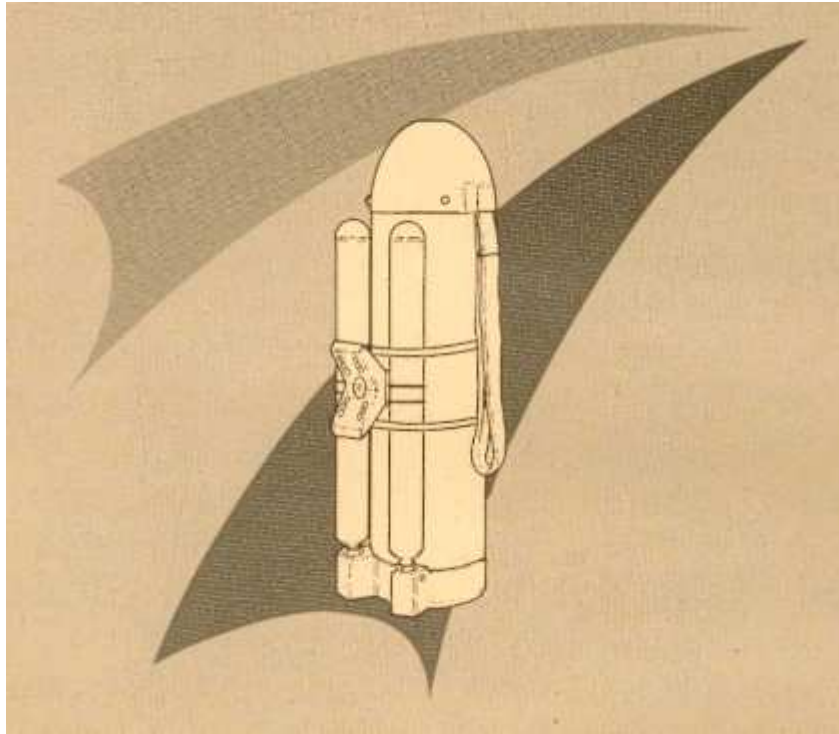


Installation and Users guide for the PARALIFE safety system.

3rd edition - November 2001



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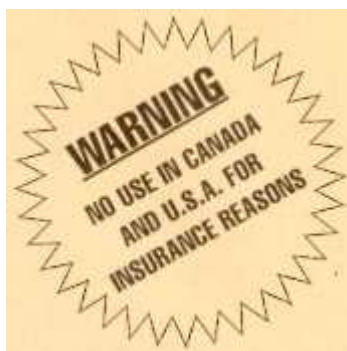
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Via Montanara, 101/d

43124 Parma Italy

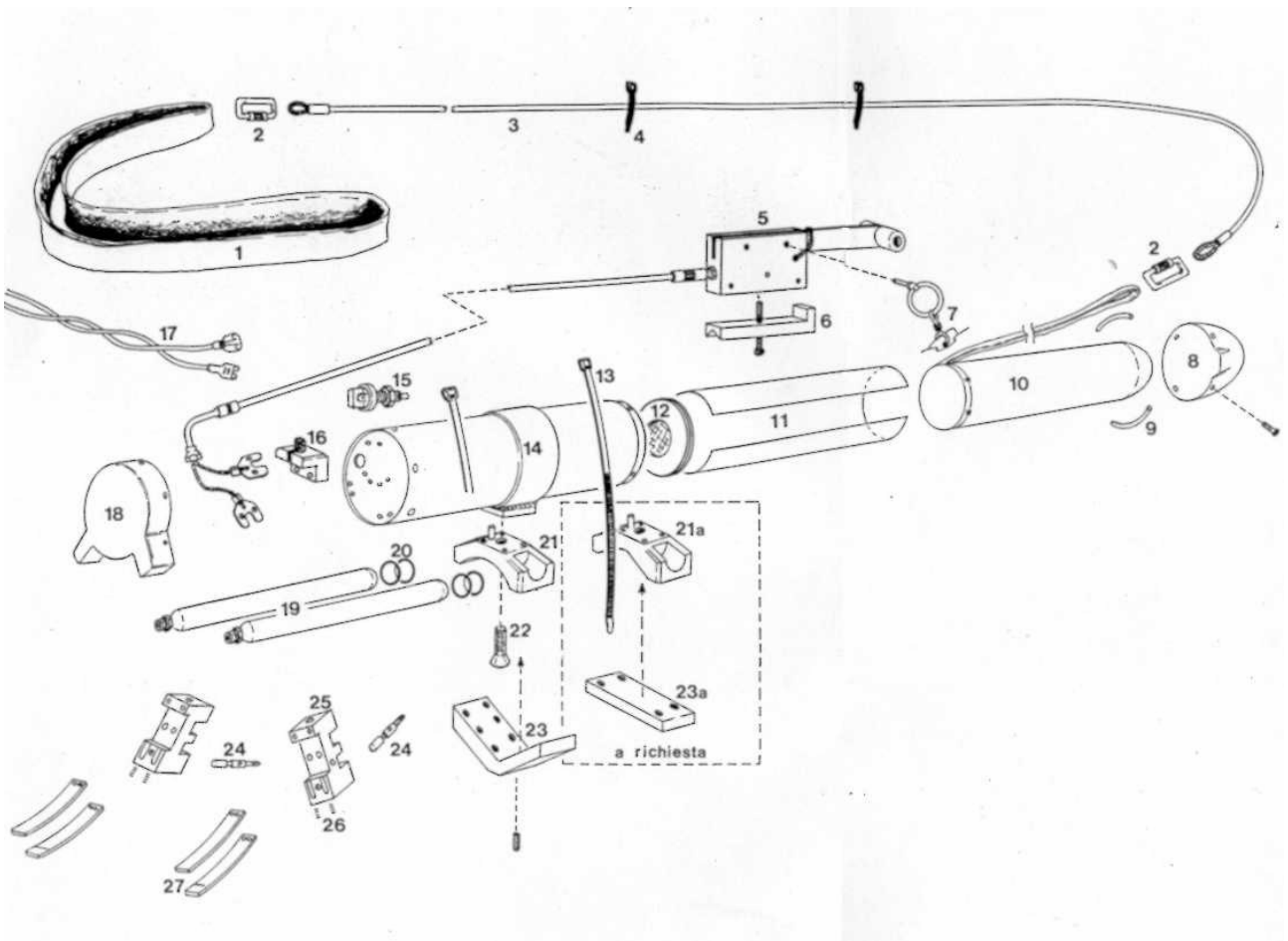
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LEGEND

- | | | | | | |
|----|---------------------------|----|---------------------------------|-----|-----------------------------------|
| 1 | Bridle | 11 | Mylar protection | 21 | Bracket for circular tubing |
| 2 | Screwlock carabiners (x2) | 12 | Piston | 22 | Central Screw |
| 3 | Static line | 13 | Cable ties (x2) | 23 | Locking plate for circular tubing |
| 4 | Cable ties | 14 | Launcher body | 24 | Cutter blades (x2) |
| 5 | Launch control | 15 | Engine cutout switch | 25 | Air cylinder blocks (x2) |
| 6 | Adaptor block | 16 | Cable guide | 26 | Rollers (x16) |
| 7 | Safety ring | 17 | Engine cutout electrical cables | 27 | Leaf springs (x4) |
| 8 | Front Nose Cone | 18 | Rear Cover | | OPTIONAL |
| 9 | Rubber blocks (x2) | 19 | Air cylinders (x2) | 21a | Bracket for square tubing |
| 10 | Pod (Parachute Container) | 20 | O-Ring | 23a | Locking plate for square tubing |



SECTION 1 – Introduction

The main characteristics taken into account for the Paralife project are:

- Dual parachute deployment system, comprised of double air cylinders and double laceration systems. Each system is independent of the other, and each able to launch the parachute on its own.
- Airtight cylinders with deformable metal diaphragm (no valves employed) charged with compressed air up to 190 atm.
- Launch lever system. There are two accidental launch preventers one of which is also active in flight.
- Lightweight alloy pod with a high level of protection for the parachute. Thanks to its metallic structure, its projectile shape and the high amount of kinetic energy, the pod is able to overcome many of the obstacles in its path during launch. The parachute therefore is opened far away from the aircraft structure and any accompanying turbulence.
- High resistance lightweight alloy launch tube with breech and strengtheners. The high resistance of this element makes launching possible even if damaged or imprisoned by aircraft structure as for example in a collision or from inflight structural failure.
- Automatic engine cutout. If correctly fitted, it deactivates the sparkplugs in the initial stages of the launch, and if the steel cable should come into contact with the propeller, this would not have enough energy to damage it or entangle it.
- Attachment of the launcher to the aircraft with an adjustable bracket; this solution allows the maximum flexibility in choosing the direction of launch.
- High resistance materials used in the construction, commonly used in aeronautical production. Almost all of the components are produced with CNC machining.
- Double coating paint guarantees high resistance to atmospheric and ambient factors.
- The parachute is made from controlled porosity material and through a direct opening pod, provides a very quick deployment. The forces acting on the aircraft can reach as much as 5 g of deceleration. Always make sure the bridle is attached to a solid part of the aircraft structure. Maximum velocity at the time of deployment should not exceed 130 km/h, (80 mph). The pendulum effect is diminished.
- The control lines connected to the shroud are lengthened by a high resistance steel cable, protected by a plastic sheath. The full length of the lines should be such that no part of the aircraft comes into contact with the lines. The control line length should be considered to be 3 meters in length.

- The bridle is made from synthetic fiber able to withstand a breaking strain of 7000 kg inflight weight.
- Treated steel carabiners of the Maillon Rapide type with double screw lock having a breaking strain of at least 5500kg.

SECTION 2 – Installation

You are hereby warned that you should at all times scrupulously observe the following instructions with regard to installation, operating conditions, operational limits and maintenance of your Safety System.

Foreword:

As the range of aircraft is very broad, it is almost impossible to supply specific data for the correct installation on all types of aircraft. PARALIFE therefore lists here a few general rules to help you optimize the installation.

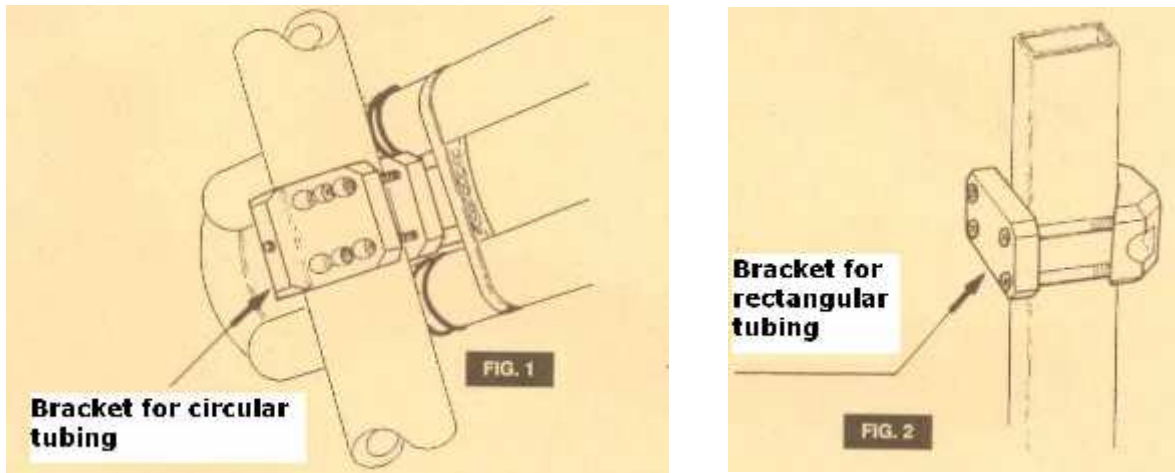
Install your system and check that:

1

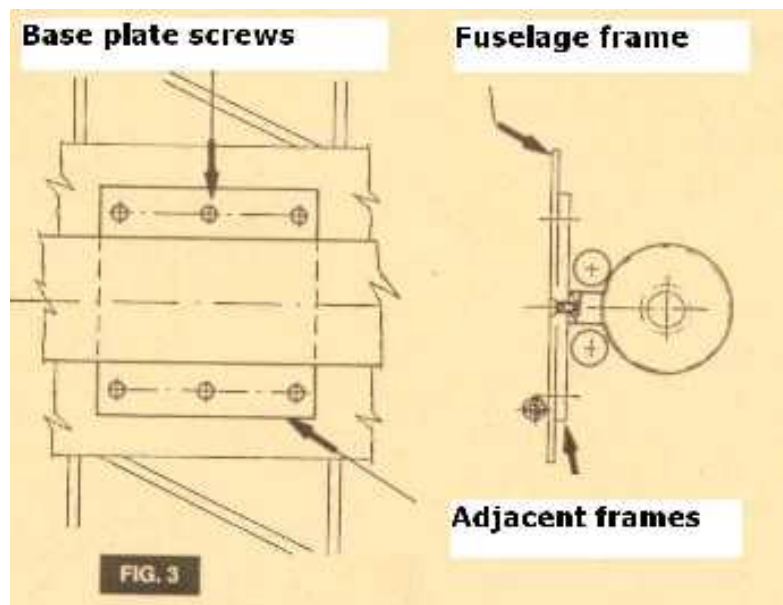
The structural component on which you intend to install the launcher is dimensionally adequate to support the forces due to the weight of the launcher and those applied to the cable during a launch, (flection torsion). To give you an idea, the minimum dimensions for circular tubing should have a minimum diameter of 45 mm and a minimum tube thickness of 2,5 mm.

2

Your launcher is supplied with an attachment for the type of structural component to which you intend to attach it. For example, a V shaped attachment with a V shaped bracket for circular tubing and a V shaped attachment with a flat bracket for rectangular tubing.



IMPORTANT: In the event that you install the system on a flat plane, (eg on a bulkhead), you must align the screw holes on adjacent frames, which allows the forces to be distributed over a greater area.

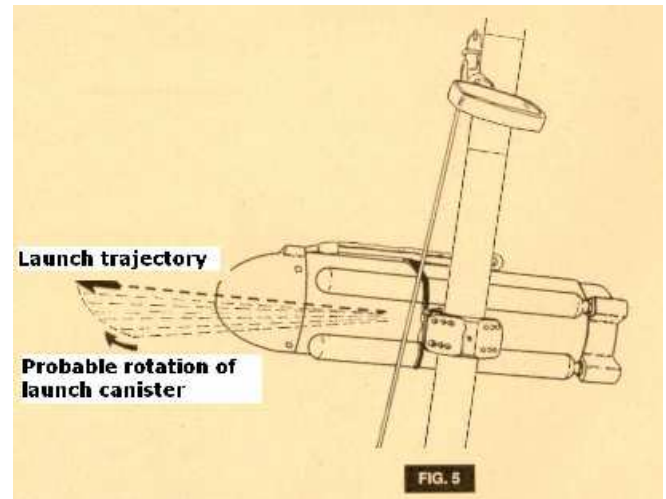
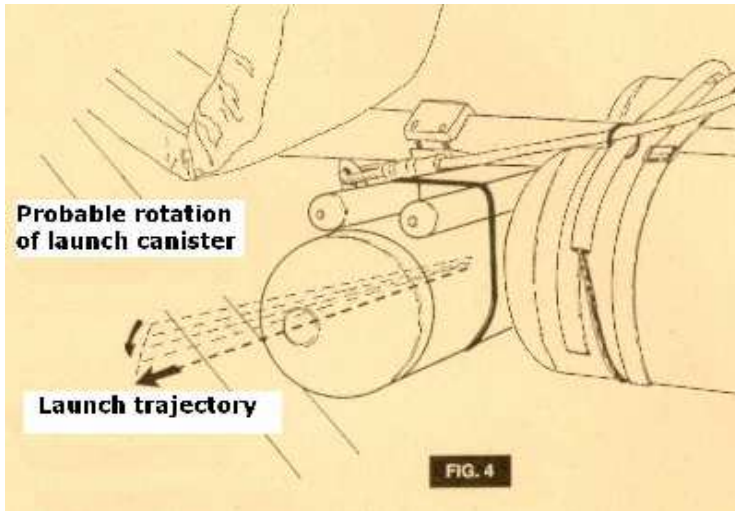


3

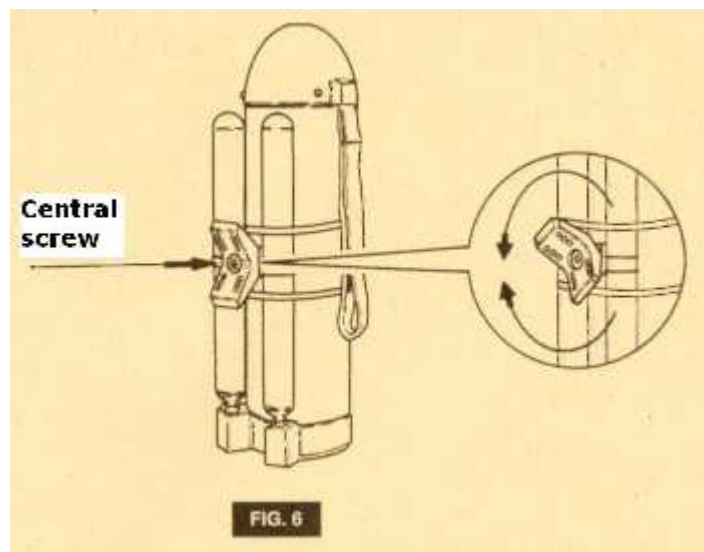
The choice of launch direction must afford the pod a trajectory that is free of obstacles, (eg cables, landing gear, rigging, rudder, fuselage etc.).

NB: You should also allow room for the pod in case the launcher should rotate due to the recoil force, which could vary the deployment trajectory.

After deployment, the shroud should be free to move toward the rear of the aircraft, (in relation to the relative wind direction).

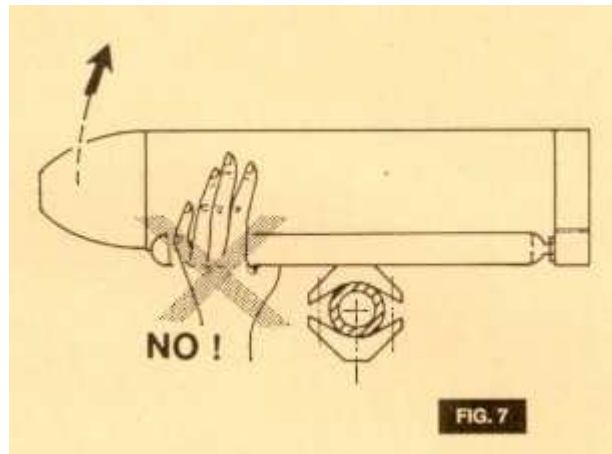


NB: For precise orientation of the launcher, please use both the multiple position bracket which allows you several different positions over a 180° range, (one every $22^\circ 30'$), and the rotation of the attachment with respect to the supporting tube of the aircraft, (obviously rotation is only possible on circular tubing).

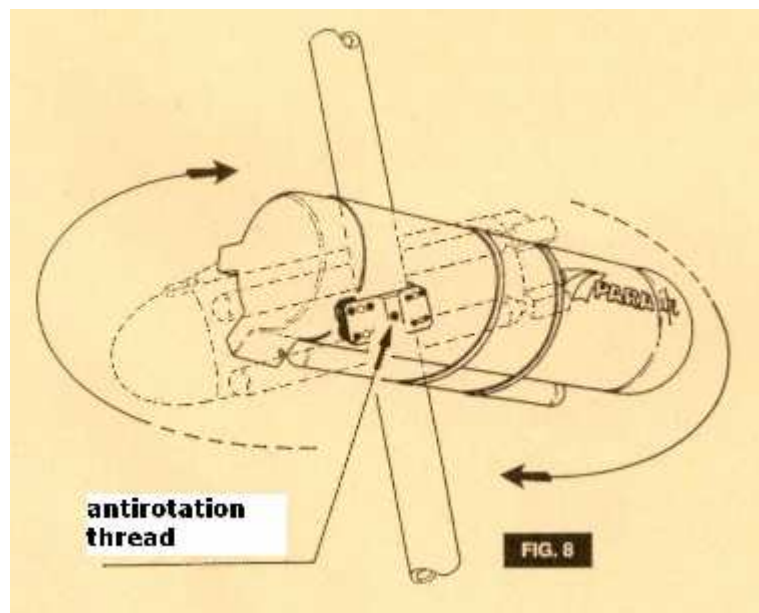


Having chosen the final position, tighten the central screw with 10mm hexagonal insert, (to 8 kgm = 80Nm), preferably using a torque wrench or socket wrench or box spanner of around 30-35mm.

IMPORTANT: Whilst tightening, **DO NOT** use the air cylinder to improve leverage.



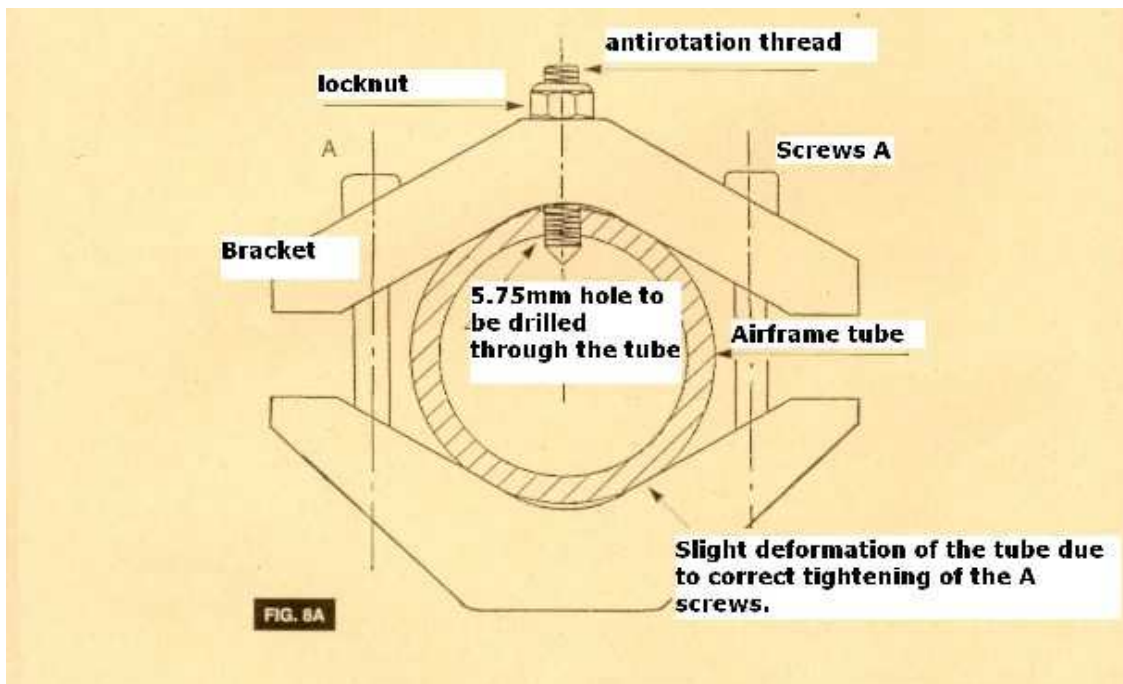
If you mount the Paralife on circular tubing, follow closely the instructions in Fig.8A regarding the central locknut.



ASSEMBLY PLAN FOR MOUNTING PARALIFE ON CIRCULAR TUBING

Recommended drilling method

- Mount the launcher on the aircraft making sure it's in the best possible position.
- Tighten the screw until the point leaves a mark on the frame tube.
- Take the bracket off and drill the hole in the frame on the mark left by the screw.
- Remount the bracket, align the screw hole with the drill hole on the frame and lightly tighten the 4 A-screws.
- Insert the central screw until it protrudes about 5mm into the frame tube (see diagram), and tighten the locknut.
- Fully tighten the 4 A-screws, (until the frame tube starts to deform slightly).



The launcher should not be too close to hot engine parts, (eg silencer), and that it is not in the path of hot exhaust gases, even indirectly. It should also be well out of the path of potential leaks such as fuel or vapour, or even sulphuric acid from the battery. This applies to all parts of the system.

IMPORTANT: Any contamination, however brief, from these highly aggressive elements, could irreparably compromise the functionality of your emergency system.

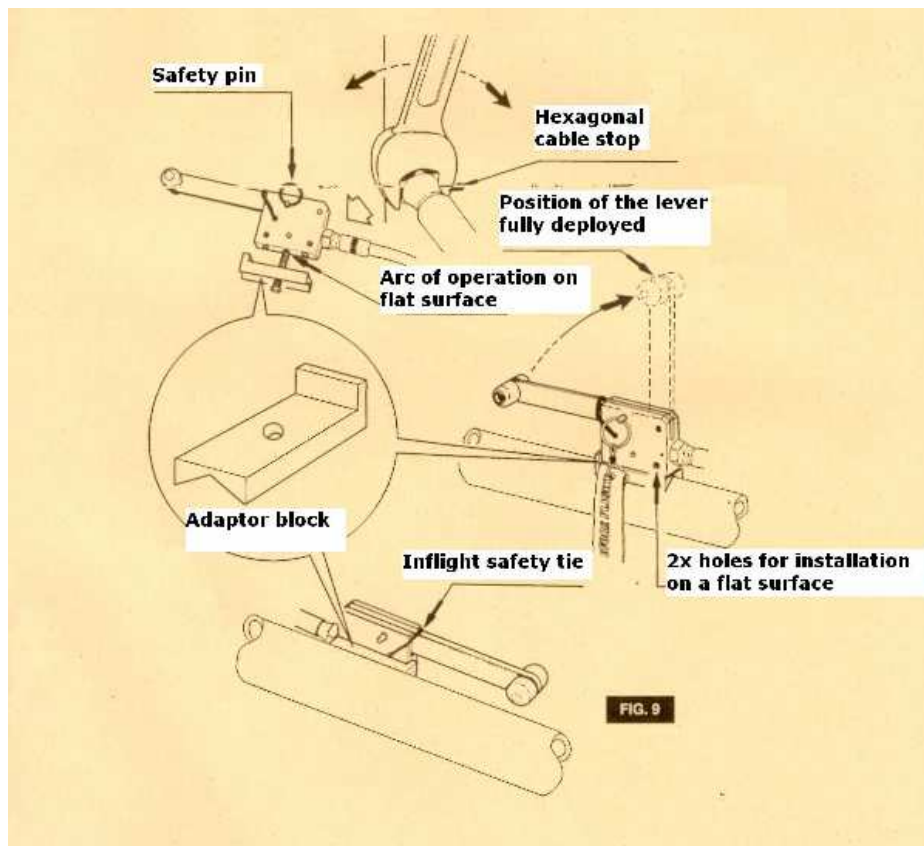
5

The launch control lever must be fixed to the aircraft structure in the correct manner. To this end, use only the predrilled holes in the control lever which in conjunction with the adaptor block, permit rapid and safe fixture. NB: for installation on flat surfaces, (square tubing), always use both holes ; for installation on circular tubing, always use the adaptor block which allows installation with a single screw.

IMPORTANT: Whichever combination you use, make sure the adaptor block is not deformed and that it cannot move while pulling the launch control lever; this would not allow the pod to be expelled resulting in a failed deployment.

Also, make sure that the area around the lever is sufficient to allow the pilot easy and rapid access to the lever. If you find it necessary to move the lever, **DO NOT** try to bend it. Instead you should use flat washers with 0,6mm as spacers,

Please also remember that the hexagonal cablestops, (19mm spanner), can be loosened, no more than one full turn, to allow you to position the cable housing with respect to the launcher and the control lever, (tighten moderately).



6

The position of the control lever should be positioned in such a manner that it may be easily reached by both the pilot and any passengers.

IMPORTANT: The control lever should always be easily accessible by the pilot even if he may be subject to violent acceleration, spinning or other forces, such as structural failure or collision.

Remember that in case of deployment, the lever should be pulled decisively and to the end of its travel, (about 90°). The short arc of movement however requires the pilot to move his arm so the lever should not be positioned near obstacles, (eg in tight spaces in small cabins). There is an advantage to be gained from the short arc of travel. We suggest that during installation, you make sure that the lever cannot get hooked in any part of the pilot's clothing or that of the passenger, or in seat belts etc. This could result in accidental deployment. See notes in Section 4.

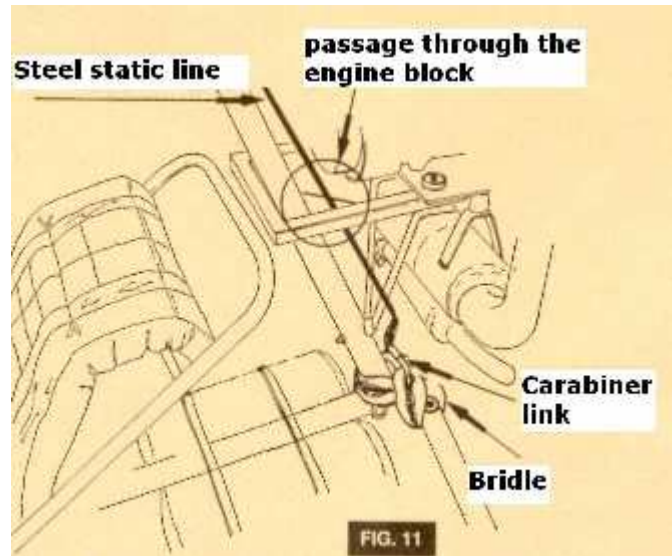
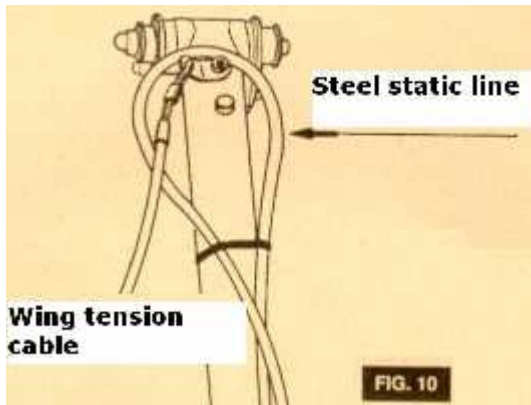
7

The cable housing should be the exact length necessary and follow the shortest distance possible.

IMPORTANT: Before you install the cable housing, make sure that any movement of the aircraft, for example while mounting the main wing, does not put tension on the cable housing or deform its path in any way that could be detrimental to deployment.

Accidental traction on the cable housing, due to the forces in play, could result in accidental deployment of the launcher. In every moment, the housing should follow gentle lines and have enough play to avoid accidental tensioning.

Make certain that the cable housing is positioned away from sources of heat and that it does not come into contact with exhaust gases. PARALIFE can supply you with a "short" cable housing, (100cm), or a "long" one, (150cm). Other lengths may be available upon request.



8

The cable and the bridle must be positioned in such a way as to guarantee:

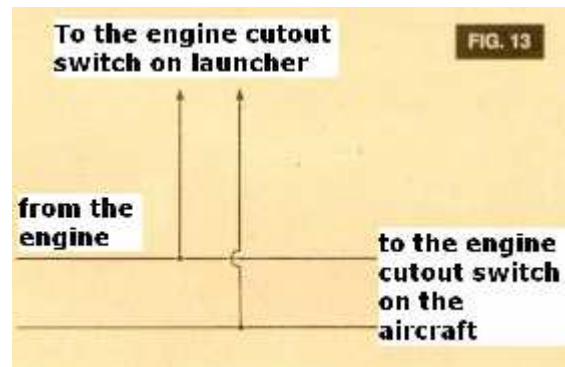
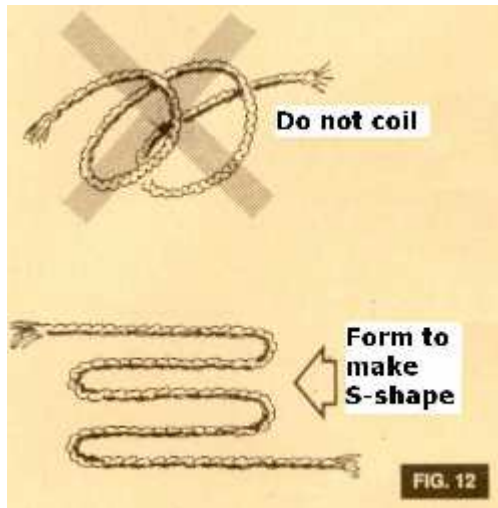
- freedom of deployment of the shroud at the time of launch, well away from any part of the aircraft structure, the pilot or any eventual passenger.
- a slightly nose-down position with respect to the horizon, (about 10°).

IMPORTANT: This nose-down position makes the aircraft structure, (mainly the undercarriage), absorb a large part of the energy upon impact with the ground, to the advantage of the aircrew.

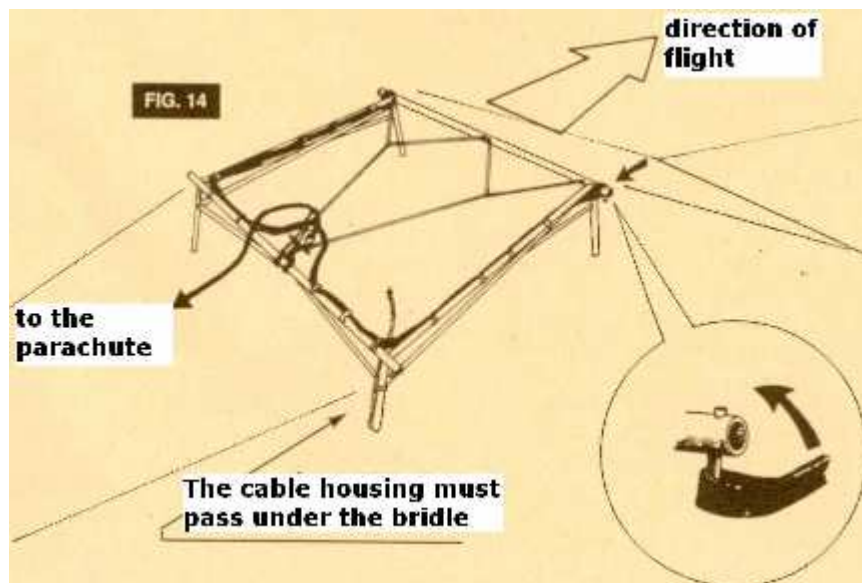
To make the aircraft assume a nose down position it is necessary to fix the bridle to a robust part of the airframe just behind the center of gravity. Excess length should not be coiled instead it should be formed to make an S-shape as shown in the diagram. Remember that the center of gravity in some aircraft is also dependant on the position of the pilot (and passenger).

9) The engine cutout switch, (this behaves like any ordinary ignition switch), should be connected to the engine ignition system.

An example is shown in Figure 13.



10). When connecting the bridle to the airframe, it's absolutely necessary that the forces generated by deployment be distributed over a sufficient number of attachment points. An example is shown in Figure 14.



SECTION 3 – Operating events

Operating events

Foreword

With the intent of helping the pilot quickly and safely identify the critical conditions that may require the deployment of the PARALIFE safety parachute, we hereby list a few possible operating conditions:

- **INFLIGHT STRUCTURAL FAILURE** caused by (for example):

Unexpected laceration of the wing surface, aileron failure, wingspar failure, hinge failure, rudder failure, stabilizer failure.

Effect: in each of the above cases, the aircraft assumes uncontrollable and irreversible flight angles, (spins, inverted flight etc).

Use of the safety system: As soon as you perceive the situation is irreversible, even if at height, deploy the parachute immediately. Eventual indecision will only waste time during which the aircraft will not only increase velocity, (resulting in greater stress on the canopy when it deploys), but could also lead to a situation where it becomes impossible to deploy the parachute.

- **SERIOUS LOSS OF FLIGHT CONTROLS** caused by (for example):

Cable failure, transmission rod failure, control rod failure, flap/aileron failure or jam, flight control hinge failure, (rudder, flaps, aileron etc).

EFFECT: the aircraft may remain level due to its intrinsic autostability, but often because of the asymmetric action on the affected control(s), (caused by the failure), the aircraft could go into an unrecoverable spin.

Use of the safety system: if you are flying at a reasonable height and the aircraft remains level, you might want to consider trying to control it. On this basis and in view of the ground below, you might want to consider an emergency landing. If you have any doubt whatsoever, do not wait too long – you might get too low. Obviously if the aircraft should enter a spin, deploy the parachute immediately, (for the same reasons explained in the previous paragraph).

- **INFLIGHT COLLISION:** the damage sustained by your aircraft and/or you, depend on the other type of aircraft, the impact velocity and the angle on impact.

EFFECT: Your aircraft, after separation from the other, could return to level flight; this means that damage is limited to non-vital parts; your aircraft, after impact, may assume progressively worse flight attitudes that can lead to in the worst case structural failure or complete loss of control of the aircraft; your aircraft remains locked in the other and you both plunge to the ground.

Use of the safety system: if you still have enough height and you are uninjured and your aircraft remains level, you could see how much control you have. If all works well and you are not far from your usual airfield, try to return to the field. Obviously, if the airfield is not easily reached then you may want to attempt an emergency landing.

If your aircraft, after impact, should assume uncontrollable attitudes, do not lose precious time or height, deploy the parachute immediately.

IMPORTANT: if possible, make sure the other aircraft is out of the trajectory of the direction of deployment of your parachute. If however, as can happen, you are locked into the other aircraft, remain calm, launch the parachute immediately even if the system may seem blocked by elements of the other aircraft. In fact, thanks to the considerable force of the launch, the metallic container pod is able to overcome many obstacles and successfully deploy the parachute in an open area. As soon as your parachute is deployed, advise the other pilot to deploy his parachute. The combined action of the two chutes will lower the sink rate and reduce the energy released upon impact.

- **TURBULENCE** created by the close and rapid passage of a big aircraft: try to get out of its wake immediately. In case your aircraft should not respond to the controls, and you have sufficient height, wait until the turbulence lessens, (usually within a brief space of time), until you are able to regain control. If you have sustained damage which does not allow you to regain control, check your remaining height and deploy the parachute. **IMPORTANT:** If you have considerable height, wait until the turbulence dissipates before deploying to avoid deploying in turbulent air.
- **EMERGENCY TAKEOFF / LANDING.** If you should be forced to make an emergency landing, and the landing ground is insufficient, you can use your **PARALIFE** as a parachute brake, taking care not to deploy too high as the deployment causes a rapid reduction in forward velocity and probably will cause the aircraft to stall. Deploy the parachute therefore no higher than one meter from the ground, making sure that the deployment trajectory does not endanger people or buildings.
- **PERSONAL PROTECTION.** Even if the rate of descent is not excessive, the angle of impact and eventual oscillation may increase the possibility of violent impact.

SECTION4 – Operational Limits

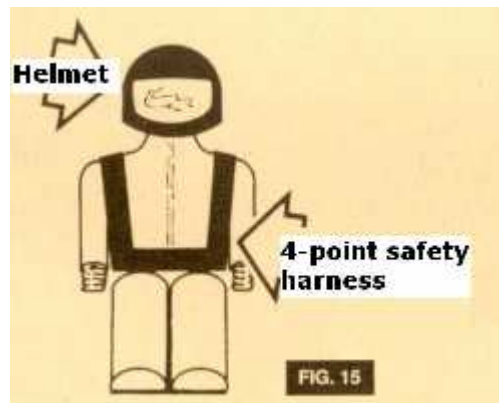
The PARALIFE safety system has the following operational limitations:

- Total inflight weight (aircraft plus aircrew) 340 Kg
- Maximum airspeed (at deployment) 130 Km/h

These limits must be rigidly adhered to.

Even small variations can lead to dangerous situations both for the crew and the parachute.

IMPORTANT: During installation of the safety system, it is essential to have already installed the 4-point attachment harnesses, (shoulder and center straps), for both the pilot and passengers.



Obviously the anchor points on the aircraft structure must have been chosen to be robust and resistant. Use of this type of harness has particular importance in certain critical flight conditions such as:

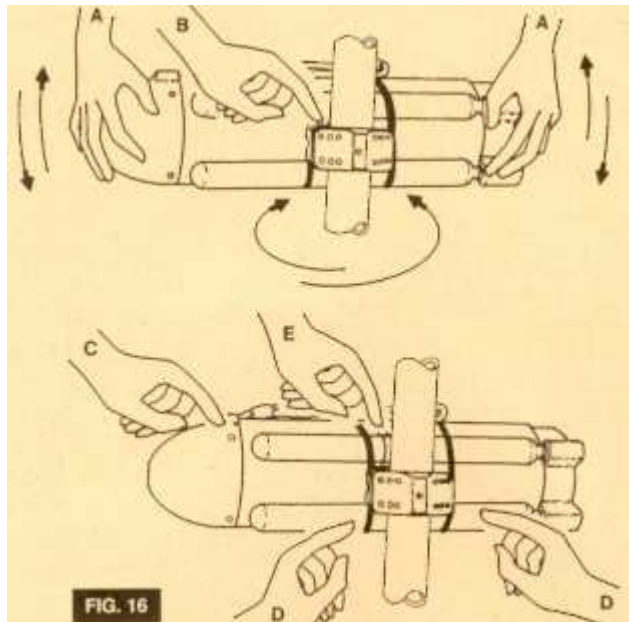
- A. Negative acceleration, centrifugal forces that tend to violently throw the pilot up or sideways preventing him from reaching the launch control.
- B. Deployment of the parachute where the weight and velocity of the aircraft are closet o the maximum allowed values. In these conditions, the deceleration may be such that it tends to pull the pilot and/or passenger from their seats.

IMPORTANT: Normal safety harness with only central straps (even with a metal buckle) are absolutely inadequate.

SECTION 5 - Maintenance

Foreword:

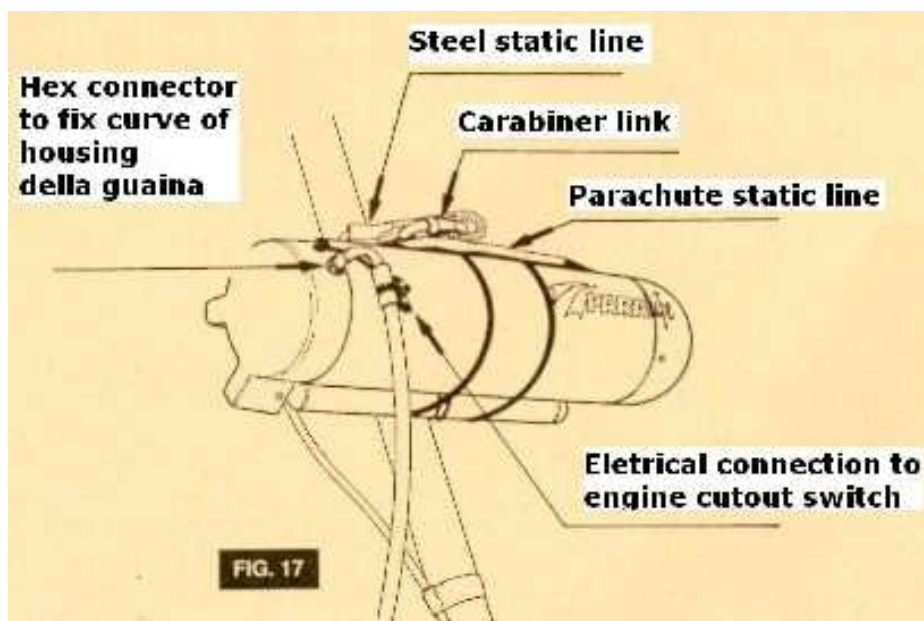
As with any apparatus, your PARALIFE safety system requires a regular checkup and a minimum of maintenance.



PREFLIGHT CHECKS.

Shake the launcher making sure that it cannot twist or move (to do this place your hands (A) at the each end of the launcher) if necessary, tighten the support screws (B) including the central swivel screw; check the integrity of the four screws (C) which secure the pod.

- Check the integrity of the cable ties (D) and the rubber rings (E) on the airbottle as well as the cable ties on the screwlock carabiners.
- Check the tightness of the screwlock carabiners, the integrity of the steel cable and the bridle which connect the PARALIFE system to the aircraft structure.
- Check the integrity of the electrical connection between the engine cutout switch and the engine.



- Check that the launch control lever is not loose and that the cable housing is not under tension. Also, the safety tie on the control lever should be undamaged (see Fig.9)
- Finally, remove the safety pin (see Fig.9) and keep it in a safe place, (eg. Ziplock pocket) so it will not come loose during flight.

NB: The safety pin should be removed by the pilot as soon as he enters the aircraft, and must be replaced by the pilot as soon as he parks the aircraft after flight and before exiting.

These precautions are necessary to avoid accidental deployment by aircrew or other personnel.

Accidental deployment on the ground could have dramatic consequences for those who may be in the trajectory of the pod when it is launched.

PARALIFE invites you to scrupulously follow this checklist. If even one of these components should not be in perfect condition, you should not fly until the defect is repaired.

NB: It is your duty to inform other users of the temporary indisposition of the aircraft until repaired.

IMPORTANT.

If your aircraft should ever sustain damage even light, check very thoroughly that the PARALIFE system has not been affected.

If you should have any doubts whether the PARALIFE system or the cable housing may have been damaged, please send the complete system to PARALIFE for a full checkup. Please note that undue stress, (even brief), on the cable housing may cause partial or full deployment of the canister, even long after the damage has occurred.

Periodic checkups.

The preflight checks, if properly done, constitute a continuous monitoring of the efficiency of your PARALIFE system, however, some components should be subject to more rigid checks especially if the aircraft is used in critical situations such as near the sea, or for agricultural purposes (crop spraying). In these cases the danger is greater and is composed of corrosive elements which can reduce or impede the functionality of certain components. Check thoroughly therefore (preferably before each flight) the bridle, the steel cable, the carabiners and their ties and the "FASTON" attachments for the engine cutout system (see Fig.17).

Problems due to engine vibration: in all ultralights these can be a significant problem, especially with 2-stroke engines. The vibrations, after a certain period of time, can loosen screws or nuts, fray housings, or cause failure due to metal fatigue etc.. On the PARALIFE system, you should regularly check that:

- Nuts, bolts and screws are still firmly attached to the aircraft (painting a reference point on the air frame can help identify irregularities).
- The central screw holds the launcher tube firmly to the universal connector
- The direction of the pod has not deviated from its original position (due to loosening of the screw) thanks to vibrations.

- The integrity of the rings and ties that hold the bottle to the launch tube, including the correct attachment of the cable housing, lever, bridle and steel cable. Cables and their housing should be firmly attached.

Any part of the system that is sandwiched between two metallic parts can be frayed from vibrations. Make sure before flying that this has not and can not happen.

IMPORTANT: In case of repairs or modifications applied to the air frame, carefully check that all of the conditions necessary for correct deployment of the system are met: pod deployment direction free from obstacles, deployment lever easily accessible etc..

Periodic review: the shroud, the shroud lines and the static line are pressed into the metal container (pod) that protects them from outside elements (pollution, ultraviolet rays, parasites, abrasions etc.). The various components have been designed to do their job for many years, however, for reasons of prudence and safety you should have a full checkup of the system done at least every 36 months.

Check carefully the revision date printed on the identification plate on the launcher – this must be rigorously observed. The revision operations as also the substitution of certain parts of the system must only be done by authorized and qualified PARALIFE personnel, who will also consign written documentation attesting to the operations involved and the new revision date. PARALIFE may not be liable for infringement of these norms and notices even in part.

PARALIFE wishes to remind you that they are available for further information and can provide solutions to particular installation problems. Happy and Serene Flying.

SECTION 6 - Guarantee

PARALIFE guarantees this product for three years from the date of production. Under the terms of this guarantee, PARALIFE, at their discretion, may repair or substitute the product except in the conditions described later. Damaged parts will be provided free of charge and the substituted parts will become property of PARALIFE. This guarantee does not cover repairs deriving from accidents, natural disasters, unauthorized use, incorrect installation, unauthorized modifications or repairs, shipping costs, packaging etc.. Furthermore, the guarantee is void if the product is used for applications specifically not covered in this manual. No guarantee tacit or implied will be applied in any case. PARALIFE shall not be liable for damages of any nature, including but not limited to loss of profit deriving from: unsuccessful rescues, accidental damage, damage arising from use of or incompetent use of their product even if the company or authorized reseller has been advised of the possibility of such damage or through complaints from any other parties.

Some states do not allow the exclusion or the limitation of accidental damages or consequential damages for some consumer products; in these cases the above limitations do not apply. Other states do not allow limitations on the period covered by the guarantee; in these cases the above limitations do not apply.

For all controversies the competent Authority is the Forum of Parma (Italy).

ACCEPTANCE OF RISK

PARALIFE should only be used in case of emergency. Its use may lead to accidents, injury or even death. These situations are beyond the control of PARALIFE who therefore declines to accept any responsibility deriving from the use of their product.

DISCLAIMER: The modification of any part of the PARALIFE system or parts of such and/or the inability to follow the guidelines, procedures and instructions included in this manual, may lead to failure of the parachute to deploy and personal injury or death of the pilot and/or passenger(s). This manual is a general guide to installation, use and maintenance of the PARALIFE system. In case of difficulty during installation, please contact PARALIFE for more detailed instructions. Never, ever, point the system towards people or buildings. Treat it as though it were a lethal loaded weapon. Do not tamper with, or try to modify, repair or disassemble any part of the system at any moment.

ADDITIONAL ADVICE

The PARALIFE system is sold as a complete unit, all the necessary components are included in the retail price. Check the list of components referring to the identification plan in Fig. 1. If your unit should be missing any element, please notify PARALIFE immediately to receive the missing pieces. Never substitute any component with non original parts. Do not acquire any part of the system except from authorized dealers.

WHAT PARALIFE CANNOT DO

The PARALIFE system is not a substitute for incompetent or inexperienced pilots, cannot make you a better pilot. Even if PARALIFE deems it advisable to fit their emergency system to your aircraft, this does not mean that you are exempt from any air disaster. This is only extra chance, and a small part of a comprehensive air safety program.

The PARALIFE safety system cannot guarantee you will not be injured during or after deployment nor that your aircraft will not be damaged. It's highly likely that the PARALIFE system may save your life, but there is no guarantee you, or your passenger will not be injured nor that your aircraft will not be damaged. Only you are responsible for the operations necessary to safeguard you in flight.

Do not experiment with your system nor deploy it on the ground just to see how it works, you could injure people or damage buildings in the vicinity.

This edition substitutes all previous publications.

PARALIFE reserve the right to modify this manual in any way it sees fit with a view to improving the safety and/or the functionality of the product.

All modifications will be obligatory for all users, in which case an advertisement will be placed in the relevant magazines.

IMPORTANT NOTICE

If you should need to deploy your PARALIFE system in a real case situation, please contact PARALIFE as soon as possible. We are always interested in live deployments to find out if we could incorporate any improvements.

Please notify PARALIFE immediately following deployment. In the case you resell your system to others, we recommend you consign this manual to the new owner.

PARALIFE CERTIFICATE OF GUARANTEE

Paralife serial nbr.		Purchase date	
Full Name		Installation date	
Address		Model	
Telephone		Ultralight make/model	
Fax		Characteristics	
Mobile			

Date, stamp and signature of Reseller

This Certificate of Guarantee must be sent to PARALIFE no later than 30 days after installation.