

Chapter 7: Safety equipment

Emergency parachutes

An emergency parachute gives you a second chance, perhaps a final chance, when some calamity occurs. This section details the important points about buying, installing, maintaining and using a parachute. Hopefully this will increase the chances of the emergency- parachute system working successfully if it is ever needed.

The basic parachute system comprises the canopy and its lines, its bridle (or 'riser') and the attachment to the harness. The system is completed by the deployment bag, which holds the packed canopy and lines, and an outer container which is normally built into your paragliding/ hang-gliding harness.

A parachute is a form of insurance, and most of us begrudge paying for insurance. With parachutes, most pilots also begrudge the size and weight. So there is an understandable tendency to desire the smallest, lightest (and cheapest) parachute. Back in the 1990s this resulted in most pilots having small, light parachutes – and then there was a series of fatal accidents where pilots got into trouble, deployed their small, light parachute, and it either burst, or gave an opening shock that destroyed their harness, or produced a descent rate that meant the landing impact was not survivable. Because of these tragedies, the BHPA was instrumental in the creation of an international standard for the design and performance of paragliding / hang-gliding emergency parachutes, and the resulting standard EN12491 is now firmly established.

The early emergency parachutes produced for hang gliding used round or 'conical' shaped canopies. These were replaced by the pulled apex (sometimes referred to as pulled- down-apex (p.d.a.)) design (or variations on it). A central line holds the middle of the open canopy more or less level with the skirt, so that air pressure forces the skirt out and the canopy presents the maximum drag area for the smallest amount of material.

The latest generation of emergency parachutes are squares. These are very stable and very efficient – meaning they produce a low descent rate with minimum canopy size.

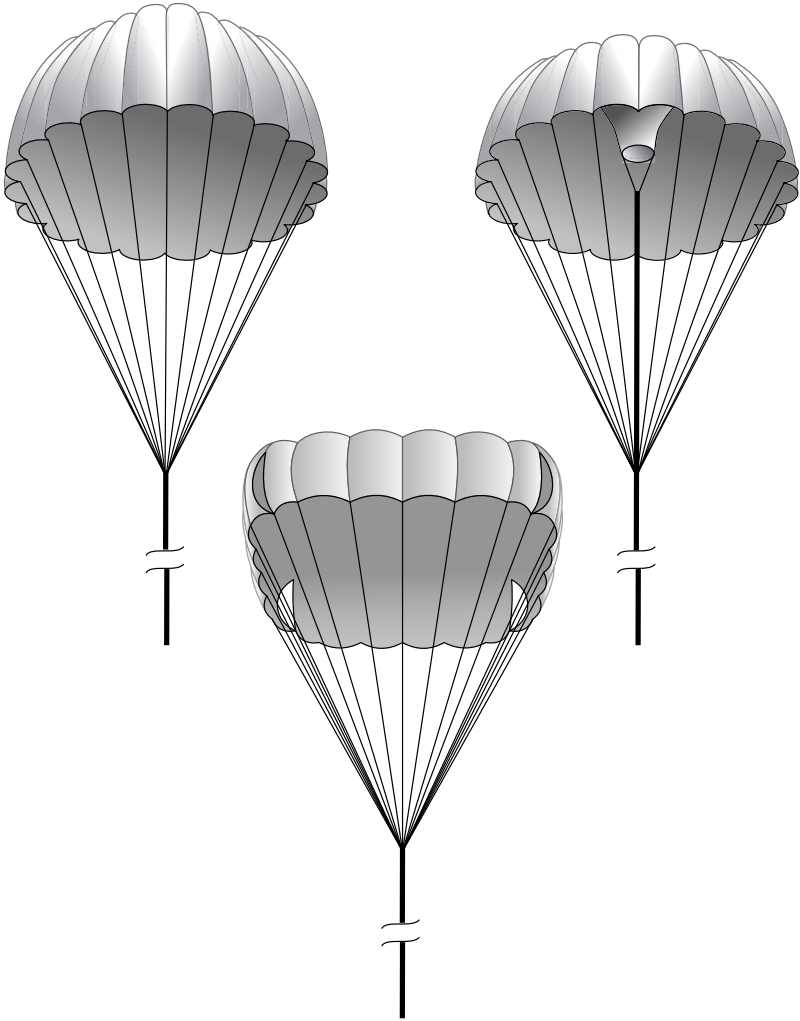


Figure 7.1 *Conical, pulled-apex and square emergency parachutes*

Choosing a parachute

Choose a parachute that is clearly marked as conforming to the EN12491 standard. Such parachutes will have passed rigorous speed of opening tests (less than four seconds), descent rate tests (max. 5.5m/s), stability tests and strength tests. In the strength test the manufacturer has the choice of two test speeds, and the successfully certified parachutes therefore carry on the certification label the warning: 'not suitable for speeds in excess of 32m/s (115km/h)' OR 'not suitable for speeds in excess of 49m/s (176km/h)'.

Other than checking the certification label and deciding whether you will be happy with the lower speed certification or whether you want the added strength of the higher speed tested alternatives, the final very important thing you need to do is check that it is available in a size suitable for your total weight in flight. This is your weight, plus your clothing, boots, helmet, harness, instruments etc and the weight of your glider: basically everything that will be dangling from that parachute if you ever have to use it

Descent rates / equivalent fall height: An emergency parachute deployment inevitably results in a ground impact, and the higher the descent rate, the higher the likelihood of serious injury. A descent rate of approximately 5.5m/s (18ft/s) is the maximum permitted by EN12491 as this keeps the likelihood of injury low while keeping all the other design factors (parachute bulk, weight) manageable.

It is sometimes easier to visualise vertical descent rates by equating them to stepping off a wall of a certain height. 5.5m/s (18ft/s or 12.3mph) is your velocity when you hit the ground after stepping off a wall 1.5m (5ft) high.

When you have imagined falling from this height onto your feet and doing a PLF, try imagining falling from this height onto your back, or your side, or your head...

You should also bear in mind that in an actual emergency, factors such as lift, sink, altitude, a semi-inflated paraglider or a damaged hang glider may all conspire to increase or decrease your descent rate.

Buying second-hand

There is nothing intrinsically wrong with buying a second-hand parachute, as long as you make sure it is certified to EN12491. You are strongly advised to have it inspected by a BHPA-licensed 'Parachute Systems Checker and Packer'. The licensed packer will check that the parachute is the right size for you, has been well looked after, is in good

serviceable condition and is not too old. (Check the manufacturer's recommendations: typically ten years unless extended by servicing and inspection).

User manual

Ensure you receive a user manual with your parachute: this should contain instructions for installing it, using it and re-packing it, as well as data on performance, size and recommended load.

Make sure that the parachute has the correct bridle for your glider type.

- Hang-glider parachutes require a six-metre bridle to keep the parachute clear of the wreckage.
- Single-riser paraglider parachutes require a short bridle with an additional Y-bridle to connect it to the two harness-attachment points. (The Y-bridle is usually included with a new harness.)

The complete system

Having the perfect parachute is not much use if it won't fit in your harness, or if you can't get it out of your harness when you need to, or if the connections to your harness are not strong enough, or if you have connected it to the wrong thing (or not connected it at all!). Emergency parachutes must be regarded as part of a complete system. For this reason you are strongly advised to consult a BHPA-licensed packer, who will have the knowledge required to sort out the whole package.

Installing

Always unpack and inspect a parachute before fitting it to your harness: it is not unusual to find faults in brand-new equipment, so check carefully. Be aware that many parachutes are shipped 'packed for transit' and look ready for use but are not!

The parachute fits into an outer container which is normally part of the harness. The outer container may be on the front or on either side; with paraglider harnesses it could also be on the back or even under the seat. All of these positions have advantages and disadvantages.

- Does the pack get in the way during take-off, flight or landing?
- Does the pack location involve extra connections when putting the harness on for flight (which might be forgotten)?
- Is the mounting secure, so that the deployment bag can be extracted easily?
- Can you see the handle?

- Can you easily reach the handle with your dominant hand?
- Is the handle likely to get accidentally caught and cause inadvertent deployment?

Make sure that the parachute (in its deployment bag) fits properly in the harness: then make sure your emergency-parachute riser is correctly attached to your harness. Modern certified paraglider harnesses are supplied with tested loops on the shoulders: you must attach the parachute to both of these (hence the 'Y' bridle) so the load is spread equally. With hang-glider harnesses the emergency parachute is connected to the main harness suspension point, using a separate steel maillon connector. The bridle(s) must be carefully routed to ensure that no twists will occur as your emergency parachute deploys and that the bridle(s) will not get tangled with your paraglider risers/hang-glider hang-strap – or with you, the pilot – you do not want the bridle around your neck! (See the section on connectors in Chapter 8.)

Strop

With older systems, it is often the case that a strop is required to connect the deployment handle to the deployment bag. As the required dimensions of this strop are often unique to each installation, it is left to you to source this item. Take great care if you have this type of system.

- The strop needs to be strong enough.
- The strop needs to be properly attached at both ends (usually with a 'lark's foot').
- The strop must be long enough to allow the deployment handle outer-cover closure pins (often plastic sheathed cable like thick trimmer cord) to be pulled completely clear, before it pulls tight and starts to drag the deployment bag out. If the strop is too short, it will be impossible to extract the parachute, no matter how hard you pull!
- If the strop is too long it can make throwing the parachute awkward.

Many newer harnesses are supplied with a bespoke deployment handle (optimised for the outer cover) permanently attached to a bespoke deployment bag that the EP is installed into. This makes a mismatch virtually impossible.

Section 2: Know Your Equipment

Check the whole system when it is put together, with you suspended in the harness in full flying kit: you need to know that you can easily deploy the parachute with your weight in the harness. Practicing without helmet, gloves and flying clothes is NOT a real practice.

If you are not 100% confident that you fully understand the whole list of items that must be matched and checked to create an effective emergency parachute system, then get a BHPA-licensed packer to install it properly for you and explain the system to you. In fact, even if you have put the system together yourself and feel confident that you have done a good job, why not invest in your future by having an independent pair of eyes give it a check-over, maybe at a Club Repack event? Pilots of all abilities have been responsible for the many packing and installation errors discovered over the years.

Maintenance and repacking

Ideally every pilot should learn how to repack their own parachute, and so become completely familiar with the system. You can learn how to do this at a parachute-repacking event organised by your local club (make sure that a BHPA-licensed packer will be supervising the evening). Alternatively, take your equipment to a BHPA-licensed packer and get the packer to show you how to repack it. (If you really don't want to understand your emergency system, simply get the packer to do a full inspection and repack.)

Repacking should be carried out at the intervals recommended in the parachute's user manual. In the absence of such recommendations, check and repack your parachute every six months. (If it has become damp it should be aired immediately and repacked when completely dry.) Repacking provides an opportunity for a close examination of the entire parachute system for general viability and wear and tear. It also allows replacement of the rubber bands, which perish, with new bands of exactly the correct specification.

By fitting a parachute your chances of surviving an in-flight catastrophe have been increased, but you are now exposed to the danger of experiencing an in-flight emergency in the form of an unintentional deployment. Approximately one in six deployments are unintentional! This is mainly because pilots fail to check and maintain their equipment adequately.

Pre-flight checks

As part of your pre-flight actions:

- check that your parachute container is properly closed and that any closure pins are secure and free to release;
- check that the deployment handle is accessible;
- check that no slack loops of riser have slipped out of your parachute container.

Be particularly careful with hook and loop (e.g. Velcro) closure systems. As Velcro gets old, it can get clogged. It can also lock together over time, so a pull that is easy when the parachute is first assembled can become almost impossible after six months. 'Pin' closures are generally much better, but still need constant vigilance.

Don't be the next pilot to end up dangling beneath your 'chute when you least expect it!

Using your emergency parachute

Practising

Once you've got your system sorted out, the next job is to learn how to use it. Your emergency parachute's user manual should advise you how to deploy for real, and how to practise (on the ground). Some clubs and schools have built suspended systems that you can strap into for practising deployment. Make full use of any simulator to which you have access: practise looking, grabbing and activating your parachute handle with your dominant hand. Make sure you know whether the container design requires you to pull in a certain direction to release the locking pins ('pop') before pulling the reserve out in a different direction ('pull'). The slowest elements in deploying the emergency parachute are invariably:

- making the decision; and
- getting the parachute out of the harness and thrown.

Time and effort spent in practising these actions and improving these parts of the system will pay the biggest dividends.

When to deploy

With situations such as a structural failure of your hang glider or paraglider, the appropriate action is clear: deploy the parachute!

With paragliders there is a range of less clear situations where control of the canopy has been lost but may be regained. The decision whether or not to deploy will depend on the height that will be lost during your

attempts at recovery and your initial proximity to the ground. Several pilots have been killed (and many injured) impacting the ground while still trying to recover control of their paragliders, when their parachutes would almost certainly have saved them. The crucial point is that **any efforts to regain control of the paraglider must be secondary to the key concern of monitoring your height**. Recovering from a complete mess is very satisfying if you have plenty of height to play with; however, descent rates can be extremely fast when a canopy is spinning out of control. Don't leave deployment to the last minute.

If in doubt, throw it out! If you are low, throw!

Cumulonimbus

Do not deploy your parachute as a method of escaping from a cumulonimbus (not that you should ever allow yourself to get anywhere near one!). You will in all probability be swept up into the thundercloud while dangling powerlessly underneath your parachute.

In such an emergency situation you need to get away from the danger –hang-glider pilots are probably best advised to pull the bar in and straight line it away, while a paraglider pilot's best option is probably to use big ears with speed bar to descend and move away. If that is not working (you are still getting sucked up) then try a spiral dive rapid-descent technique. This will give a much higher descent rate than a parachute – perhaps 15m/s (50ft/s). Of course, if you have suffered catastrophic structural failure in the cloud your outlook is rather bleaker – you can throw the parachute and risk being swept up, or delay the throw and risk your parachute and/or harness being shredded by the opening shock. Whilst EN12491 certified parachutes will survive an opening after a very few seconds of free-fall, they are not designed to withstand terminal velocity opening shocks (reached after approximately twelve seconds of free-fall) and nor is your harness. Best policy all round is keep clear of cu-nimbs!

Deploying your parachute

- 1. Look** for the deployment-bag handle. Harnesses (especially paraglider harnesses) can have a number of adjustment straps that may easily be confused with the parachute deployment handle in an emergency. Be sure to look for the correct handle so you don't waste precious time tugging on the wrong strap – many parachutists have died through pulling a strap instead of the correct handle.
- 2. Reach and grab** the handle securely. If your right hand is not available, use your left!
- 3. Get the parachute out and throw it.** Some container systems

require you to pull the handle in a certain direction to release the closure pins before you can extract your parachute. Some designs that use 'hook and loop' tape are even more complicated. Make sure that you know your equipment. After 'popping the pins', use the motion of pulling the deployment bag out of the harness as the throw – one continuous motion. Throw hard.

4. **In the ideal world....** In the ideal world you will never have to deploy your emergency parachute! Very occasionally, pilots have deployed their parachutes in situations where they have had the luxury of being able to choose how and where to throw it. For instance, a hang-glider pilot after a mid-air collision, still flying a semi-controllable glider. In this ideal world, you would throw the parachute into clear air, and you wouldn't throw it between your legs and, if hang gliding, you wouldn't throw it through the control frame as this could result in the glider inverting, which usually limits your ability to adopt a sensible landing position. (More often you will be in whirling, tumbling mess, so just throw it, hard, straightaway, as a continuous part of pulling it out of the harness container.)
5. **Look to make sure your parachute has opened.** The deployment bag should release and the canopy start to deploy as soon as the bridle is at full stretch. If it does not, try yanking the bridle several times very hard. Hopefully, the parachute will inflate and the bridle will be yanked out of your hand. If this does not release the deployment bag, pull the parachute back in, hand over hand. Throw the parachute again.
 - If the deployment bag has released but your canopy has not yet inflated, yank vigorously on the bridle. This will help to spread the suspension lines and open an air channel.
 - If you are pulling on a parachute bridle, never wrap the line around your hand and let it go immediately the parachute starts inflating. The parachute will inflate with tremendous energy.
6. **Prepare for impact.** Paraglider pilots should assume the PLF position (see 'Keep practising your PLFs!' on page 11). Hang-glider pilots should unzip (or kick out of) their harness and climb into the control frame, keeping their weight distributed towards both corners of the base-bar. If this is not possible, concentrate on getting into a foot-down/head-up position with your feet together and your knees slightly bent. Keep your arms and head tucked in. Try to use your legs as shock-absorbers by allowing them to flex as you impact.

Allow your body to roll in the direction of the impact.

After you impact, disconnect from the glider immediately (getting injured by being dragged across the countryside after a successful emergency-parachute descent would be a shame). If you are already involved in the early stages of a steeplechase event, do whatever you need to do to get away from the glider and parachute. With hang gliding this might mean cutting the bridle or cutting your harness (use your hook knife).

Once on your feet, deflate the parachute by grabbing the hem at one side and taking it forward into the wind.

Radio your friends to let them know your position and condition. You should also contact the local police, who may be launching a full-scale search if a member of the public has seen your descent and reported it.

Preventing paraglider re-inflation

With paraglider emergency parachute systems it is possible for the paraglider to re-inflate after the emergency parachute has been deployed, and for the two to then 'fight' during the descent, invariably increasing the descent rate and sometimes producing disastrous tangling etc. You need to 'pull in' or 'disable' your paraglider, whilst avoiding any asymmetric action which could result in a free wing-tip thrashing around uncontrollably. Pulling both 'C'-risers (to create a 'C'-line stall) or pulling the rear risers are suggested techniques. Once your paraglider is fully pulled in, the emergency parachute can do its work without any dangerous interference.

Steerable/gliding emergency parachutes

As with most parachute design alternatives, the steerable emergency parachute concept has a trade-off. The main reason for having a steerable emergency parachute is so you can steer yourself away from any danger during the descent – which is an attractive idea. But there are several downsides.

- Steerable parachutes rely on forward glide for them to create lift, so they require the paraglider to be completely disabled or released, otherwise it will re-inflate.
- They tend to be complicated to re-pack, with more chance of difficulties when opening.
- If you do not have the space to manoeuvre for a landing into wind, an uncontrolled landing is likely to be downwind, at wind speed plus glide speed.

NB. Because of the hang-gliding requirement for a long single bridle, a steerable emergency parachute is not an option for hang-glider pilots.

Paraswivels

Some hang-glider emergency parachutes are supplied with a swivel fitted into the bridle. It is not unusual for a broken hang glider to spin like a sycamore seed as it descends under an emergency parachute, and the swivel is intended to prevent the parachute suspension lines being twisted together if this happens. Such twisting could ultimately result in the canopy mouth being closed, with obvious dangers. Paraswivels are more common in countries where high-altitude flights are made regularly, and where a parachute descent is likely to take tens of minutes rather than the tens of seconds likely in the UK.

Summary

- An emergency parachute should be part of your flying equipment.
- Choose one certified to EN12491 that is the right size for your total weight in flight – which includes the weight of your glider.
- Make sure that it is correctly connected to your harness and correctly installed, so that it can be deployed when you want, and won't deploy unintentionally. ('Correct installation' should always involve a test release of the inner bag from the outer container.)
- Maintain it properly (which includes having it repacked regularly).
- Make sure you know how to use it, and use it when you need to!

Extract from the BHPA Pilot Handbook - 4th Edition