"Trouble-Shooting Your A.I.R. deployment rocket motor."

Any mechanical device is prone to occasional failure. Our A.I.R. rockets have been in use for many months. (September 1992) Design improvements are always being considered to make the system as reliable as possible. There are very few things that you need to do to keep your rocket in good working condition. Just make sure that you have at least 2500 psi in the tank, and nothing can keep the system from a safe deployment, short of something in the way of the rocket.
The only precautions and care of the actual rocket motor are these:
1. Be careful to not bang the gauge on a hard surface. The gauge has been known to crack at its base, allowing air to escape.
2. If you have to drain the system and re fill it, make sure that the burst valve plug is re-seated into the check-valve. Soapy water brushed onto the parts will show any leaks. Also, re-install the o-ring plug in the fill port to stop potential check-valve leakage.
3. Keep dirt and sand out of the rocket motor pocket.
4. Keep your parachute system dry, and re-pack the parachute once a year.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