Parachute and Bailout – Know Your Companion and Know How to Handle It

By Elke Fuglsang-Petersen

When Leonardo Da Vinci first invented a parachute in 1495, he probably could not imagine that mankind would be able to actually fly some 300 years later. Well, flying is one thing ± coming down safely is a different story. Mr. Da Vinci never tried to jump. The first person to ever use a parachute was the French aeronaut Jean-Pierre Blanchard, who in 1785 had built a balloon and flew up (too) high. His aircraft exploded and he landed safely with his chute. The rigging technique was invented more than 100 years later by a German tailor, Käthe Paulus, who jumped more than 140 times. During World War One, she was busy organizing parachutes into packages and so developed a rigging technique which was later patented.

Of course most glider pilots do not have the strong desire to jump out of an intact plane, but we all know, bad things can happen and a bailout can be the last chance to make it safely back to the ground. The latest incident during the World Gliding Championship in Texas so ended without injuries.

Have a look inside your backpack!

Thinking of the first inventions, parachutes nowadays look a little different in shape and size. **Round shaped** canopies

Left: What do you think when you go to grab a parachute?

mainly reduce the falling speed. Their direction is mostly downwards and they fly only at a slow forward speed. They have modifications in the canopy for steering purposes. **Sports parachutes** are shaped like mattresses, which operate comparable to an airplane (buoyancy!). These parachutes do not fall, but glide in the air. They are steerable, controllable, and have a higher forward speed. Sports chutes are not suitable for an emergency unless the jumper is trained in their use. Imagine what happens if you fly too slow.

If you have ever had a chance to look into your "backpack," you will have recognized that your emergency parachute has a round canopy and a lot of lines. The canopy's diameter measures 20-26 ft. Its area is about the size of a one bedroom apartment (430-530 ft^2). You might also have wondered about the hole in the top with a 2-3 ft diameter? This needs to be there for the airflow and it will prevent the parachute from swinging. The two modifications (holes) in the canopy help the chute move a little forward (3-5 mph). Two of the 20 lines are for steering purposes. They have colored toggles or handles which can easily be found by the involuntary parachutist. If you were given the chance to open your emergency chute before handing it over to your rigger you might have had some fun with the spring operated pilot chute.

A parachute weighs 13-16 lb and has to be considered as cockpit load. The chute's weight capacity will be 180-220 lb. There is also a minimum weight capacity, depending on the model. Think about this before wrapping a tiny little passenger into an emergency chute. Most parachutes won't properly open with a 60 lb person.

As a rule of thumb the minimum opening altitude is 1,000 ft AGL. All parachutes are tested and must open within 300 ft and 3 seconds (FAA re-

Above: The layers of fabric have to be folded just so, and the lines have to be clear. Below: Ask your rigger to try the rip cord. Better yet, try it yourself with your rigger watching.

quirement). The sink rate of about 20 ft/s is fast and the touchdown is more a BUMP!

Static line or rip cord?

In most clubs, we make use of two different systems to open a chute. A **static line** ensures a fast deployment, and you will have a good chance to jump successfully even if you are injured. These systems are good for student training. Never forget to fix the static line in your glider! If you regularly fly in higher altitudes you might be better off with a **rip cord operated** parachute. Think of the lack of oxygen high up in the wave or imagine the strong lift in a thunderstorm. In both cases a long free fall would maybe save your life.

Daily handling

Do a short daily inspection before applying your chute. Have a close look at the container, the harness, and hardware (snaps), and check the handle and the pins (on the parachute's back) of the rip cord. The log book and anti-tamper seal will tell you if the chute is current or needs to be repacked. During the day, keep the chute dry and away from sunlight (UV!). Never leave it in the dirt! Maybe you have a bag for it? If for some reason a chute gets dirty or wet, don't hesitate to contact your rigger.

Above: Chute on the rigging table. There are a lot of lines.

Right: Careful folding of the canopy and then stuff it in ± meticulously.

Below: There is a method to the folding and stowing to ensure opening every time it's called on.

Always apply the parachute before you climb into the cockpit! Close the harness and check if the rip cord handle is free and all snaps are properly closed. Don't cross the leg straps ± OUCH! Tighten the harness before taking your seat. While still standing it should not be too tight and not too loose. Do not adjust the harness after you have entered the cockpit. Think about how a loose or tight harness could hurt you in case of a hard opening shock.

Always wear your chute until you have completely left your airplane. This acts as training and avoids

mistakes. It also saves time in an emergency!

Store all parachutes in a dry and clean place, in a closet or on a shelf. Keep them away from bugs, grease, acids or other chemicals, and remember UV light kills the fabric. To maintain your emergency equipment, regularly see your rigger. For most parachutes the rigging interval is 180 days.

Be prepared

Here are some glider pilot's arguments that I've heard during the years: "I do not like this heavy backpack," or "It is uncomfortable when climbing into or out of the glider," or "My chute is an (un)comfortable cushion and its belts are bothersome during pee business … but okay, it is a nice sweat absorber," and "Why should I ever bailout?"

Soaring in general is not a dangerous sport, but some of us have experienced a midair collision or a structural failure. Severe control problems or a fire in the cockpit (powered glider) might also force a pilot to take his second chance and bailout. So, think positive! My parachute is my (second) best friend. It can save my life in an emergency.

Bailing out ± no problem?

Crash ... then what? Try to figure out if your plane is maybe still able to fly. "Do I still have controls? Is landing the whole thing impossible?" If this is the case, the decision is clear: Get out of there!

1. Release the canopy,
2. Push away the canopy,
3. Undo the belts,
4. Bailout into the spin direction.

After reading this, take a short break. Close your eyes and repeat this procedure: 1. ± 2. ± 3. ± 4. **Could you find the canopy release?**

Think of your cockpit organization. Do you have instruments like a PDA, a camera, or a backup logger in your cockpit that are not integrated in the panel? Where is your microphone? What about loose wires and cables, your oxygen system, and the pee hose? Do you have a knee pad or instruments wrapped around your leg?

G-forces might hamper a quick jump. On DG-Flugzeugbau's webpage there is an emergency system called "NOAH" (http://www.dg-flugzeugbau.de/noah-e.html). It consists basically of a folded air cushion, integrated into the glider's seat which will blow up by pulling a handle. It also releases the belts immediately. In less than a second the pilot will be lifted up to the frame of the cockpit. This enables him to simply roll out of the glider. The NOAH system can be built into gliders that have a foldaway instrument panel.

The jump and the landing

After finding the way out of your cockpit, you have hopefully used up a bit of your adrenaline. Now, try to keep calm and count 21, 22, 23 …. Pull the rip cord handle with both hands. You can also use just one hand, left or right, whatever matches the situation.

A static line chute will already have opened by itself.

Be prepared for an opening shock and then have a look up, into your chute. Don't forget to breathe. Now, try to locate your position and estimate your altitude. Knowing the wind direction will help to prepare for the landing.

With the toggles on the steering lines you can maneuver the parachute into the wind. Pulling left turns left, pulling right …. Hopefully you'll find a landing area without obstacles. Before touchdown look at the horizon, like in your glider. Bend your knees a little. They will help to smooth the bump. Always keep your legs together!

Please do not pull the lines for the touchdown, you're not a skydiver! Try to fall sideways and roll over if necessary. After landing, get up and run around the canopy. If you can't get up, grab one of the lines and pull it until the canopy closes. In windy conditions, you can also try to lie down on the chute. You should get out of the harness or cut the lines as soon as possible.

Landing hazards

There is a small chance in your life as a glider pilot that you will have to bailout one day, and there is another small chance that you will then have to

deal with hazardous terrain. Nobody hopes for this but the following problems can occur, and it is worth thinking about different landing areas. A land out in a glider also has to be mentally prepared.

If you are forced to land with your parachute in **water**, try to steer into the wind and open your chest strap shortly before touching down. After "ditching," release the leg straps and get out of the harness. Swim away from the chute (usually upwind) or swim against the drift of the water. Optionally, dive away from the canopy.

Power lines might be in your way. It is important to keep your feet together and stay upright. Take your arms up to dive through the lines. In case of touching a wire, don't touch a second wire. In case of getting stuck between the wires, don't allow anybody to touch you. Helpers should contact the power company and ask to close down the power line.

Obstacles like **trees** can be in your way. For a tree landing you also must keep your feet together. Cover your face and belly with your hands and elbows and keep your chin tucked in.

If you have to land on a **roof** or **ridge**, steer away from the highest point. Then run down the roof/ridge and try to hold the canopy open until you are safe.

All this sounds like you have to be an athlete to succeed in a bailout. True, a bailout is no easy hike. It is your second chance when your soaring is suddenly over. I have never done a bail-out nor have I jumped from a working plane. But I've listened to a number of people and heard of successful bailouts. I've also heard of injuries from people who had maybe never before thought of bailing out. So I do my mental training from time to time. Go through the steps and be prepared and your chances to do a "safe jump" will be a lot better. Your emergency adrenaline will hopefully do some extra work for you, and if you consider installing a NOAH system in your glider, this will push you quickly out of the cockpit.

When done properly, it all fits back in and ready for the next 180 days of use.

Crash … remember …

1. What to do first, second, third, …?
2. Mind training
3. **Go through these steps every time you get bored in the cockpit.**

Some suggestions for your glider operation

Take the opportunity to practice "bailing out" and make it a fun evening in your club: Announce an after fly party and prepare your favorite club ship, maybe a two seater? Put a mattress besides it and then let all pilots simulate a bailout. If you know of a scuba diving shop, ask to borrow a lead vest to simulate the G-forces while wearing it. You might want to film some of these bailouts. Take the bailout time with a stop watch and then try it once more. Improve your times. Discuss the issues. Have fun and don't forget to have a drink together.

This link is to further information on parachutes: http://commons.wikimedia.org/wiki/Category:Parachutes?uselang=de

Time lapse video of parachute rigging: http://youtu.be/Ek-tbMtF-9A

About the author: *Elke Fuglsang-Petersen is a German glider pilot, who has spent three years (not only) soaring in Colorado's Front Range. Besides job, family and flying gliders she has always been engaged in "club stuff," like instructing, board business, media work or rigging parachutes. During some extended cross country flights she was able to earn a gold badge, some State and two US-records and was awarded the AML-Trophy in 2013. She says, "Soaring in my single seated glider is the best way to enjoy my spare time, get out and away from all those little problems down below. I am happy to sometimes be able to see the world from a different angle."*

David Hart's Flight Line column and Robert Brock's Glider Pilot Parachute Endorsement in May *Soaring* were great reminders of the important of parachute training. The following book excerpt provides additional tips.

— Lawrence Spinetta, Austin, TX

THE JUMP FROM THE SAILPLANE

From John Kukuski's *Theory and Technique of Soaring (1952)*

In the case of an accident in the air, the breaking up of the sailplane or collision with another machine, it is most important for the pilot to control his nerves and to keep calm. The sailplane should be abandoned in the shortest possible time, the method of leaving the cockpit depending on the position of the sailplane in the air.

When the sailplane is in a normal gliding position the pilot should release the safety harness and climb overboard, keeping his body close to the fuselage. He should first move his feet to the pilot's seat and then push the upper part of his body overboard head down, an energetic kick by his feet now resting on the side of the cockpit or on the instrument panel will then send him clear of the sailplane.

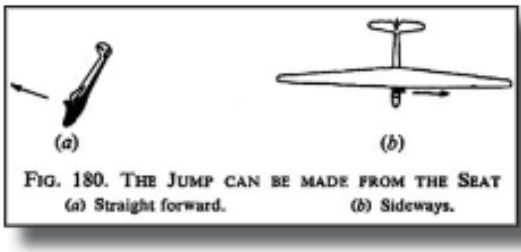

FIG. 180. THE JUMP CAN BE MADE FROM THE SEAT
(a) Straight forward. (b) Sideways.

When in a steep dive the pilot's body will have the tendency to fall down and the weight will be supported by the feet on the rudder bar. The first move in this case is for the feet to be firmly rested on the bulkhead as near the pilot's seat as possible, then the safety harness is released. As the sailplane approaches the ground rapidly these actions should be performed in the quickest possible time. The jump can be made straight from the seat (Fig. 180), or sideways when the pilot should climb overboard trying to rest his hands on the struts bracket or skid, and sending himself clear with a hard kick of the feet. The danger in the latter method is in getting involved with the wing.

When the sailplane is in a spin the pilot should try to abandon it as in the gliding position, but climbing overboard into the direction of the spin—in a left spin over the left side of the cockpit.

When in an inverted spin the jump from the sailplane is quite simple and it is sufficient to move the feet as near the pilot's seat as possible and release the safety harness, when the pilot will be thrown out immediately.

On no account should the rip cord handle be held whilst abandoning the sailplane.

Opening the Parachute

The pilot should wait to open the parachute until he is clear of the sailplane. If it is opened too early there is the danger of the parachute becoming entangled with part of the sailplane, especially when it has broken up in the air.

While leaving the sailplane the pilot should look around and see if there are any parts flying loose such as the rudder or ailerons. If so the opening of the parachute should be delayed if there is sufficient height to permit it. The pilot should not rely on the altimeter reading in such cases as the instrument will not show the correct height due to the high sinking speed. It is better to judge the height by looking at the ground

A pilot of average weight in a free fall will reach a terminal velocity of about 120 mph in a period of 11 seconds after falling 1200 ft. After that time the speed of fall is fairly constant. There is no need to be afraid of a delayed opening of the parachute as there is no danger in it, and it can be prolonged for about 800 ft if necessary.

If there is a possibility of collision with falling parts the speed of fall away from the sailplane and flying parts should be increased. This can be done by moving the knees up close to the body and folding the hands across the chest with the right hand feeling for the handle of the rip cord.

Pilots should be particularly careful with the opening of the parachute when leaving the sailplane in clouds, ahead of a thunderstorm, or strong thermal currents. There have been cases in the past when an early opening of the parachute in clouds prevented a normal descent as the very strong up-currents lifted the parachute and pilot to very great heights where lack of oxygen and low temperatures are liable to prove fatal. It is generally better when possible to delay the opening of the parachute until free of the cloud, as the base of cumulus or cumulo-nimbus cloud is seldom lower than 1000 ft which gives the parachute time to open before reaching the ground.

In a normal free fall the hands should always be kept close to the body with the right hand across the chest holding the handle of the rip cord.

The parachute is opened by pulling the rip cord out of the pocket with a sharp jerk. Immediately after this action the right hand should return to its previous position across the chest. The parachute should open in about 1-5 seconds during a normal free drop.

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and MOTORGLIDING MAGAZINE

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FLIGHT LINES

BY DAVID HART
EDITOR

You'll note parachutes are featured in both the "Teaching Soaring" and "Repairs, Maintenance and Upgrades" columns this month. We may take our parachutes for granted, but jumping from a glider is not an easy maneuver and requires preparation and practice.

I tell my students, with whom I usually fly *without* a parachute, to jump from a glider in flight only if it isn't flying anymore, either because of a midair collision, or because of a mechanical failure, like the wings coming off. If the glider is flyable, you will be better off flying it to the ground rather than jumping, even if it means going into trees or ground looping in a short field, since your body in a glider cockpit is better protected than your body hanging under an open canopy. Of course, you always have a landable field in glide distance, and you've practiced low energy landings, right?

I've often wondered about bailing out at ridgetop altitude or avoiding pieces of the glider after exiting the cockpit. So, I've decided to purchase a static line rig for my parachutes. Motorgliders pose additional risk to jumpers: their emergency procedures for jumping with the motor running include a warning to stop the engine before exiting the cockpit, by manually retracting the motor if necessary, so the propeller is stopped by hitting the fuselage.

U.S. Army Airborne Insignia (aka Jump Wings).

I've never bailed out of a glider, and hope I never have to, but I made five static line jumps from perfectly good airplanes as an ROTC cadet at U.S. Army Airborne School in 1982. We built up to the actual jumps as follows: first practicing our parachute landing falls (PLFs) off a low platform, then jumping from a 34-ft tower with a static line, then being dropped with an open chute from a 250-ft tower, and finally jumping from an actual airplane in flight.

Executing a proper PLF is essential to landing a parachute without injury. A PLF can be executed in any direction except for straight forward or straight back, so it's important to steer your chute into the wind as you near the ground, then roll to the side as you make impact. We were taught to use five points of contact with the ground, in order: feet (together), calf, thigh, hips, then back. Done correctly this dissipates the force of the landing.

A poorly executed PLF can be painful or even dangerous. With forward momentum but no sideways roll, your points of contact when hitting the ground will be feet, knees, and face; if drifting backward, they will be feet, butt, and head. Not good! When practicing parachute emergencies, in addition to practicing your egress, try a rolling fall onto grass just to get the feel of it. It could save you from a broken leg, or worse.

PRACTICE – PRACTICE – PRACTICE

(EMERGENCY BAILOUT PROCEDURES)

By Allen Silver

Would you like to reduce your egress time by 50% or more? All you have to do is practice your emergency egress procedures before and after each flight. It's a simple concept yet very few pilots do this. After all, accidents only happen to someone else, right? Over the past few years I've run clinics at conventions, flying group meetings and FBO's teaching pilots and instructors how to egress their aircraft in case of an emergency. It soon became apparent that by teaching pilots to practice, practice, practice these procedures *before* and *after* each flight, the time needed to egress an aircraft was drastically reduced.

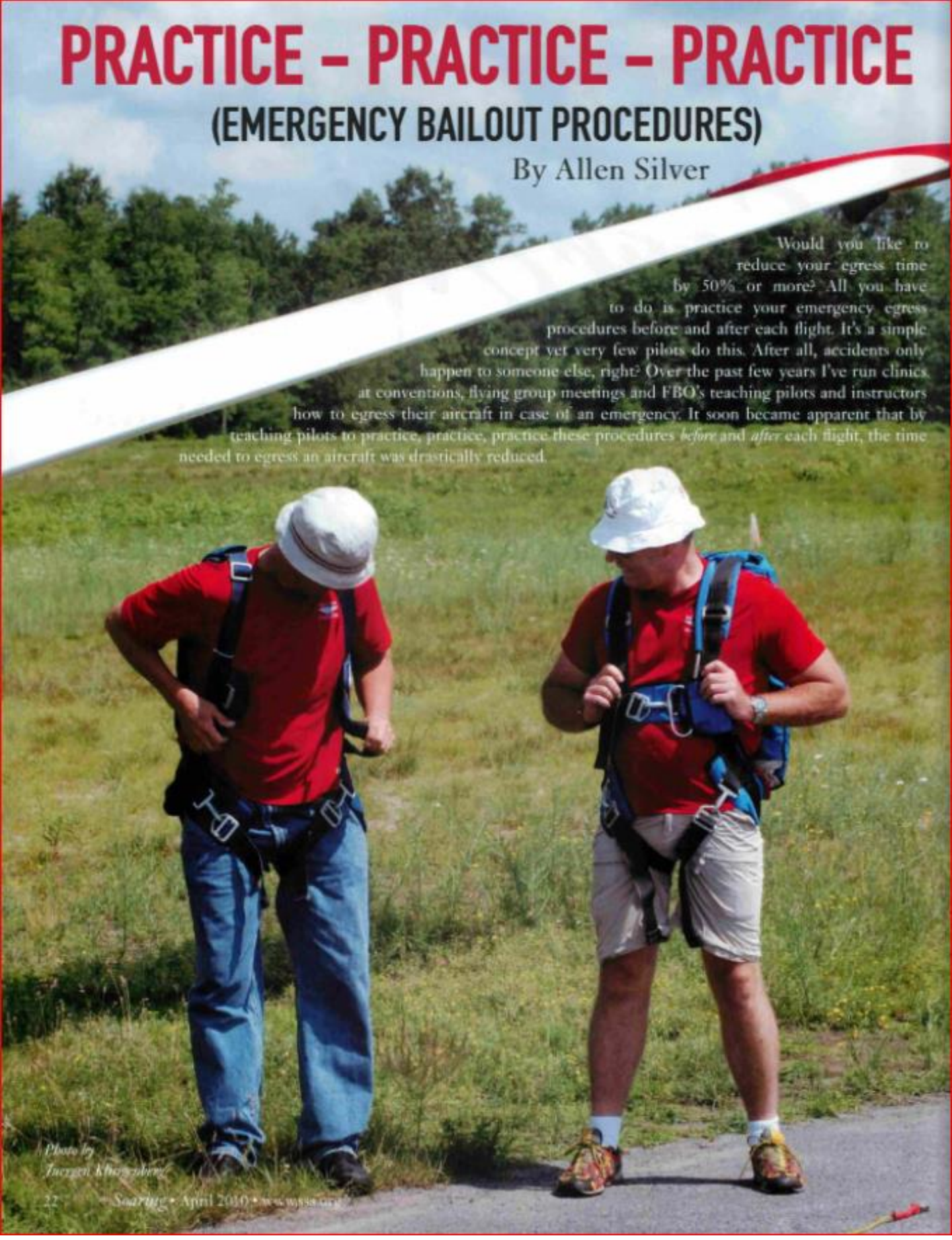


Photo by Juergen Klueglsberg

WHY PRACTICING WORKS

If you have no game plan, the thought process during an emergency is a four-step, panic-filled process that goes something like this:

Step #1 *Recognize The Problem.*

Also known as the "Oh Sh**!" step. When a major problem occurs, your brain will take a second or two to realize that you had a midair collision and your left wing just departed your aircraft!

Step #2 *What Do I Do?*

I need to bail out. Should I jettison the canopy first, or am I supposed to unfasten my seatbelt?

Step #3 *How Do I Do It?*

Where is that emergency canopy or door release lever? Do I push it or pull it? Do I even have one?

Finally, you arrive at **Step #4** *Actually Doing Whatever You Figured Out In Steps #2 and #3* ... and hope you have enough altitude left to do it!

Any hesitation in these steps starts to add up. By practicing before and after each flight, **Steps 1, 2, & 3** can be eliminated (well, I suppose you'll never really eliminate the "Oh Sh**!" step, but at least you can keep the time to a minimum) and **Step 4** can be accomplished more quickly. You'll be reacting because you've developed the habit of practicing your egress procedures over and over before and after each flight. This is often called muscle memory.

Practicing is a process, not a one-time event. When you first learned to fly, your instructor didn't show you how to make one landing and then said, "Great! That's over with!" You had to spend hours in the pattern to get good at it. Even now, you continue to practice maneuvers you've done over and over to make sure you don't lose your edge. Preparing for an emergency is no different. We are creatures of habit and repetition is the key to reacting quickly and decisively. Nothing but **Practice, Practice** and more **Practice** will achieve this goal. The results will save you precious time and altitude which, in a real emergency, could mean the difference between making it home to view another sunset or not.

STRATEGIZE WHILE YOU'RE ON THE GROUND

Start by looking at the aircraft you are going to fly and establish a plan of egress. There are certain actions you must take in any aircraft and you must do them in the correct order. I have a catchy phrase to help you remember: "CANOPY – BELTS – BUTT." If you fly an open cockpit airplane, you can skip the canopy part. But if you have a canopy (or door) it is extremely important that you jettison this **before** unfastening your seatbelts. I've seen placards on some popular aircraft that suggest loosening belts first. Don't do this! Your belts are the only thing holding you in the aircraft. If you're tumbling out of control and unfasten your belts before jettisoning the canopy or door, you may be ejected through it or pinned in a position where you can't reach the release mechanism. Neither situation is desirable. Unless you absolutely cannot reach the release handle with your belts on, always jettison the **CANOPY** first, then release your **BELTS**, then get your **BUTT** out of the airplane.

If you're flying someone else's aircraft, or a rental, become familiar with and discuss the emergency procedures before your flight. Some possible questions to ask are:

Does the canopy or door jettison?

If your door or canopy has a separate mechanism to jettison it during an emergency, learn how to operate it. Also, make sure this mechanism actually works!

If the canopy slides back, does it lock in place?

If not, it could slam forward on your hand and fingers. A possible solution would be placing an elbow on the track.

Does your canopy swing open to the side?

If it does, maybe a shoulder against it will help prevent it from slamming back shut on you during a bail out. Aerodynamics can play strange tricks when an aircraft is plummeting out of control. Don't assume the canopy will just rip off in the slipstream.

Also, think about how you would actually claw and crawl your way out of the airplane or glider. In an emergency, you're not worried about where you step or what you might break on the way out. Bailing out is quite different from the way you normally get out of your airplane (unless you routinely dive out head first onto the ramp!) and will probably be difficult if the aircraft is tumbling out of control and pulling positive G's. In general, it's best to try to dive out over the side head first. Try to slither over side head first like a snake to minimize the wind blast and lessen the chance of hitting your head on the tail. But the important thing is to get out any way you can and as quickly as you can.

There are many other things to consider, but I'm trying to get you thinking about the various scenarios that might occur. Work out a possible solution from the comfort of your hangar, while you're still on the ground. Remember Murphy's Law: whatever can go wrong, will...and at the most inopportune time!

What's the only thing worse than not being able to get out of a disabled aircraft? Find out in segment two of this three-part series. In the meantime: **Practice, Practice, Practice!** If you have questions please feel free to call (510) 785-7070 Mon.–Thurs. or email me at Allen@SilverParachutes.com. Visit my website at www.SilverParachutes.com for additional information.

DON'T FALL OUT OF YOUR PARACHUTE

All the practice in the world won't help if your parachute doesn't fit properly. It's rather embarrassing to be tumbling in freefall after a successful egress and notice a parachute just like yours floating a few feet away! You can fall out of an improperly adjusted harness. This has happened in the past and it's so easy to remedy. Your parachute rigger will be able to help you. A properly adjusted harness will place the 3-bar adjuster slides (if your chute has them) just below your collar bone (see Figures 1 & 2).

GRAB THE RIGHT PARTS

Now that your parachute is adjusted properly, let's make sure you can easily identify the ripcord from all those other shiny pieces of metal. I suggest you or your parachute rigger put a piece of brightly colored tape on your ripcord handle. This will help you to see and quickly identify the handle, saving precious time. You should always try to pull the ripcord with both hands (Fig. 3), but what if one is injured? Think about and practice how you would pull the ripcord if one arm is injured. I teach the methods shown in Figures 4 and 5.

Before every flight, take a moment and visualize jettisoning your CANOPY, unfastening your BELTS, and getting

Figure 1.

Figure 2.

your BUTT out of the aircraft. Next, **Look, Find and Reach** and take hold of the ripcord. Next release your grip, but pretend you have the ripcord with both hands and simulate pulling it. Next take hold of your ripcord with only your left hand and simulate pulling it. Now repeat this process with only your right hand and simulate pulling your ripcord. Go through this same process once again at the end of each flight after you shutdown (if in a powered aircraft). Practicing before and after each flight only takes a few seconds and you'll be conditioning yourself to react in a real emergency and could very easily cut your egress time by 50% or more.

YOU'RE NOT ON THE GROUND YET

Opening your parachute is, of course, the most important part of any successful bailout. But there are still many steps you can take to increase your chance of survival and minimize injuries. Don't go through all the effort of scrambling out of your doomed aircraft and successfully opening your parachute only to land downwind in 20 knot winds, or create a fireworks display in some power lines.

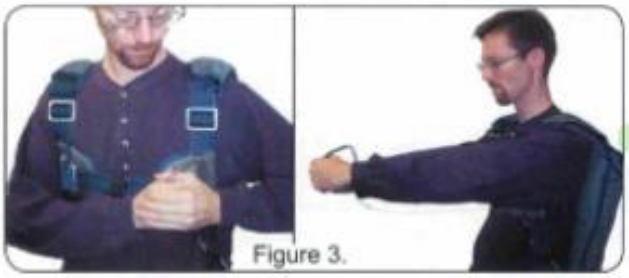


Figure 3.


Figure 4.

*Two-Handed Pull (the preferred method): grasp ripcord with right hand, place left hand on top and hook left thumb in ripcord. Pull straight out – **hard!***

Floating back to earth under an open parachute certainly beats trying to grow feathers on the way down, but

if you just drift at the mercy of the wind, you can still be seriously injured on landing. Steering your parachute to avoid life-threatening obstacles and to face into the wind for landing gives you the best chance to avoid, or at least minimize, injuries on landing.

GET A GRIP

Steering your parachute is easy if you have steering handles. They are typically a loop of gold or red 1" wide webbing attached to a steering line that goes up to one of the rear vents on the parachute canopy (See Figure 6). By pulling one of these handles, the corresponding vent is partially closed and the parachute turns.

If right arm is injured, grasp ripcord with left hand and hook thumb inside ripcord (just like in the two-handed pull). Pull straight out from your body **hard** like your life depended on it.

Not all parachutes have steering handles. The manufacturer may rely on you to remember which riser to pull down on. The risers are those pieces of 1 ¾" wide webbing that the connector links and lines are attached to. Pulling down on one of the **rear** risers has the same effect of closing a rear vent, although it is slightly harder than pulling on just one steering line. There can be four risers above your head and pulling on the wrong one can make steering more difficult. It can also increase your rate of descent and, in extreme cases, collapse your parachute. At the very least, a qualified parachute rigger can sew handles directly onto the rear risers to make them easier to identify and hang onto. Installing steering handles and making sure you know what they look like and where they are located will help lessen the stress during an actual emergency. Why not stack the deck in your favor ahead of time?

PARACHUTE STEERING 101

After your parachute is open, take a hold of the steering handles or rear risers and **do not turn them loose** until you have landed. To keep the handles from blowing around in the wind, they are typically tacked in place with thread that is easily broken when you pull on them. If the steering system is properly rigged, you should only need about 10 pounds of force to pull the handles and steer.

Up high, you can pull one of the steering handles or risers down as far as you want. You won't collapse the chute; it just turns faster. Remember to pull down **only one handle or rear riser at a time**. In all likelihood you are wearing a round (umbrella) shaped parachute. **Never** pull both risers or steering handles down prior to landing, on this type of parachute. Doing so could dramatically increase your rate of descent. Your round parachute is not a rectangular parachute (non-rigid glider) like a skydiver uses and should never be flared when landing. Pull the right handle or riser to turn right and the left to turn left. When that turn is completed, all you have to do is ease the pressure off the steering handle or riser and allow it to return to its original or neutral position. When landing an aircraft you make smaller corrections as you get closer to touchdown. The same applies to steering your parachute. Try to make only minor inputs when low to the ground as this will reduce the oscillations (swinging) and help you land softer. The only exception is if you recognize a life-

Figure 5.

threatening obstacle, like power lines, at the last moment. You **must** miss these at all costs, even if it means making a low turn or landing downwind. It does you no good to face into the wind and land softly in the power lines.

Remember that arm that was injured during the bailout? It hasn't healed yet, so think about how you would steer with only one hand. Be creative. If you can't make a 90 degree right turn because your right arm is injured, try making a 270 degree left turn instead. Two wrongs don't make a right, but three lefts do!

Figure 6.

This is the hardest way to pull the ripcord. If left arm is injured, grasp ripcord with right hand and pull across your body like you're elbowing someone behind you.

APPLES & ORANGES

The majority of pilots wear emergency parachutes with round (umbrella shaped) canopies and you must not confuse these with the rectangular, ram-air canopies used by skydivers. They are apples and you're wearing an orange. Everyone has seen skydivers in the movies, at a local drop zone, or at an airshow. Maybe you've even made a jump. You may have noticed or were taught that rectangular (ram-air parachutes) are flared for landing by pulling both steering handles down at the same time a few feet before landing, much like flaring an airplane. These "apples" are actually non-rigid gliders. Your round "orange" is an umbrella, not a wing. If you try to flare a round parachute, you will, at best, increase your descent rate, and at worst, partially collapse the canopy. A partially collapsed canopy will re-inflate in about 20 feet. This is not good if you are 15 feet above the ground! More on landings later.

WHERE WILL YOU LAND?

Most steerable, round parachutes are designed to have about a 5 mph forward speed. Air flowing up into the canopy is forced out the vents in the rear. Kind of like a jet engine but without all the noise. This dampens oscillations and makes the parachute steerable. The 5 mph forward speed created by the vents cannot be stopped. Pretend the gas peddle is stuck at 5 mph. With this knowledge and the diagram in Figure 7 you can get a rough idea of where you're drifting. If there is no wind, then you'll be going 5 mph in any direction you are facing. If you don't like what's in front of you, turn and head in a new direction at 5 mph. In the unlikely event that the wind is blowing at exactly 5 mph, you'll be coming straight down if you face into the wind. Look below you and decide if this is where you want to land. If you see something that you would not like to land on and have plenty of altitude, just turn your parachute 180 degrees and head downwind at 10 mph. Once you are downwind of the obstacle, turn back into the wind. You won't make it back to that obstacle unless the wind dies down and you have enough altitude. Power lines or any life threatening obstacle must be missed at all costs even if it requires a turn close to the ground.

TIP: Steer away from roads. Besides the obvious danger of getting hit by a car (a real bummer after just surviving a heroic bailout!), power lines that often run alongside roads can be hard to see until it's too late.

In our final scenario the wind is blowing at 10 mph (or any speed faster than the approximate 5 mph forward

speed of your parachute). Facing into the wind will have you drifting backwards, but it's better to land going backwards at 5 mph then running with the wind and going 15 mph. Just remember to glance over your shoulder on the way down to see what obstacles you might be backing toward.

ON THE GLIDESLOPE

For a parachute to be certified, it must have a descent rate of no more than 24 feet per second. Descent rate is affected by your weight and also the model of parachute you choose — for the average person, 16 feet per second is a good number to work with. Couple that with the 5 mph forward speed and you're looking at a glide slope of about 45 – 60 degrees. Of course, this will vary with the wind and other factors, but we're not concerned about doing trigonometry during a bailout. We're dealing with a rule of thumb that will help save your life. If you look down (or behind you, depending on which way you are drifting) about 45 – 60 degrees, that will give you a good idea or approximation of where your touchdown area is going to be. If you don't like what's there, turn and go somewhere else (if altitude permits). Just remember, **miss obstacles first** and then face into the wind for landing

K.I.S.S. THE GROUND

Hopefully, you won't be bailing out on a regular basis, so I use the KISS method (**K**eep **I**t **S**imple **S**tupid) when teaching landings. If you've had any military training, you might be familiar with the "parachute landing fall" or PLF. During a bailout, you're not trying to be a paratrooper so don't worry about it. Landing under a modern emergency parachute is about the same as jumping off of something about 3–5 feet high. You could do that without any special training, right? Landing your parachute is no different.

When descending under your parachute it is usually more comfortable to hang in a parachute harness with your legs slightly out in front of you. Prior to landing you *must* get them under you before you land so you don't hit on your tailbone. Keep your feet together to help brace your ankles, and *never* lock your knees. Land on the balls of your feet and try to take up most of the landing shock using your leg muscles like the springs of shock absorbers, bending them enough (but keeping some tension) to cushion and slow your landing. You'll probably be drifting across the ground when you land and will get pulled off your feet by the parachute. This is when it's important for you absorb and slow most of the landing shock with your feet and legs. This will also lessen the chances of receiving severe upper body injuries, especially to your head. Practice jumping off something 3–5 feet high and you'll get the idea. Remember to keep your feet and knees tight together and not locked.

IT'S NOT OVER YET

Once on the ground, you must get out of the parachute harness as quickly as possible to avoid being dragged in strong winds. Get out of your parachute harness even if there is no wind just in case a gust suddenly comes up. It only takes about 5–6 mph to drag a light person. Being dragged over rough terrain in strong winds can be deadly in a short distance.

Practice getting out of your harness. If your harness has a chest strap, get in the habit of removing that first. If you are being dragged and you unfasten the leg straps first, the harness could strip off of you and the chest strap could choke you. Some harnesses are more difficult to get out of than others. If this is the case, you might need to collapse the parachute by reaching up and grabbing no more than two lines that are side-by-side and reel them in hand-over-hand until you get the parachute under control. If you are injured, this may not be an option either (remember the broken arm from earlier?). You might consider a hook knife. My company makes a "SMAK PAK" survival kit that attaches directly to your parachute harness. It has a hook knife on the outside of the kit within easy reach. With one hand, you can use the hook knife to quickly cut off a riser to collapse your parachute. It can also be used as a seatbelt cutter. Once out of your harness, spread out your parachute so someone can find you. Use your signal mirror, whistle or whatever survival equipment you have to summon help. If you have your cell phone with you, maybe it'll work. If it does, call for help and maybe call your favorite pizza place that guarantees delivery in 30 minutes or less. Survival gear must be on you to be called survival gear. If it's stored in your aircraft I call it camping gear, which may not be accessible after a bailout.

Take some time to think about possible emergency scenarios that maybe unique to your aircraft and practice your procedures before and after each flight. In an emergency, seconds can mean the difference between life and death. If the unthinkable happens, you'll be able to take quick and decisive action. You owe it to yourself and your loved ones to **PRACTICE – PRACTICE – PRACTICE**.

If you have questions please feel free to call (510) 785-7070 Mon. – Thurs. or email me at Allen@SilverParachutes.com. Visit my website www.SilverParachutes.com for additional information.

About the author: Allen Silver, owner of Silver Parachute Sales & Service, is one of the world's recognized experts in getting you out of your aircraft quickly and safely. He contributes articles to various flying publications and writes a bimonthly column for "Sport Aerobatics" magazine. He is an FAA Master Rigger, a Designated Parachute Rigger Examiner, and is the current chairman of the Parachute Industry Association's Rigging Committee. Seventeen of Allen's 25 years in the California Air National Guard were spent working with parachutes and survival equipment. He also has over 48 years of skydiving experience and has amassed more than 3,200 jumps as a sport and professional skydiver. He now spends most of his time staying in the aircraft and has over 1700 hours and an instrument rating. His business is devoted entirely to pilots and their needs.

BY ROBERT BROCK

Glider Pilot Parachute Endorsement

My glider student is alive today because I gave him a Parachute Endorsement.

As part of John Marten's pre-solo checkout last July, I included instruction on how to properly wear and operate his Softie parachute. John's first and final flight in his AC-5M Russia glider terminated shortly after release from aero tow when his left wing broke off at approximately 1,500 ft above the ground (see *Soaring*, Accident Report, November 2023).

Above and Beyond

During his cockpit checkout, I asked John if he had a parachute. He said he had a Softie in his truck, but that it had not been repacked in years. Ted Fawnsworth (Master Rigger and Certified Free Fall Instructor) had recently repacked my Softie Mini-240 Parachute after more than ten years in storage. Ted invited me to pull the ripcord and participate in the inspection and repacking. Ted observed it was like new, even the rubber bands were in perfect condition. I told John to get his Softie and I gave him the parachute tutorial Ted Fawnsworth had given me.

As a CFI, I was under no obligation to include Parachute Training, or even insist that John wear his parachute. However, I believed it was my duty to do everything possible to ensure the safety of my student.

The FAA does not have a "Glider Pilot Parachute Endorsement." However, a CFI can and should expand FAA endorsements (some of which are woefully inadequate) to include parachute instruction. The CFI can create a clear and simple Parachute Endorsement/ logbook entry, like the example below:

I certify that John Marten has received instruction on how to wear, adjust, operate, and land using his Softie Mini 240 emergency parachute. He received instruction on how to jettison the canopy, unfasten seat belt/shoulder harness and bail out of N55SM. Signed and dated.

Following John's amazing bail out, his used Softie Parachute was sent back to the manufacturer for inspection. Dan Tarasievich, owner of Para-Phernalia, Inc. (Arlington, WA) sent me a new/free replacement mini-Softie 240 parachute to give John so I could give John what I considered to be a new top-notch glider self-launch endorsement, even though John had received an endorsement from another CFI.

Parachute Endorsement Builds Good Habits

Below are the basic elements of the Parachute Endorsement with instructor Collin Gyenes and student John Marten. Collin's RF-5b motor glider was the training aircraft at the McMinnville (OR) Airport.

1. *Inspecting and adjusting chute for proper fit.* Bending forward from the waist to adjust shoulder harness help position the parachute in the correct seated position for piloting. Collin is 6'3". His Softie Wedge is longer to better fit his body. Both parachutes had been repacked and certified within the previous 180 days as required by the FAA.

Collin supervising John's parachute adjustment and proper fit.

2. *Opening Chute.* Bailing out of a glider, especially when it is coming apart in the air or rapidly spinning, is extremely disorienting. Looking at the ripcord handle, and then pushing the handle with both hands outward increases survivability. Practice! Every time an emergency parachute is worn, practice. Practice produces recent muscle memory that helps when conditions are chaotic.

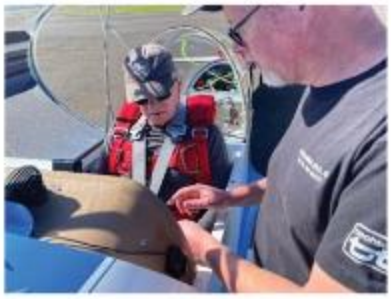
Practice and simulate: a) look at the ripcord handle, b) grabbing it with both hands, and c) while holding the ripcord handle, briskly extend arms outward from the chest.

3. *Landing.* Landing with an emergency parachute like the Softie Mini-Softie 240 is like jumping off an 8 ft ladder.

Practice and simulation: a) bend knees and position to fall sideways to absorb the shock when landing and, b) do not look at the ground. The goal is to avoid a rigid stance and tightening of muscles.

Collin demonstrating knees bent, some experts recommend crossing arms and looking ahead when landing.

4. *Getting In and Bailing Out.* Collin instructing John about the glider seat/shoulder belts, how to release the belts and canopy. Often a few seconds can mean the difference between life and death. Practice speeds up bailing out and parachute deployment. Since belts and canopy releases are often different depending on the specific glider model, I write the Parachute Endorsement specifically for the pilot's parachute and aircraft. Practice LOOKING AT THE RIPCORD while seated in the glider. LOOK at it before pushing away from the glider. Going from cockpit with visual references to open air can be extremely disorientating. Note the Ripcord handle/ring is near John's heart. It is easy to reach in free fall. Pull the Ripcord ASAP. Seconds matter.



Using the checklist and reviewing steps to bail out reinforces learning and makes it useable.

5. *Teach by Example.* If the instructor uses a checklist for every take-off and landing the student is more likely to follow that example. If the instructor also wears a parachute and practices the simple steps outline above, it becomes a habit that saves lives. Just ask John.

About the author: *Robert Brock, Ph.D. has been a CFI in power and gliders for over 40 years (8,000+ hrs PIC in SEL, tailwheel and gliders).*

Getting ready to start the engine.

Bail Out Decision

Bill Burner

What follows is a true story. It is about the decision to bail out of your glider. It is a short story because things happen really fast when you jump out of a plane. The point of the story is to illustrate how little time you might have once you decide to abandon your glider in flight. Being able to bail out successfully depends upon your altitude above ground. Because each accident is different and there are so many confounding factors, it is impossible to define a minimum bail out altitude. But whatever it might be for a given crisis, it is very probably much higher than you would think.

> "how little time you might have once you decide to abandon your glider …."

A close friend of mine in the Albuquerque Soaring Club, almost 50 years ago, was a practicing anesthesiologist in Santa Fe. He had just bought a competition class sailplane, the Zuni. It was newly designed and built as a racer in Moriarty, New Mexico. The Zuni he was flying was the first production model of this design. He was on a test flight, making his final glide back home. Knowing him, he was probably flying at V_{NE}. But it was a very windy and gusty day. All we know for sure is that he pulled both wings off the glider. He hit the ground nose first, wingless, and at close to a vertical angle. He had managed to jettison the canopy and was standing up, on the seat pan, at impact …. He had run out of time.

I told you it was going to be short; things happen fast when your glider is falling apart or out of control. So, how much time do you have to get out of your ship and pull the ripcord? Or, putting it the other way: How much altitude do you need to get out and open your chute? Here's a free fall table which is well known to all sky divers. The rightmost column shows the cumulative distance fallen, assuming you started with a descent rate of zero.

Table (1): Free fall acceleration, velocity and distance.

t (sec)	$a\ (\frac{ft}{sec^2})$	v (mph)	dist (ft)
0	32.0	0	0
1	31.0	22	16
2	28.1	42	61
3	24.1	60	134
4	19.6	75	231
5	15.4	87	347
6	11.6	96	478
7	8.6	103	620
8	6.3	108	771
9	4.5	111	928
10	3.2	114	1089
11	2.3	116	1254
12	1.6	117	1421
13	1.1	118	1589
14	0.8	119	1759
15	0.5	119	1929
16	0.4	119	2100
17	0.3	120	2271
18	0.2	120	2442
19	0.1	120	2614
20	0.1	120	2785
21	0.1	120	2957
22	0.0	120	3129
23	0.0	120	3301
24	0.0	120	3473
25	0.0	120	3645

Free fall table for sky diving.

The table shows in the right column the altitude consumed for each second after you jump. It shows that in less than 10 seconds you will have fallen 1,000 ft, and you will be close to terminal velocity. The next 1,000 ft will pass by in barely 5 seconds.

Keep in mind, this table is for a skydiver who is wearing a baggy jumpsuit and is stretched out, belly to the earth, grabbing as much air as he can. However, a glider pilot, who is wearing shorts and a T-shirt, and fumbling around trying to find the ripcord, will be falling faster. And his time remaining correspondingly shorter. Also, consider that skydivers start downhill by leaving a jump plane which is in level flight, whereas a glider pilot, abandoning a sick glider, is already in descent mode, and probably several seconds down this skydiver's free fall table when he actually exits.

The bottom line is that, for disasters which occur within 2,000 or 3,000 ft of the ground, time is short, critically short. It is imperative to act quickly to egress your ship.

Where are you most likely to get into such a mess? It could be anywhere, hopefully high. Altitude is safety for parachuting. But a threat we all face, on every flight, is at low altitude.

That threat is air traffic around the airport. Midair collisions are likely to require the pilot to bail out, and that could well be within just a few thousand feet of the ground, likely somewhere on this short table.

Moral of the story: Waste no time, get out as quickly as possible.

Once out of the plane, pull the ripcord immediately, especially if low. Do not worry about proper body position or attitude or anything that is going to slow you down, just get out and pull.

Emergency parachutes are designed to do one thing well, and that is open. If you pull the ripcord, it will open. Even a partially open parachute might be enough to save your life, which is all that matters at that moment.

Factors which go into the split-second decision you must make:

Egress

Obviously, the biggest problem is egress. It is a time consumer, time that

is precious. We know how hard it is to climb out of our gliders on the ground. Toss in: g forces and wind blast, either one of which can be overwhelming; the disorientation and difficulties of being thrown around inside the cockpit; reaching the canopy jettison handle, which might take a few seconds to find because it is bouncing all over the place; unfastening the seatbelts; etc. It is impossible to simulate on the ground how extremely difficult egress will be.

> "It is impossible to simulate on the ground how extremely difficult egress will be."

The descent rate of your broken glider

It will have consumed a lot of altitude, possibly thousands of feet, before you finally clear the glider.

Can you get it inverted or produce negative gs?

That would help immeasurably with egress, if you can manage to make it happen.

Type of glider

If Schweizer, or all metal, consider riding it in. They have remarkable crashworthiness. Fiberglass gliders will provide little protection.

Skydiver rule of thumb

The first 1,000 ft of free fall take 10 seconds; add 5 seconds for each additional 1,000 ft. That is not 10 seconds to do something, but 10 seconds until impact. Technically you will be 89 ft underground at exactly 10 seconds. If exiting at 2,000 ft, you are 15 seconds off the ground. 3,000 ft is only 20 seconds until impact, etc. Remember: This is what skydivers experience, after starting with a zero-descent rate. The time until impact shown on the referenced free fall table will be much shorter for glider pilots than skydivers.

A final point is on landing

> "land with both feet together."

I will put on my orthopaedic hat for this one: To avoid injury it is really important to land with both feet together. Military parachutists practice this on every jump. The reason is that parachutes tend to oscillate as they descend. According to Murphy's Law, you will most likely hit the ground during the down swing of an oscillation. The natural impulse is to reach out reflexively with whichever foot is going to hit first in order to cushion the down swing. But that is a mistake. Doing so will cause all the force of the impact to be absorbed by that one foot and ankle alone.

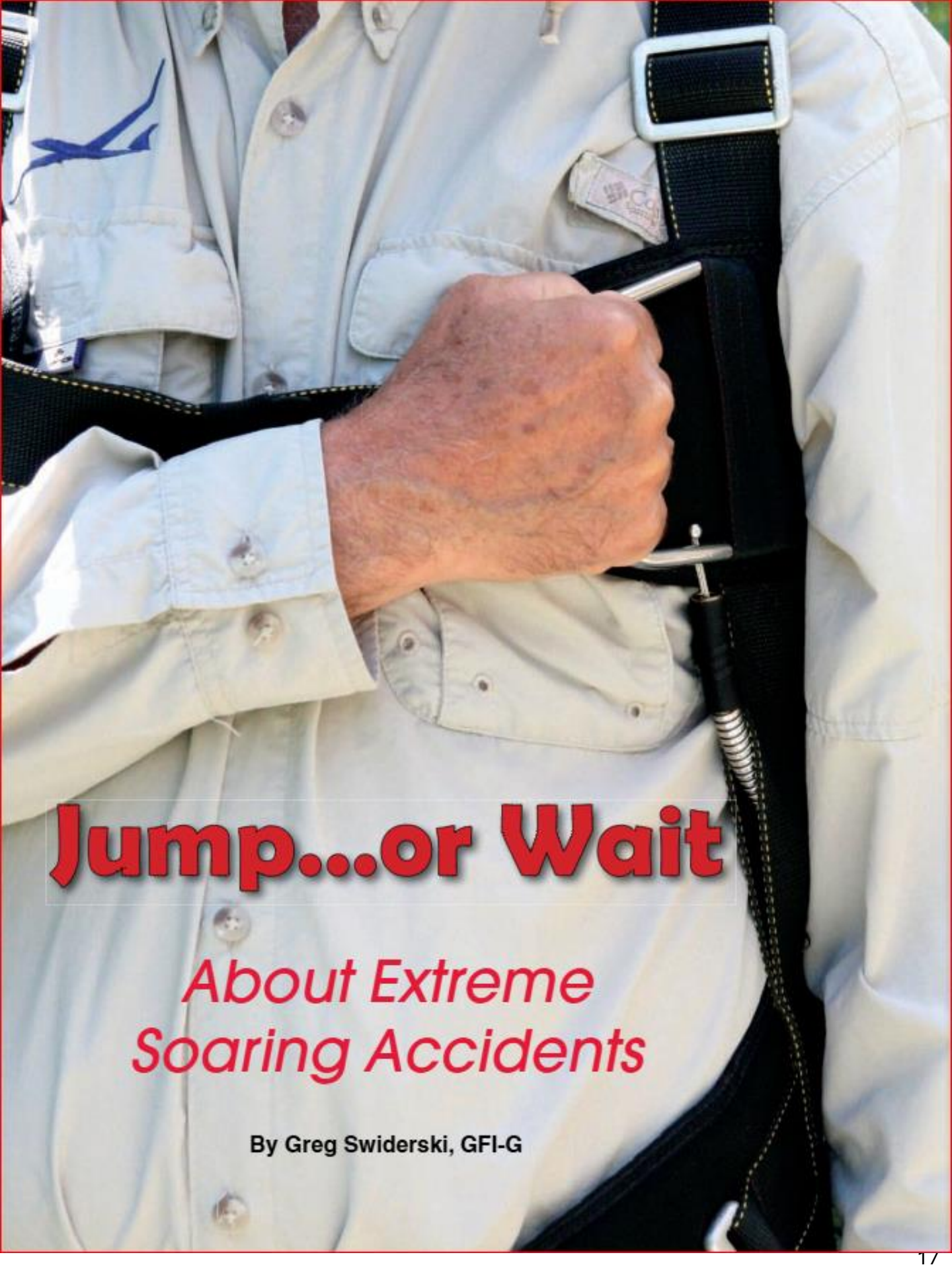
Keeping your feet together really helps to spread out the force of the impact. But, keeping your feet together is not natural, in part because the harness you are suspended in tends to spread your legs apart. So, on your way down, practice pulling your feet together a few times, in anticipation of the landing. Pulling your feet together will take a little more effort than you think. So prepare in advance to do it.

Conclusion

Get out quick – your life may depend on it. And keep your feet together on landing – your legs will depend on that.

For a video on bailing out by G. Dale, go to https://www.youtube.com/watch?v=cDXIxHAmSX0&t=106s

About the author: *Bill Burner is a retired orthopaedic surgeon with extensive sky diving and parachuting experience.*



Jump...or Wait

About Extreme Soaring Accidents

By Greg Swiderski, GFI-G

There is a saying among skydivers that, "You don't need a parachute to skydive, you need it only if you want to skydive again." For a glider pilot, the parachute is an emergency rescue equipment ± an aerodynamic antigravity brake, reducing the jumper's free-fall speed about ten times, for safe return from the sky to the Mother Earth. The fall speed of 15 mph is usually safe for touchdown, if you use your legs as shock absorbers ± but 150 mph is certainly not.

The parachute should save the life of a crew in an emergency, when ± according to the possibly best judgment ± remaining in the glider will be a much worse, potentially tragic choice. To perform this important function, the parachute belongs to the cockpit as a package, together with the pertaining knowledge and determination of the pilot; basic knowledge about parachuting, situational awareness, fast analysis of the emergency, decision to jump, bailing-out technique, parachute opening and maneuvering, terrain analysis and touchdown technique. No dive and pull up, neither touch-and-go, nor crash-and-go.

How tough is the decision to bail out ... ?

As in any hazardous situation, there is a probabilistic luck (good or bad) factor involved, but let's leave that aside at this time. We will need it later for consideration of what can and should be done to help if the ugly luck happens.

For now, let's imagine that everything with bailing-out went fine and the pilot is hanging under his parachute and enjoying the panoramic view. For an extreme midair accident survivor, it is the most beautiful sight in his/her life. But the second phase of the rescue operation is still ahead, and coming fast: the safe landing. Some maneuvering may be needed to avoid bad terrain or objects (power line, buildings, traffic); a proper body rotation to land downwind some harness prep if deep water is below. All of this is not banal. It could mean a difference between a happy walk from the site, or being taken on a stretcher for a long recovery. Here also the luck factor plays a strong role, but again, it can be helped a lot by the skill and the cool wit.

In the USA, parachutes are obligatory only for certain aerobatic situations per federal regulation, and for SSA-sanctioned competitions. In many European countries, *all* glider flying is done with parachutes on, and some pilots think our approach is "scary." But let's remember that almost all general aviation flying, as well as transportation and cargo flying, is being done without parachutes. Gliding accident fatality statistics do not show any advantage of one system over the other ± but there are too many factors complicating the objective comparison to advocate any radical change in the established approaches.

An overwhelming majority of glider accidents are related to landings and takeoffs, but the competition racing is certainly the type of glider flying with higher risk, because of the traffic congestion and the potentially hazardous style of flying in a large group of gliders and some tow planes.

May private glider owners opt nowadays for "softie" type of parachutes, because of their cushioning convenience, certainly important for a multi-hour flight, Thus, the parachute becomes functionally more a cushion than a lifesaver. There is not much wrong with such an approach, provided that the main designated function and the preparedness are not ignored. Nobody knows when, where, at what circumstances and altitude the bad luck might suddenly strike. The penalty for being unprepared can be very harsh.

The available glider accident records indicate the following typical reasons which make bailing-out necessary. I am dividing them here in five classes: ☛

A) Structural damage, as a result of aerobatic maneuver or excess speed.

B) Structural damage due to strong turbulence (wave rotors, clouds).

C) Structural or control system damage due to incorrect assembly.

D) Structural damage due to a midair collision.

E) Control system damage due to other reasons.

Since classes A and B became very rare for the modern, very strong, composite gliders, let's concentrate on the remaining three classes of accidents.

Here are several examples from recent years:

• During a competition, in straight flight pilot AD was hit from behind in the tail. Both gliders involved in the collision sustained structural damage, necessitating bailing-out. Pilot AD jumped and landed successfully (she had a solid parachute training, with over 100 jumps), the other pilot perished without jumping. Class D.

• During thermalling in a competition, pilot AP was hit in the bottom of the fuselage by another glider, which was entering the thermal at high speed with a pull-up. AD landed successfully, the other (very young and talented) pilot perished without bailing-out. Class D.

• During the WGC in Texas, two gliders collided in a thermal. One returned successfully to the airfield (assisted by two friends), the other pilot jumped and landed without problems. Class D. Both had FLARM units.

• During a thermal flight in Leszno (Poland), a pilot experienced a sudden loss of pitch control in his private Jantar. He was considering bailing-out instantly, but stable behavior of the glider and an altitude reserve induced him to experiment with flying the glider down to the critical altitude (1500 ft), safe for bailing out. He succeeded in maintaining the speed within a reasonable range without using the spoilers, so he decided to continue and land, taking advantage of the large, open airfield. He landed successfully and saved his glider. The reason: wrong assembly and preflight check. Class C.

The glider shook and entered a very fast left spin ...

• A pilot of a new, composite, high-performance glider, equipped with a stabilator (one-piece, "floating" horizontal stabilizer), experienced sudden loss of pitch control. The glider went into an uncontrolled dive, the pilot bailed-out and landed successfully. The reason: delamination of the control transmission lever (design and manufacturing fault). Class E.

How tough is the decision to bail out, especially from your own, pricy and beloved glider? Neither being a witness of the above-described accidents, nor having opportunity do discuss it relatively fresh with the survivors, I can only speculate about their mindsets. Therefore, I am adding here a description of one more accident, which I know well in detail, because I was the participant ± the single pilot.

It was an accident Class C ± wrong assembly. I was a university student and a fast progressing glider pilot at the Warsaw Aeroclub in Poland. I had a Silver Badge and above 50 hours of flight time. One summer weekend morning, I took off in a popular glider SZD-12 Mucha 100 (no radio) for a final flight in basic aerobatics, completing the task according to the training program. The weather was perfect, with blue sky, good visibility and no wind, making it easier to keep the sequence of maneuvers aligned and boxed within the assigned space. My maneuver sequence was: left spin 360, a loop and a left hammerhead, then the same sequence to the right. I was towed to 1100 m altitude AGL (about 3600 ft AGL), aligned the glider with the Vistula River, put my sunglasses in the cockpit pocket and entered the left spin. After aligned recovery, I dived to gain enough speed for the loop and started pulling up to the sky.

Suddenly, I heard a very loud crashing noise behind my back. The glider shook and entered a very fast left spin or spiral, I was not sure. I knew right away that something catastrophic happened. The controls were useless. Bailout was necessary. When I was opening the belts, I took a look to the left ± the left wing was gone, all of it. I was not scared of jumping. I made about ten jumps previous year with the AW Parachuting Section, although I joined them only in my quest for flying. The medical commission disqualified me for a pilot training for being too lean, but somebody from the Aeroclub approached me with the advice: "Join the parachuters, they will take you ± and once you are the Aeroclub member, all will be easier." It was one of those precious, life-changing bits of advice. In this case, it was probably even more than changing.

So I made an instant decision, and the first point was what should be the proper way of bailing-out? I do not remember that I was ever given in my primary training any instruction about bailing-out, just the remark before soloing the Mucha, that, "The lever on the right (hinges) side of the canopy is for releasing the canopy in emergency." Okay, that should be easy, then what's next? Thinking fast about my jump, I suddenly realized that no-wind is a big problem. I might be hit by the spinning glider, or my parachute might be destroyed. It became the fight for life. I decided to delay the opening as much as reasonable ± at least 5 seconds, to create separation.

I grabbed and yanked both levers of the canopy locks, but nothing happened. The relative wind was pressing hard the canopy. Maybe also the unused lock was not working? Maybe I had not properly synchronized my hands? It took me

four tries and a couple of spin rotations. Finally, I forced it up more from the left side, and it flew away violently. I glanced at the fast rotating altimeter's pointer, prayed "God help me," dived down to the inside of the spin and started counting the seconds of delay. I always enjoyed a nice free-fall, but this time I was really very scared of the wreck above. From that fear I exaggerated with the delay, because when I opened the chute, the ground was really close.

... suddenly my yellow Mucha whizzed by from the right ...

I landed on a grassy field, not far from some storage buildings, some trees and a farm. While I was unfastening my parachute, a man shouted to me from the storage side. I looked at him, instead of up, and suddenly my yellow Mucha whizzed by from the right, barely missing me, and landed not far away. I was lucky to be on her missing-wing side. The other wing landed earlier, all within 100 yards. I pushed the chute into the cockpit, found my glasses and went to the near brushes for a nature call. When I was returning I stopped two women, who were dragging my lost wing to the farm (I wondered what was their recycling plan) ± and then I joined incognito the growing crowd of gawkers, surrounding the glider wreck.

Finally a car from the AW-Club came ± they were not sure how the "airshow" ended, because the hangar was obstructing the lower part of the action. The Accident Investigation Commission found decisively the cause: the left wing's double-threaded pin was not inserted in the upper ear, also a small screw, whose position should indicate the correctness of the pin assembly, was missing. The gliders were serviced and assembled by full-time mechanics, and we blindly trusted their jobs. After the formal decision, I returned to flying (with much more preflighting) and even to jumping (I was once lured to a group skydiving from 16 thousand feet ± performed from a perfectly sound airliner, leased for the occasion. I know, with no cash stash it makes me look wacky, so please keep it private). Oh, and I don't fly aerobatics, if there is no wind. Such a stupid prejudice.

Conclusion: I had my share of a clear luck, but my parachuting experience was also a big help.

The Aviation Psychology says about possible negative reactions of the pilot (or a crew member) to a sudden severe danger:

- Negation (Impossible! Why me?).
- Incapability of making a fast and real situational evaluation and a plan for rescue action.
- Panic – automatic, intuition survival reaction for self-defense, which might be irrational and harmful.
- Psycho-physical paralysis, resignation.
- Chaotic reaction, no rational plan.
- Unawareness of critical risk elements, resulting from lack of relevant knowledge and training.

Problems with these negative reactions became especially painful, if we see the cases when some pilots fail to bail out and perish in crashed gliders (with their parachutes unactivated), as shown above in two examples. In some cases though,

the full scope of the reasons might not be clear. Obligation of having a parachute for some flights should be combined with proper instruction and training, related to fitting, servicing, maintenance, storage, opening, maneuvering, and landing. The most efficient instruction and training could be certainly provided by a parachuting school. Making at least one jump would break a psychological barrier and assure the know-how.

I knew right away that something catastrophic happened.

Another important approach to the extreme accidents is prevention. Here, the midair collision risk comes to the front nowadays and stimulates the progress in related technology. The Swiss-made, GPS-based FLARM. dominates the soaring market, and justly so, because it is (unlike the radar-based ADS-B) smartly tailored to the glider competition type of flying, giving you almost perfect situational awareness. Unfortunately, to be fully effective, it must be ubiquitous (everybody has one, including the tow pilots) ± and the price is quite high for many aspiring young pilots. Bill McCollum once wrote that it is a simple device and should not cost more than $100. We would like that. Nevertheless, some solution has to be found. Leasing is one option, but it should provide enough training time to use it effectively. Together with the Audio-Vario, it should help in keeping the pilot's concentration of visual and mental attention not in the cockpit on the glass gadgetry ± but outside, before the glider - in time and distance. In this effort more help from the Club instructors could be provided, both in specialized training to break bad habits, as well as by more custom-tailored BFRs, fitting the pilot's individual profile, the type of flying activity he or she is involved or aspires to and the type of glider he or she flies. A part of it is a psychological evaluation of the pilot, especially his or her attitude to risk and operation rules, to catch early and correct a hazardous mental attitude and risky behavior. It may save some lives too.

Let's keep in mind the rule (I have seen it in Tom Knauff's pilots' lounge on the wall) that in extreme situation, the pilot's skill does not rise to the occasion, but falls to the level remaining in his/her memory from the relevant training.

About the Author: *Greg Swiderski, CFI-G, Ph.D. Learned to fly gliders and parachute jumping in Poland. Immigrated from Germany in 1986. Learned to fly powerplanes and then returned to soaring. Currently teaches gliding and flight safety at the COSA Gliding Club in Marion, Ohio. Shares flying private SZD Jantar Std2 with his son Marcin. Also teaches alpine skiing. Likes spending summer vacations in Poland, flying in mountains, sailing and kayaking. Lives in Columbus, Oh. (greg441212@hotmail.com)*

SOARING TECH

BY BILL COLLUM

Getting Out Alive

With the 2010 soaring season fast approaching, it's time once again to polish up our flying skills and tend to our equipment. For many sailplane pilots, an emergency parachute is a standard cockpit accessory. Usually trouble free and ready to be deployed instantly in an emergency, a parachute is still a complex piece of equipment that requires occasional attention. Let's spend a few minutes looking into the history and technology behind the modern parachute, and then consider how they can best be cared for and used.

The idea of what we think of as "the parachute" dates back to the fifteenth-century. While the concept predates his designs by several years, Leonardo da Vinci is credited with the first workable parachute capable of lowering a human from a significant height. With a pyramid-shaped "canopy" held open by a square wooden frame, the surface area of da Vinci's parachute was probably sufficient to make a jump from a high tower survivable. In fact, in July of 2000, Adrian Nichols of the UK, built a parachute from da Vinci's original design and used it to make a successful jump from a hot air balloon floating 7,000 feet over South Africa.

About a century later, Venetian inventor Fausto Veranzio improved on da Vinci's design by replacing the pyramid-shaped canopy with a dome-shaped sheet of sailcloth, lowering the weight of the apparatus, and increasing its drag. In 1617, he implemented his design and made a successful jump from a tower in Venice.

In the late 1700s, Frenchman Louis-Sebastian Lenormand created the first "emergency parachute" intended to make possible a controlled descent from a damaged balloon. In 1793, his design was used for the first time when Jean-Pierre Blanchard used a Lenormand-designed parachute to escape from his ruptured hot air balloon. Blanchard then began developing his own parachute designs, made entirely from folded silk without the wooden frames required by previous designs. The first use of such a "frameless" parachute occurred in 1797 by Andre Garnerin, who later went on to test additional improvements to Lenormand's design in an effort to increase stability and reduce descent speeds.

Garnerin-designed emergency parachute, circa 1800. Photo courtesy of U.S. Library of Congress, Public Domain

Gleb Yevgeniyevich Kotenlikov of Russia first conceived the modern "pack" parachute in 1911 after witnessing the death of a pilot friend. Determined to make flying safer, Kotenlikov devoted himself to the creation of a parachute system suitable for use by pilots and capable of being worn within the tight confines of a cockpit. He created a system in which a folded parachute was packed into a rigid metal container, which was worn on a pilot's back. He is also credited with the invention of the "static line" which opens a parachute automatically as the wearer falls away from an aircraft.

When Grant Morton had made the first "jump" from an aircraft in 1911 over Venice Beach, California, he made use of a loose canopy held bunched in his arms and thrown out into the wind as he leaped from the Wright Flyer in which he rode as a passenger. Albert Berry made the first jump from an aircraft in flight using a Kotenlikov-style "pack" parachute on March 1, 1912. This test, conducted by the U.S. Army, proved the basic design, which was to become the basis for the parachutes that would be issued to pilots in later years. In 1913, Slovakian Stefan Banic patented a soft "knapsack" style parachute based on Kotenlikov's ideas, which then became the real progenitor of most modern parachute designs.

In 1919, Leslie Irvin of Los Angeles made the first true "free fall" jump using a pack-style parachute. He later went on to found the Irvin Air Chute Company, which eventually made many thousands of parachutes that were used by Air Forces around the world. The company, which is still in existence today, claims that their

parachutes have saved more than 10,000 lives.

Parachutes were, as a rule, not used regularly by pilots until after World War I. However, artillery spotters, flying in highly inflammable hydrogen-filled tethered balloons, did use parachutes during WWI to escape when under fire by enemy aircraft. Towards the end of the war, Everhard Calthrop of the UK created a parachute designed specifically for aircraft crews. After testing by Major Thomas Orde-Lees, who demonstrated that a parachute could be deployed at low altitudes by jumping from the Tower Bridge into the Thames, the Royal Flying Corps adopted Calthrop's design. While not widely used, a few RFC flight crews were equipped with Calthrop parachutes late in the war.

Parachutes came into general use in the years between WWI and WWII. By the 1930s, not only were military pilots and flight crews usually equipped with pack-style emergency "chutes," parachutes by then were also used to equip units of "airborne" infantry which could be quickly deployed by air (the concept of the "paratrooper" is credited to the Italian Army which created the first such unit in the late 1920s).

Parachutes today are routinely used, not only to save the lives of pilots, but also to deliver soldiers and their equipment (up to the size of light armored vehicles) wherever and whenever they are needed. Some air-droppable weapons make use of parachutes to slow their fall, giving the delivering aircraft time to escape before detonation. Parachutes are also used in more esoteric applications, such as slowing down a reentering spacecraft for a safe landing. Some returning satellites have even been snatched in midair by specially equipped aircraft, which fly by and snag their parachutes.

The author's son wears a National 490 Pilot Emergency Parachute before "mounting up" to fly in a contest. In most cases, contest rules require pilots to wear approved emergency parachutes. Photo by Bill Callum.

The author's son wears a National 490 Pilot Emergency Parachute before "mounting up" to fly in a contest. In most cases, contest rules require pilots to wear approved emergency parachutes.

By far, the type of parachute that will be most familiar to sailplane pilots is the "backpack," "chair," or "seat" style emergency chute. In a backpack style, the parachute is folded into a soft container, which the user wears like a knapsack. Subtle differences in packing style and the shape of the container can be used to taper the size and shape of the pack for improved comfort. For instance, the parachute that I routinely wear is packed so that it is slightly thinner at the top than at the bottom, providing a bit of extra "lumbar support" to make long hours in the cockpit a little more comfortable. A "chair" style parachute is packed into a container, which starts at the wearer's shoulders and continues down toward their "seat." A "seat" style parachute is packed entirely into a thick container on which the wearer sits. These are rare in the soaring community, but are popular with pilots of old "war birds" which often have a pilot seat that is "dished" deeply enough to accommodate a thick seat-style parachute.

A modern emergency parachute consists of five major assemblies: the main canopy, the body harness, the suspension lines that connect the canopy to the harness, the deployment mechanism that is used to release the canopy, and the pack, which contains the entire assembly. Differences in the amount and strength of the materials used in constructing the parachute can result in significant differences in performance. Parachutes are usually rated in two ways: the maximum safe user weight and the maximum deployment speed. For example,

Parachute riggers inspect and repack a pilot's emergency parachute. Photo U.S. Navy, Public Domain.

the parachute that I use in my sailplane, a Model 490 made by National Parachutes, is rated for a 241-pound pilot and can be deployed at speeds up to 140 knots.

Any parachute intended for emergency use must, according to FAA regulation, have been inspected and repacked sometime within the previous 180 days (see Docket No. FAA-2005-21829; Amendment Nos. 91-305, 105-13). This must be accomplished by an appropriately licensed "parachute rigger." Such inspections usually only run a few dollars ($50-$60 seems to be about the rule), which is money well spent to ensure that a critical piece of equipment will operate properly when it's needed. To further promote reliability, it's also a good idea to store the parachute whenever possible in a temperature-controlled environment, protecting it from extremes of heat and cold. Storing the parachute flat on its back, rather than standing it up on its bottom edge for long periods can prevent the canopy material from "settling" over time and changing the geometry of its folded shape. To protect it from wear or damage (and possible accidental deployment), store the parachute in its storage bag whenever it's not actually in use.

Modern parachutes make use of several different types of canopies, including the familiar round canopy, rectangular ram-air inflatable wings, and triangular Rogallo-type delta wings. While the majority of sport jumpers make use of ram-air style canopies which, with a little training, can be "flown" like a wing, most emergency parachutes still

Student pilots learn how to handle an emergency parachute. Photo U.S. Library of Congress, Public Domain.

make use of the round canopy which requires little or no skill to "float" safely to Earth.

Even though it can't be as effectively "flown," as the shaped canopy, a round canopy can be controlled to some extent. The canopy can be "steered," by pulling on the rear risers or steering handles if equipped. This makes it possible to turn the parachute into the wind to reduce the landing impact. As simple as a round-canopy parachute is to use, it's still worth spending some time at your local sport-jumping center to better understand how it can be controlled. Even better, treat yourself to a jump or two to gain some experience with the procedures — and emotions — involved in leaping from an aircraft. Yes, I've done it

a couple of times and, no, I wouldn't want to do it on a regular basis, but I'm glad I tried it. I found that I didn't so much mind the "jumping" bit, but I felt distinctly helpless and uncomfortable hanging under the canopy for the two or three minutes it took to float back down to the ground. That's a discomfort that I'll willingly accept, however, if circumstances ever force me to use a parachute again.

While many modern sport jumpers use a hand-deployed "drogue" chute, throwing it out by hand into the airstream to draw the main canopy out of the pack, most emergency chutes make use of a "ripcord" mechanism, first created by Polish inventor Theodore Moscicki. When activated by pulling on a release handle, the "ripcord" pulls a cable, which releases several pins holding the back of the pack closed, releasing a spring-loaded drogue chute. The drag on the drogue then pulls out the main canopy, which is inflated by the airstream.

The ripcord handle is not always easy to find in an emergency, especially if it is the same silver color as the parachute's buckles, strap adjusters, and other fittings. I suggest wrapping the handle in brightly colored, easily recognizable tape. Since in an emergency there won't be much time to fumble around, I also suggest that you spend a bit of time training yourself to look for, recognize, and grab that color when under stress (I'm used to emergency mechanisms being designated by yellow and black stripes, so I've used yellow and black electrical tape to wrap my ripcord handle). I also suggest, the next time you bring your parachute in for a scheduled inspection and repack, that you pull the ripcord to deploy the parachute while it's strapped to your back. This will give you an idea of the force and range of motion required to deploy the parachute when it's actually needed. It will also give you a chance to examine the entire parachute up close to see how it's constructed and assembled before it is tucked back into its container by the rigger.

Even if you are wearing an emergency chute, it may not be so easy to make use of it. Emergency egress from a damaged sailplane can be difficult. Not only does the low, reclined seating position and narrow confines of most sailplanes make leaving the cockpit difficult under the best of conditions (especially with a 15-pound parachute strapped to your back), aircraft damage leading to high centrifugal or other "G" forces or potential pilot injuries following a midair collision may make quickly exiting a severely damaged sailplane almost impossible. It is clear that some kind of emergency egress system would shave critical seconds when they count most, and perhaps even allow a pilot to be "ejected" from a damaged sailplane in what would otherwise be a non-survivable situation.

DG Flugzeugbau has been a pioneer in creating a pilot "ejection" system for sailplanes. Their NOAH system (short for "NOtAusstiegs Hilfe," German for "Emergency Evacuation Assistance") is essentially a pneumatic cushion, which is built into the pilot seat. In an emergency, the pilot activates the system, which jettisons the canopy, releases the seat belts, and inflates the "air bag" in the seat bottom. This lifts the pilot to the level of the cockpit side rails, allowing him or her to simply roll out of the cockpit.

The NOAH system is designed to be easily operated by a pilot who may be under a great deal of stress in the most adverse of circumstances. DG claims that the system can be activated in less than one second by the pulling of a single clearly marked lever.

The NOAH system was certified in Germany in 2002. DG now offers the system as an option on most of their aircraft. NOAH provides a significant amount of additional safety while adding only a few pounds of weight and a few percent to the cost of a new DG sailplane, and is, I believe, an option worth serious consideration. I hope that other manufacturers take DG up on their offer to help them adapt the system for their own products.

Testing the NOAH emergency pilot egress system installed in a DG-800. Photo courtesy of DG Flugzeugbau.

In recent years, it has become increasingly popular to equip light aircraft with "whole plane" parachutes. These so-called "ballistic" chutes are stored in a canister attached to the fuselage and are deployed in an emergency to lower the entire aircraft to the ground. A solid-fuel rocket is usually employed to drag the canopy out of its container and away from the aircraft for rapid canopy inflation. Still relatively rare on sailplanes, I know of at least one motorglider, an Urban Air Lambada, which was saved by such a "ballistic" parachute after undergoing an in-flight structural failure.

A limitation of such ballistic parachute systems was illustrated by a recent midair collision, which took place near Boulder, Colorado. A Cirrus SR20 hit a Piper Pawnee towing a sailplane with two people on board. The Cirrus was equipped with a ballistic parachute system, which functioned properly deploying a large canopy to slowly lower the damaged aircraft. However, the collision caused a fire, which quickly engulfed the fiberglass Cirrus. It appears that the two people aboard leaped to their deaths rather than burn in the wreckage as it was lowered by the parachute. While a ballistic parachute system certainly adds a significant extra margin of safety, my personal preference is to continue wearing my personal parachute even in aircraft that are so equipped.

There are no regulatory requirements that force a sailplane pilot to wear a parachute (unless performing aerobatics). Wearing a parachute is a choice. If you fly a sailplane, it's a choice you may want to seriously consider. Even though the odds of ever needing one are small, if the day ever does come when you do need a parachute, I promise you that you'll be very glad to have one.

Some manufacturers of pilot emergency parachutes...

National Parachute Company:
www.nationalparachute.com

Strong Parachutes:
www.strongparachutes.com

Butler Parachute Systems:
www.butlerparachutes

Softie Parachutes:
www.softieparachutes.com

If you have a technology that you'd like to have discussed, would like to suggest a product for review, or have questions or comments on this article or on any other edition of Soaring Tech, I'd be glad to hear from you. Drop me a note at soaringtech@ssa.org. Be sure to include the words "DO NOT PUBLISH" on the subject line if for some reason you don't want to see your words printed in a future edition of Soaring.

See you on the porch,

—Bill

SAFETY CORNER

BY GEORGE THELEN

SAFETY PARACHUTES

So who uses safety parachutes more than anyone else in private aviation? Well, the parachute guys they all have backups, but these aren't the same style we wear. And the law says the aerobatic pilots must also wear safety chutes. But then, there aren't so many aerobatic guys in overall numbers. That leaves glider pilots. And the utilization is a pretty high percentage, although I don't know that there are any accurate figures as to that usage. This isn't just something that popped into my head, but I was told this by the people who pack parachutes. They know where their bread is buttered.

Okay, then, if using a parachute is such a good idea (I always refer to it as my Plan B, or my other insurance policy) why are safety parachutes not universally used in soaring? Actually, the current law discourages it! Huh? Think about it!

The current law harkens back to World War II, when the old round nylon chutes were deemed necessary to be repacked every 90 to 120 days. The new safety chutes we wear, are all synthetic fabrics that are coated for separation, and to hold the air in. There isn't that much that happens to them between repacks if they are kept in cool, clean, dry places between wearings. The rubber bands that are used to organize the canopy risers, are prone to heat damage, and are the most vulnerable component to any length of time between repacks. Basically, the hotter and wetter place the parachute has been, the sooner it needs to be repacked.

So, I said that the law discourages the use of parachutes. Why? Like a lot of the low speed limit signs along urban sections of the highway, it turns a lot of otherwise law-abiding citizens into lawbreakers. Everybody knows that modern parachutes, stored properly, don't need a repack every 120 days. As a result, most of us are breaking that rule at least part of the time.

That still doesn't explain why ALL glider pilots are not wearing parachutes, all of the time, while in the air. Think about it again. Who isn't? The fixed base operators and the clubs during rides and during training. Whoa! Isn't that the optimum time to introduce parachute usage? I can understand the problem with fitting a ride passenger every time with a parachute, and then taking the time to give them training in how to use it, if the need arose. How many of you actually pay attention on every commercial airline flight to the evacuation instructions in case of an emergency landing, or have hung on every word during a lifeboat drill on a cruise ship? Yawn.

But during flight instruction? Wouldn't that be the optimum time to introduce parachutes, and instruction in their usage? It would be, except the 120-day repack rule poses a huge cost and potential liability to the operation or club. Lets say, God forbid, at some point a student actually had to use a safety chute owned and repacked by the operator. And the F.A.A, or the insurance carrier, came along and inspected the repacking log and found a deficiency. Or the user claimed that the parachute was faulty. Or that the user claimed that they hadn't been provided adequate training in actually using the thing. What then?

The cost factor to a club or fixed base operator is not insubstantial either. Maybe $50 for each repack, every 120 days with a bunch of parachutes, and we can be talking about real money here, in a perennially marginal industry. And a time consuming other layer of maintenance, inspection and bureaucracy.

This all brings me to a recent conversation that I had with Allen Silver of Silver Parachutes, who is leading a movement to lengthen the time between parachute repacks to 180 days, or twice a year.

Silver Parachute Sales & Service is spearheading a multi-organizational effort to extend the repack cycle of emergency parachutes from 120 days to 180 days.

A notice of Proposed Rulemaking regarding the 180-day repack has just gone out for public comment. All pilots who use emergency parachutes are encouraged to comment on this NPRM.

Two years ago Allen Silver and Darin Silver; working on behalf of the Parachute Industry Association & United States Parachute Association; petitioned for an exemption to the 120-day repack cycle. "We're discovering that the newer parachute materials perform better when handled less frequently," says Allen Silver, a master rigger with over 40 years experience in the field of parachutes. "Right now, twenty-five other countries safely use repack cycles of 180 days or longer."

In a letter dated August 10th 2005, the FAA stated that since such a large group was requesting the exemption, it would be appropriate to initiate a rule change project. This is good news for everyone who wears a parachute. Darrin Silver notes, "In addition to the safety benefits, pilots will now see reduced maintenance costs on their parachute equipment and can make it through an entire airshow or contest season without the downtime of having a parachute repacked."

Comments regarding the Notice of Proposed Rulemaking (identified by Docket Number FAA-2005-21829) may be sent using any of the following methods:

DOT Docket Web site:
Go to http://dms.dot.gov and follow the instructions for sending comments electronically.

Fax: 1-202-493-2251

Mail:
Docket Management Facility
U.S. Department of Transportation
1200 New Jersey Avenue, SE.
West Building, Ground Floor, Room W12-140
Washington, DC 20590-0001

For all of our sakes, please stop reading this now, and join me in sending in this set of comments to help the government modernize the rules, I think, for all of our added safety.

Perceptive minds would ask why a parachute packer would try to lengthen the time of use before a parachute repack? Wouldn't this decrease his business and the number of repacks done? Allen points out just the opposite. In fact, this would encourage individuals to use parachutes and more closely follow the law. It would also lessen the cost factors to clubs and fixed base operations, that might help them to consider more parachute usage. Just two times a year might make it much easier to pack at the beginning and end of the season.

Lets go on to discuss some of the practical considerations. Even though I walk a hilly 1.5 mile route out my front door daily, and do some serious hiking/ cross-country skiing on one day of each weekend at 63 years old, I still have trouble lifting myself from the seated position in my glider to get out. Lifting myself by putting my hands on the side rail of the cockpit gives almost no leverage what-so-ever. Trying to get out of the cockpit in a hurry, if there were trouble down at low altitudes,

would be worrisome. Below 800 ft AGL, I am not sure that it would even be smart to try. DG has designed an ejection seat, that sounds like it might help, but I have never seen one. Also, the DG glider's low cockpit side rails might be an advantage here.

Next comes the question about hooking a lanyard to the hull of the glider and to the ripcord of the parachute. This was talked about a lot 10 or 15 years ago. There might be a regional component to this option. In the east, where gliders might be flying much closer to the ground having the lanyard deploy the chute immediately, might be a lifesaving advantage. Here in the west, where we tend to fly at somewhat higher altitudes AGL, the idea of getting away from the glider, and not having the parachute snag on the rudder, before deploying the pilot chute, becomes more attractive. All of this consideration is made more complicated by the revelations a number of years back, about older glider canopies hitting the pilot's head, when the glider's canopy emergency release handle is pulled in flight.

So far we have been mostly talking about single place aircraft, but there are additional rules and factors in multi-place aircraft. In a two-place glider, if there were an emergency, and only the front pilot was wearing a parachute, and jumped out, the person in the back seat would be pretty much doomed. The glider would be out of CG, and probably uncontrollable. My understanding of the rule is that both pilots must wear parachutes in this situation, and that both pilots must stay with the ship, if only one or the other is wearing a chute.

One could argue that this is a lot of talk about very little substance. Over the last 20 years that I have been doing this column, there have only been a handful of successful parachute saves from gliders. The most recent were the two high altitude accidents we described in the last two years. The first was the motorglider that broke up in cloud over Reno, on a long distance record attempt in an enormously strong wave created by the core of the jet stream. The pilot successfully parachuted to safety, while sustaining some injuries in the high winds. Our second example was the mid-air collision between the glider and the business jet that we talked about last year. In that case the glider pilot also bailed out at above 15,000 ft, but only sustained light abrasions on landing.

The only low altitude parachute save I can remember, was Jim Indrebo's contest finish in a Concept 70, where the wings came off of the glider. This had to have happened at least 35 years ago. (I saw Jim last week, and he still is looking pretty good these days.) Anyway, after that, when Jim was instructing students, he would tell them to act like the wings were coming off of the glider every time that they exited their cockpit after they had landed, so that they could practice getting out in an emergency. This may be a good exercise for all of us to follow.

Finally, I will save the best story for last. This may be an urban myth like the story about the guy in Arizona who pancaked his car into a mesa, by strapping a JATO assist rocket to the trunk of his car. So I don't have a way of verifying it. But then, it was told to me by a usually reliable source.

The story is that they were having a contest out in the desert northeast of Los Angeles. The pilot in question was flying an older fiberglass glider in the Sports Class. He was coming back for a relight and heavily ground looped the ship on landing. He got out and inspected the glider, but couldn't see much damage, so he took a second tow.

Just after he lifted off on aero tow, he came up on the radio and reported that the glider was breaking up beneath him. They all heard a continuous "play by play" of the creaks, groans, and breakup sounds reported by the pilot. He said that he just hoped that he could just nurse the ship to a safe altitude to be able to bail out, and parachute to safety.

So they slowed the tow plane down to just above stall speed, made slow wide turns near the airport, and took him to an extra high altitude. Without stopping, all along the way he was reporting his intentions. Finally he started to address his wife who was crewing for him on the ground. He said that this possibly was the last time that he would ever speak to her, and he just wanted her to know how he felt. He was delaying releasing from the tow plane so that he could speak to her just that much longer. Finally, this was it, he was pulling the tow release, and he would probably be saying goodbye forever. Then the radio finally went silent.

A woman's voice was heard to come up on the radio, and she said, "Roger." (He then safely parachuted to the ground, and that is the end of the story.)

The reporting period for comments for this proposed rule change is coming up just after our publication date. I hope that all of you will join me in making our voices heard in support of this lengthening of the time period for parachute repacks. Along with that I would encourage all of you to give me your feedback on this topic.

Our special thanks go to Allen Silver. He read me the riot act, about how I had my parachute straps adjusted too loosely. I countered that I didn't like to talk on the radio with that high pitched a voice. But he also told me how my hook knife was packed wrong, how I might fall out of the straps if I bailed out, and the other stuff I needed to do. This is safety, guys. Ask your parachute packer to critique your equipment, and your use of it. And listen.

SSA

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SAFETY CORNER

BY GEORGE THELEN

PARACHUTE SAVE FROM FLIGHT LEVELS (Part 1)

There was an accident with a Schleicher ASH-26E this last November near Reno/Sparks, Nevada that elicited great sympathy from me. Fortunately, the pilot lived and has recovered from his back injuries, but many years ago, I experienced almost the same set of problems at that spot; and nearby, was similarly, spontaneously enveloped in a lenticular cloud. So, if you detect me getting really involved in this description, you will understand why.

The details of this recent accident are remarkable, and to address them I am going to change my normal, casual format to a more formal type of organization of the material.

The Setting - The north/south Sierra Nevada Mountains of California and Nevada are geologically a tilt block, the west side has sunk down beneath the central valley, and the east side forms an escarpment. Visualize a wedge shaped door stop. On the west side, the mountains slope down gradually, and the east side drops off sharply. At their crest on the south end, the peaks reach almost to 15,000 ft (5,000 meters), and the shape of the wedge is shorter and steeper. Much farther north near Lake Tahoe, the east crest is down to 10,000 ft (3,300 meters) and the mountain range is much wider, a lower, wider wedge.

At the far south, the mountains end as they turn west near the Garlock fault line at Tehachapi. There is a jog, and a gap, mid-range, in the alignment near the volcanoes at Mammoth Mountain, and a bifurcation of the main ridges near Markleeville and Lake Tahoe. But a major change occurs at Reno-Sparks, Nevada. There is a gap in the mountains at Highway 80. The main ridgeline jumps 22 miles west to Donner Summit, and the Sierras diminish in altitude as they merge into the south end of the volcanic Cascade Range, at Mt. Lassen.

So if you told me that there was a wave flight accident in the Sierras, but you didn't tell me where it occurred, I would predict Tehachapi in the south, where the ridge turns; Mammoth Mountain, at the jog and gap; and at Reno/Sparks, essentially where the escarpment ends, or at least, bifurcates. Given only one choice, I'd say Reno.

Remember, the world's altitude record in gliders, was set behind the south end of the Sierra Nevadas at near 50,000 ft (18,000 meters). For those of you who fly on the Appalachian Ridges in the eastern U.S., you know that most of the problems and accidents happen at the water gaps, where the crossings are much tougher to do than just flying along the unbroken ridge lines.

The Pilot - Another reason I have sympathy for the circumstances of this accident is that the pilot and I similarly started in soaring as teenagers, and have had a lifelong exposure to this sport. Unlike my misspent flying career, however, this pilot became a flying professional, and currently works for one of the major overnight package carriers. He is in his mid-50s, and had become more interested in glider record attempts.

The flight that resulted in the accident, actually was well planned in advance. The motorglider was equipped for this type of wave flight, and a flight plan was filed with the FAA two days before he took off. For example, the ASH-26 E was equipped with a higher volume oxygen system, an altitude encoding transponder, and a turn and bank gyroscopic system. The date and time of the flight were carefully planned with soaring meteorologists, and with other similarly inclined pilots. One of them was flying nearby Reno, just below flight levels at the time of the accident, and was experiencing many of the same conditions as the accident aircraft.

The Flight - Prior to the Accident

From the National Transportation Safety Board accident investigation:

The personal flight was performed under the provisions of 14 CFR Part 91, and an instrument flight rules flight plan was in effect. The flight originated from Inyokern, California, about 6:45 a.m.

Preliminary information from the FAA indicates that the pilot did not report experiencing any difficulties during the flight. The pilot had been cleared to fly in an airspace block between Flight Level 180 and 280 (18,000 ft and 28,000 ft or 6,000 and 9,000 meters). Controllers (at the Oakland Center) opined that the pilot's communications sounded normal during conversations within minutes of their losing radio and radar contact.

So if the flight took off from Inyokern (at the southern end of

the Sierras) at 6:45 a.m. and the ASH was in Reno at 9:32 a.m. The flight lasted over 2 3/4 hours covering about 300 miles. I'm not sure if there was a remote start point, but if there was, it couldn't have been far. My information is that the first part of the journey was in the middle of that flight block, first under control of the Los Angles Center, and then handed off to the Oakland Center for flight following.

There are certain aspects of this flight that, at first, don't come to mind. First is the red line, or VNE, of the glider, which is 146 knots below 10,000 ft. Above 10,000 ft it is more complex, 170 knots true airspeed or 118 indicated (thinner air as you go up changes true and indicated airspeeds). The pilot had an altitude conversion chart in his cockpit. Why is this important? Because he was flying north from the outside, into the core of a strong jet stream which was centered between Bridgeport (south) and Susanville (north). Reno fit slightly on the north end of the core area. How fast are we talking about? 130 to 180 knots, winds aloft at 30,000 ft in that core area.

And then there was the battery. After the accident, the pilot expressed his concern for the battery draw during the flight, at those altitudes. This was a motorglider with an electric retraction system for the boom, and electronic engine controllers. Of course there were the varios, radios, and other electric instruments. There were frequent communications on the radio with the air traffic control centers. Then there was the Mode C transponder. At those altitudes, the transponder was being bombarded by inquiries of position and altitude, from airports, aircraft, military installations, and enroute radar up and down California's Central Valley, and from far to the east into the Nevada desert.

So, because this weather system was relatively dry, meaning that there were fewer clouds than might be imagined from such a strong weather system, the pilot elected to leave the electric turn and bank instrument "turned off." Actually there is a relatively small draw from the turn and bank, but at the extremely cold temperatures at these altitudes the batteries were operating far below their optimum outputs.

I questioned whether clear vision panels were being used? My own experiences at those altitudes along the Sierra Nevada have almost always involved some canopy frosting and visibility problems on the inside, due to condensation from my breath freezing. Apparently clear vision panels were not being used (and may not have been needed in this dryer air mass.)

Other than the cold saturation of the glider's structure, canopy, and batteries, there is not much else to report about the first 260 miles.

Circumstances of the Last Part of the Flight

Going back to my original description of the anomalies of the shape of the mountain range, this brought the ASH-26E to the change in shape of the ridge line south of Lake Tahoe, where it jumps east. Somewhere in this area, the pilot lost the wave and was down to 15,000 ft (5,000 m) behind Mt. Rose.

Mt. Rose is 16 miles southwest of the Reno Airport (4415 ft), and at 10,776 ft is a powerful standing wave producer, especially with the core of the jet stream directly overhead. Other pilots, many years ago, have gone to over 42,000 ft. in this location. Maybe 15 miles north, and along a descending ridge line, the crest of the Sierras jumps sharply westward at Interstate 80 to Donner summit. There are some intervening mountains and ridges of which Pea Vine Mountain is the tallest at 8266 ft just 10 miles northwest of Reno International.

It was behind Mt. Rose, and just west of Reno that the pilot was able to regain the wave, going to flight levels in the low 20,000s. Here is the NTSB report again: FAA air route traffic control center recorded radar data for the last 8 minutes 13 seconds of recorded fight indicates that at 0932:17 the glider was at a mode C transponder altitude of 20,000 ft. At 0935:42, the glider's altitude had decreased to 18,800 ft, and at 0939:06, it had increased to 20,800 ft.

The last mode C radar hit occurred at 0939:30. At this time the glider was located about 0.8 nautical miles north-northeast (030 degrees, magnetic) of Sparks. One minute later, the glider was about 2.2 nm and 032 degrees from Sparks.

The main wreckage was found about 2.6 nm north-northeast of Sparks. The wings and the horizontal stabilizers were not with the main wreckage. According to the Sparks Police Department personnel, various other components from the glider have been located in the city over an approximate five mile long path.

Several FAA air traffic controllers, based in the Reno/Tahoe International Airport control tower, reported observing a target rapidly descend on their D-BRITE radar. Using binoculars while looking in the same general area, they observed a parachute. The controllers telephoned 911 and advised local authorities of the situation.

The pilot, with his deployed parachute, was located about 1.6 nm and 007 degrees from the main wreckage.

The Reno Airport, elevation 4,415 ft, mean sea level, is located about 4,8 nm south of the accident site. At 0956, Reno reported the following weather conditions

at the airport: wind from 190 degrees at 29 knots with gust to 38 knots; 10 miles visibility; few clouds at 10,000 feet, and 25,000 feet.

An acquaintance of the pilot reported to the National Transportation Safety Board investigator that, at the time of the accident, he was soaring several miles from the accident site. The acquaintance stated that his friend was engaged in a cross-country wave soaring activity. Lenticular clouds were present in the area.

My information had the pilot noticing that the canopy was clouding up at the beginning of this sequence. He tried to wipe the inside, but the condensation was on the outside in the form of a lenticular cloud. At that time, realizing that there could be a problem, he reached down and turned on the turn and bank. This would allow him to safely maneuver in cloud. However, even at the best of circumstances it takes eight to nine minutes for the gyros to spool up. Shortly thereafter, the glider was fully engulfed in cloud, and the pilot lost control of the aircraft. The wing roots made a clean swath through the fiberglass as both wings came off. Whatever stresses the wings departing made to the fuselage structure that produced forces that exploded the ultra cold canopy. We know this because the fuselage was found with the canopy frame still locked in place.

Still very high, the pilot egressed through the space previously occupied by the canopy. Shortly thereafter, the horizontal stabilizer reached its VNE, and departed the tail. I can't explain this, but the pilot's shoes were found, still in the cockpit.

The next sightings came from the air traffic controllers, when they called 911. Nearing 500 ft AGL, still over houses at the edge of Sparks, the pilot reportedly shouted to people on the ground to help catch him. His first touch down, drifting fast downwind to the east, was on an embankment sloping up from the subdivision that he had just passed over. This area has low flat rocks, sagebrush, and soft sandy soil between the rocks. As the pilot landed, he immediately hit on his butt, which injured a number of his vertebrae, but not his spinal cord. Falling down he suffered concussions on the front of his head and the side of his head.

The police arrived first, followed by a helicopter, which took him to the Washoe Medical Center nearby. My current understanding is that the pilot has mostly recovered and is back at work.

My brother, who is the foreman of our Reno crew, called me on the phone within 10 minutes of the accident. He happened to be in Sparks that morning, and said that they had broken in on radio programs and announced the breakup of the aircraft over town, suggesting that residents stay inside to avoid being hit by debris. His statement was that the wind was howling, somewhere in excess of 35 knots where he was. Others reported later that winds close to the base of the mountains on the west side of Reno were 50 kts with gusts to 70.

Analysis

Oops! I hit word count, and I just ran out of room. Next month we will consider the ramifications of many of the factors involved around the time of the ASH-26Es breaking up. We will then try to return to the overall lessons learned from this whole incident. There is just so much to consider, and hopefully, to learn from here.

Until then, I want to go back to the theme that I began this piece with, how pleased I am to be reporting that the pilot in this accident lived, and has recovered mostly from his injuries. He is one of us. I have worked hard to get the details as close as I can to the truth. There is no maliciousness in trying to report what happened, since, as you will see next month, there are so many things to be learned from this incident. I also have experienced almost all of the things that happened to this pilot, in close proximity (fortunately without the crash), so I am not taking this lightly.

-George Thelen

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READY TO HIT THE AIR WAVES?

We're all suffering from a bit of "Cabin Fever," but some great soaring contests are in the works right now! Check the calendar listing on Page 40 for contests close to your area!

SAFETY CORNER

BY GEORGE THELEN

PARACHUTE SAVE FROM FLIGHT LEVELS (Part 2)

Last month, in this space, we described the November 2005 accident involving a Schleicher ASH-26E which occurred over Reno/Sparks, Nevada, during a high altitude wave flight. If you will remember (or better yet, re-read that column), the motorglider left Inyokern, California, at 6:45 that morning, and some 2:45 minutes later and 300 miles further north was positioned at flight level 20 (20,000 ft./6,400 m.) over Reno. Most of that flight had occurred at flight levels in the mid-20s. Since the glider was now in the core of a strong jet stream, with the VNE of the glider and the wind speed approaching each other at that altitude, the sailplane either drifted backward into a lenticular cloud, or one formed all around the aircraft. At first, the pilot attempted to spool up the glider's turn and bank instrument, but losing all visibility, lost control of the aircraft before the artificial horizon became operable. He parachuted away from the fuselage, still at flight levels, after the wings came off and the canopy exploded. The Reno tower air traffic control staff noticed the rapidly descending aircraft on radar, and saw the parachute coming down on the eastern outskirts of Sparks. We left off last month with the pilot being taken to Washoe Medical Center by helicopter.

Analysis

So, trying to repeat little of what we described last month, I thought we would work backwards to some conclusions at the end of this column. My emphasis will be, unlike the National Transportation Board or the FAA, on the gliding or survival aspects of the flight.

The Parachute Descent

My first question concerned the use of a lanyard on the ripcord of the parachute, attached to the cockpit wall. I'm not sure here, but my initial indication was that the pilot manually pulled the ripcord soon after he left the aircraft through the now missing canopy, at somewhere near 18,000 ft. Let's stop here and digress for a moment. If you consider your average sky diver, he/she uses a "Hershey Bar" shaped parachute that has a glide ratio of around 3 or 4 to 1. He jumps out of a perfectly good aircraft and spends much of the time in free fall doing all of the silly stuff we see on television all the time (just joking here, guys). Only near the ground do they pull the ripcord and steer to a selected landing spot. They wouldn't be caught DEAD doing this on a day with 35 to 70 knot winds on the ground! If you did a time/altitude graph, it would be a steep sloping line to the point that the parachute opened, followed by a much shallower line to touchdown. Our backpack survival parachutes, by contrast, generally have a 24 ft round canopy, which is steerable, but is much less maneuverable, with pretty much a zero 1 L/D. Bail out at 18,000 ft in a 100 knot (or more) wind, pulling the rip cord immediately, and the graph of your trajectory is going to carry you a long way downwind.

Getting back to our accident, my guess is that the wings came off of the ASH somewhere close to the University of Nevada, Reno, just north of the high rise casinos downtown. The pilot's first choice was to either freefall to a much warmer altitude before pulling the ripcord, or doing what he did, by pulling it almost immediately.

My point is that this decision radically changed his point of impact on landing, I think for the better. Sparks is an older desert community, some warehouses, businesses, mostly residential, with some strip malls, and a few catchment basins and parks thrown in. This is an almost fully developed urban setting, mostly of one to two story buildings, streets, power lines, low trees, you get the idea. The 20-story Nugget Casino would have been just to the south.

Going back to our model of the vector components, the parachute/pilot were descending at 16.3 ft per second, but covering the ground (at landing) horizontally at 30 to 40 miles per hour. Consider the full height of the pilot and parachute, literally against the buildings, power lines, trees, fences, automobiles, etc, which sideways, become very hard objects indeed. Those of you who would like to simulate this parachute landing, you could have your wife or girlfriend drive your sedan along at 35 mph, climb up through the sunroof, stand fully erect, and jump off. (I didn't think so.) Those are pretty much the forces involved.

I was talking to Allen Silver (Silver Parachute (510) 785-7070, if you have parachute related questions) who is my parachute packer/dealer, at the recent Dallas, Texas SSA Convention. I brought up this accident and his concerns were that the pilot might have succumbed to the temptation to sit in the leg straps, which is much more comfortable on the ride down, rather than having them pull hard on the crotch. On landing, your legs are your shock absorbers, and they need to be fully functional.

I asked about the direction of the person's body on landing, facing into the wind, or downwind. It wasn't clear in our accident which way the pilot was facing on touchdown. What we do know is that he immediately hit hard on his butt, which caused the spinal injuries, and went down hitting his forehead along with the side of his head.

It was very fortunate that the pilot had crossed the warehouses, and the new housing that is going in on that far eastern fringe of Sparks. The hills and mountains rise out of the valley floor, enough that it makes building much more difficult on the rising ground. This may have been another big plus, because something (the slope, the brush, or the rocks) stopped the pilot from being dragged by the parachute along the ground, after the first touchdown.

Allen said that if this were him, he would have had a hook knife readily available, and only after he was on the ground would he cut away the webbing of the risers, only after he knew that he wasn't going to cut himself up with the knife, on impact. This would have collapsed the chute canopy and kept him from being dragged. Allen also said that the raising slope may have been to our pilot's benefit. If he didn't have a hook knife, something snagged the canopy to have kept the pilot from being

dragged. It is impossible to get out of the harness very quickly. On flatter ground with a high wind, the tendency is for the person to touch at first, with the canopy never really touching the ground, and becoming airborne again, sideways, for another hundred yards before hitting hard, again and again, perhaps fatally.

Other Flights

The NTSB report mentioned a friend flying a similar glider in the same area at the time of the accident. I am not sure that I have this right, but I think the other pilot took off from Minden (30 miles south of Reno) and was flying VFR also on a record attempt, in the same wave system. However, he was staying at lower altitudes, which means that he was staying below 18,000 ft and facing lower wind speeds. His flight took him to a turn point toward Susanville, California, maybe 70 miles NNW of Reno. He was returning toward Reno when the first ASH lost its wings, and was unaware that the accident had occurred. He continued at high speed southeast to near Coleville where he encountered problems with cloud and staying with the wave system. The winds were very strong, and he abandoned the flight, returning to Minden. It was at that time that he learned of what happened in Reno earlier.

I mentioned that I had had a similar experience as the accident glider in the same general vicinity. This was more that 30 years ago, and it was where I crossed the Reno Air Races at Reno/Stead Airport in early September. Also in strong wave.

My flight started at Minden, with some time spent banging around in rotor. I got into the primary wave near Spooner Summit at Carson City and went rapidly north to Reno, at maybe 17,800 ft. Looking down, I could see the tiny cars and planes as I passed far overhead. This is the same gap in the mountains that our accident flight pilot faced, and I lost the wave heading north from Hallelujah Junction. I kept going, but was losing huge amounts of altitude, until I turned around to get back to near

the 10,776 ft Mt. Rose, southwest of Reno. I picked up the wave again and was almost immediately back to the 17,000 ft level.

Moving south at 80 knots indicated at Washoe Lake, a lenticular cloud formed, and enveloped me in maybe three seconds. I had been in clear air, and there were no lennies nearby. Boom! I couldn't see anything. I am a glider pilot, and my first instinct was to stay in the lift. Reality set in and that instinct only lasted about a nano-second. Let's do the math together. Turning right, upwind, staying in the lift zone of the wave, my 80 knots of indicated airspeed would have gotten me pretty much nowhere into an 80 to 100 knot headwind. Turning left, downwind, my 80 knots airspeed (which is actually more at that altitude) plus another, say 90 knots tail wind, gave me a 170 knot ride out of the back of the lenticular. This took about 30 seconds or less, and the ride down in the downwash of the wave was spectacular. I probably lost 5,000 ft in a minute or two, but hey, it was clear air!

This is one of those long ago incidents, that you remember, but don't dwell on. Until you do an accident report like this one and realize the actual danger you were in back then. And then you (me) swallow hard!

The Battery

I said in last month's column that I thought that the pilot of the ASH was really well prepared for this flight with the equipment that he was using. There was a turn and bank in the glider. My old Libelle had one, but how many of you have them? And could you use it, even if you did have one? The ASH pilot didn't turn his on, because he was worried about the battery drain. That means that his battery was too small, no matter what its capacity actually was.

The Weather Analysis

In the last column, I mentioned that the pilot had filed a flight plan two days in advance of this flight. This meant that he had very good prior information about the size, shape, and moisture content of the storm that was approaching. It was relatively dry, lined up in the right direction to provide a strong wave, and timed to allow an early start. (How many of you have started soaring flight at 6:45 a.m.?)

But what is wrong with this picture? He was going at high altitude into the core of the jet stream. Even this wasn't lost on him, he had an altitude/airspeed conversion chart. That high altitude flight, in the 20s flight levels, allowed him to get the high achieved speeds that he was able to produce at the beginning of the day in the first 300 miles. But like the U-2 pilots who are at the very top of their flight ceilings (VNE and stall speed cross each other in the 70 to 90,000 ft level) this meant that there had to be a very precise balance of airspeed and wind speed. The other pilot's flight at lower altitudes was in just that much lower wind speed that the risks were diminished, while the rewards (high achieved ground speed) were harder to accomplish.

Summary of Causes

The flight planning with the weather forecasrs was probably flawed if the ASH-26E pilot needed to stay at those very high altitudes throughout the flight, especially going into the area of the core of the jet stream. The decision to leave the turn and bank off throughout the flight, in retrospect, was also flawed (even though this was a dry system with fewer than normal lenticulars). No matter the size of the battery, it was too small. Fiddling with the turn and bank at the time of the loss of visibility may have distracted the pilot from taking evasive action. I don't think that he had a hook knife for the parachute, but anyone doing this kind of flight needs one.

Conclusion

This column is not to be construed as criticism of anyone, especially the pilot in this accident. I have tried to get this as close to the actual truth as possible. But the real reason for going through this exercise is to get everyone thinking about the various risks and factors of this kind of flight (especially me, thinking back!) Anyway, I am especially pleased that this pilot lived and was able to recover from what truly was an accident.

-George Thelen

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If you have not planned your soaring vacation for 2006, time is slipping away! Check out the list of contests and events on the Soaring Calendar section, Page 40. E-mail your club's calendar listing to magazine@ssa.org for timely publication.

CHUTE SMARTS

by Allen Silver and Darrin Silver

Why do you wear a parachute? The regulations require parachutes for aerobatic flight only under some circumstances, yet pilots routinely strap one on before an acro flight.

As a vital piece of safety gear, the parachute has saved some lives. Unfortunately, many pilots don't think much about actually using it. All you have to do is practice your emergency egress procedures before and after each flight.

It's a simple concept yet very few pilots do this. After all, accidents only happen to someone else, right? However, with a little practice you can improve your egress time by more than 50 percent.

Over the past few years I've run clinics at conventions, flying group meetings, and FBOs teaching pilots and instructors how to egress their aircraft in case of an emergency. Soon after I started doing this it became apparent that by teaching pilots to practice these procedures before and after each flight, the time needed to egress an aircraft was drastically reduced.

The reason is simple. If you have no game plan, the thought process during an emergency is a four-step, panic-filled process that goes something like this:

Step 1: Recognize the Problem. This is also known indelicately as the "Oh sh**!" step. When a major problem occurs, your brain will take a few seconds to realize that your left wing has left the airplane.

Step 2: What Do I Do? This is where you decide you need to bail out. Once that decision is made, you need to prioritize the method of bailing. Do you jettison the canopy/door or unfasten your seatbelt first?

Step 3: How Do I Do It? At this point you have to understand how to put the procedure into action. You need to find the canopy release lever. Then, do you know whether to push it or pull it?

Step 4: Actually Doing Whatever You Figured Out in Steps 2 and 3. Let's hope you have enough altitude left to do it.

Any hesitation in these steps starts to add up. The time it takes you to go from one step to another will seem like an eternity if you happen to be plunging toward the ground or trapped in an inverted flat spin. And time, of course, is altitude.

By practicing before and after each flight, steps one, two and three can be dramatically reduced or even eliminated, and step four can be accomplished more quickly. You react quickly because you've developed a habit of practicing egress procedures over and over.

Practicing is a process, not a one-time event. When you first learned to fly, your instructor didn't show you how to make one landing and then say, "Great, that's over with." You had to spend hours in the pattern to get good at it. Even now, you continue to practice maneuvers you've done over and over to make sure you don't lose your edge. Preparing for an emergency is no different.

Humans are creatures of habit, and repetition is the key to reacting quickly and decisively. Nothing but practice, practice, and more practice will achieve this goal. The results will save you precious time and altitude which, in a real emergency, could mean the difference between making it home to view another sunset or not.

Plan on the Ground

Start your planning by looking at the aircraft and establishing a plan of egress. There are certain actions you must take in any aircraft, and you must do them in the correct order. I have a catchy phrase to help you remember: "Canopy, belts, butt." (If you fly an open-cockpit airplane, you are excused from the canopy part.) It is extremely important that you jettison the canopy or door before unfastening your seatbelts.

Some airplanes carry placards that suggest loosening your seatbelts first. Don't do this! Your belts are the only things holding you in the aircraft. If you're tumbling out of control and unfasten your belts before jettisoning the canopy, you may be ejected through it or pinned in a position where you can't reach the release mechanism. Neither situation is desirable.

Unless you absolutely cannot reach the release handle with your belts on, always jettison the canopy first, then release your belts, and then get your butt out of the airplane.

If you're flying a borrowed or rented airplane, or if you purchase an airplane

Figure 1.

Figure 2.

in which you don't have much time, take the initiative to become familiar with the emergency procedures before flying aerobatics. Some possible things to consider:

Does the canopy or door jettison? If your door or canopy has a separate mechanism to jettison it during an emergency, learn how to operate it. Also, make sure this mechanism actually works.

If the canopy slides back, does it lock in place? If not, it could slam forward on your hand and fingers. A possible solution would be placing an elbow on the track.

Does your canopy swing open to the side? If it does, maybe a shoulder against it will help prevent it from slamming back shut on you during a bail out. Aerodynamics can play strange tricks when an aircraft is plummeting out of control. Don't assume the canopy will just rip off in the slipstream.

Also, think about how you would actually claw and crawl your way out of the airplane. In an emergency, you're not worried about where you step or what you might break on the way out. Bailing out is quite different from the way you normally get out of your airplane—unless you routinely dive out headfirst onto the ramp. It will probably be difficult if the aircraft is tumbling out of control and pulling positive g's. In general, it's best to try to dive out head first over the side. This minimizes the chance of hitting your head on the tail. But the important thing is to get out any way you can and as quickly as possible.

The Mechanics of Chutes

All the practice in the world won't help if your parachute doesn't fit properly. It would be rather embarrassing to be tumbling in freefall after a successful egress and notice a parachute just like yours floating a few feet away. Yes, you can fall out of an improperly adjusted harness. This has happened in the past and it's so easy to remedy. Your parachute rigger will be able to help you. A properly adjusted harness will place the three-bar adjuster slides (if your chute has them) just below your collar bone (see Figures 1 & 2).

With your parachute adjusted properly, make sure you can easily identify the ripcord from all those other shiny pieces of metal. You or your parachute rigger should put a piece of brightly colored tape on your ripcord handle. This will help you quickly identify the handle, saving precious time. You should always try to pull the ripcord with both hands (Figure 3), but what if one is injured? Think about and practice how you would pull the ripcord if one arm were injured. I teach the methods shown in Figures 4 and 5.

Before every flight, take a moment and visualize jettisoning your canopy, unfastening your belts, and getting out of the aircraft. Look at the ripcord, grab it with both hands, and simulate pulling it. Grab it with only your left hand and simulate pulling it. Grab it with only your right hand and simulate pulling. Go through this process once again at the end of your flight after you shut down.

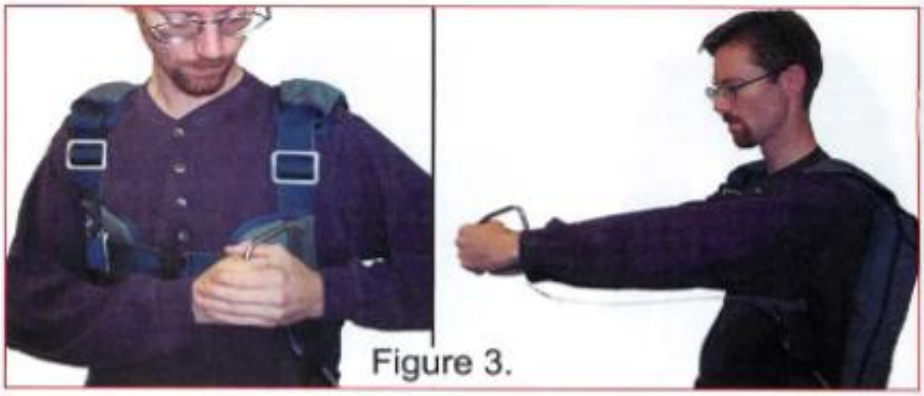


Figure 3.

Two-Handed Pull (the preferred method): grasp ripcord with right hand, place left hand on top and hook left thumb in ripcord. Pull straight out – hard!

Practicing before and after each flight only takes a few seconds and you'll be conditioning yourself to react appropriately in a real emergency.

Opening your parachute is, of course, the most important part of any successful bailout. But there are still steps you can take to increase your chance of survival and minimize injuries. Don't go through all the effort of scrambling out of your doomed aircraft and successfully opening your parachute only to land downwind in 20-knot winds, or create a fireworks show in some power lines.

Floating back to earth under an open parachute certainly beats trying to grow feathers on the way down, but if you just drift at the mercy of the wind, you can still be seriously injured on landing. Steering your parachute to avoid life-threatening obstacles and to face into the wind for landing gives you the best chance to avoid, or at least minimize, injuries on landing.

Steering your parachute is easy if you have steering handles. They are typically a loop of gold or red webbing attached to a steering line that goes up to one of the rear vents on the parachute canopy (See Figure 6). By pulling one of these handles, the corresponding vent is partially closed and the parachute turns.

Not all parachutes have steering handles. The manufacturer may rely on you to remember which riser to pull down on.

Figure 4.

If right arm is injured, grasp ripcord with left hand and hook thumb inside ripcord (just like in the two-handed pull). Pull straight out from your body.

This is the hardest way to pull the ripcord. If left arm is injured, grasp ripcord with right hand and pull across your body like you're elbowing someone behind you.

The risers are those pieces of 1 1/4-inch-wide webbing that the connector links and lines are attached to. Pulling down on one of the rear risers has the same effect of closing a rear vent, although it is slightly harder than pulling on just one steering line.

But watch out. There can be four risers above your head, and pulling on the wrong one can make steering more difficult. It can also increase your rate of descent and, in extreme cases, collapse your parachute. At the very least, your parachute rigger can sew handles directly onto the rear risers to make them easier to identify and hang onto. Installing steering handles and making sure you know what they look like and where they are located will help lessen the stress during an actual emergency.

After your parachute is open, take a hold of the steering handles or rear risers, and do not turn them loose until you have landed. To keep the handles from blowing around in the wind, they are typically tacked in place with thread that is easily broken when you pull on them. If the steering system is properly rigged, you should only need about 10 pounds of force to pull the handles and steer.

Up high, you can pull one of the steering handles or risers down as far as you want. You won't collapse the chute; it just turns faster. Remember to pull down only one handle or rear riser at a time. Pull the right handle or riser to turn right and the left to turn left. When that turn is completed, all you have to do is ease the pressure off the steering handle or riser and allow it to return to its original or neutral position. When landing an aircraft, you make smaller corrections as you get closer to touchdown. The same applies to steering your parachute.

Try to make only minor inputs when low to the ground, as this will reduce the oscillations (swinging) and help you land softer. The only exception is if you recognize a life-threatening obstacle, like power lines, at the last moment. You must miss these even if it means making a low turn or landing downwind. It does you no good to face into the wind and land softly in the power lines.

Remember that arm that was injured during the bailout? It hasn't healed yet, so think about how you would steer with only one hand. Be creative. If you can't make a 90-degree right turn because your right arm is injured, try making a 270-degree left turn instead. Two wrongs don't make a right, but three lefts do.

As the Ground Rushes Up

The majority of pilots wear emergency parachutes with round canopies, and you must not confuse these with the rectangular, ram-air canopies used by skydivers. They are apples and oranges. Everyone has seen skydivers in the movies, at a local drop zone, or at an air show. Maybe you've even made a jump. You may have noticed or were taught that rectangular, ram-air parachutes are flared for landing by pulling both steering handles down at the same time a few feet before landing, much like flaring an airplane.

These "apples" are actually non-rigid airfoils. Your round "orange" is an umbrella, not a wing. If you try to flare a round parachute, you will, at best, increase your decent rate, and at worst, partially collapse the canopy. A partially collapsed canopy will re-inflate in about 20 feet, but this is not good if you are 18 feet above the ground.

Most steerable, round parachutes are designed to have about a 5 mph forward speed. Air flowing up into the canopy is forced out the vents in the rear—kind of like a jet engine but without all the noise. This dampens oscillations and makes the parachute steerable.

The 5 mph forward speed created by the vents cannot be stopped. Pretend the gas pedal is stuck at 5 mph. With this knowledge and the diagram in Figure 7 you can get a rough idea of where you're drifting. If there is no wind, then you'll be going 5 mph in any direction you are facing. If you don't like what's in front of you, turn and head in a new direction at 5 mph.

In the unlikely event that the wind is blowing at exactly 5 mph, you'll be coming straight down if you face into the wind. Look below you and decide if this is where you want to land. If you see something that you would not like to land on (like those ever-present power lines) and have plenty of altitude, just turn your parachute180 degrees and head downwind at 10 mph. Once you are downwind of the obstacle, turn back into the wind. You won't make it back to that obstacle unless the wind dies down and you have enough altitude.

Tip: Steer away from roads. Besides the obvious danger of getting hit by a car (a real bummer after just surviving a heroic bailout), power lines usually run alongside roads and can be hard to see until it's too late.

In our final scenario the wind is blowing at 10 mph (or any speed faster than the 5 mph forward speed of your parachute). Facing into the wind will have you drifting backwards, but it's better to land going backwards at 5 mph instead of facing forward going 15 mph. Just remember to glance over your shoulder on the way down to see what obstacles you might be heading towards.

For a parachute to be certified, it must have a decent rate of no more than 24 feet per second. Decent rate is affected by your weight and also the model of parachute you choose, but for the average person, 16 feet per second is a good number to work with. Couple that with the 5 mph forward speed and you're looking at a glideslope of about 45 to 60 degrees. Of course, this will vary with the wind and other factors, but we're not concerned about doing trigonometry during a bailout. We're dealing with a rule of thumb that will help save your life.

If you look down (or behind you, depending on which way you are drifting) about 45 to 60 degrees, that will give you a good approximation of where your touchdown area is going to

be. If you don't like what's there, turn and go somewhere else (if altitude permits). Just remember, miss obstacles first, and only then face into the wind.


Figure 6.

Landings, the Final Frontier

Hopefully, you won't be bailing out on a regular basis, so I use the KISS method (Keep It Simple, Stupid) when teaching landings. If you've had any military training, you might be familiar with the "parachute landing fall" or PLF. During a bailout, you're not trying to be a paratrooper, so don't worry about it.

Landing under a modern emergency parachute is about the same as jumping off of something 3 to 5 feet high. You could do that without any special training, right? Landing your parachute is no different.

It is usually more comfortable to hang in a parachute harness with your legs slightly out in front of you. Just make sure to get them under you before you land so you don't hit your tailbone. Keep your feet together to help brace your ankles, and don't lock your knees. Land on the balls of your feet and try to take up most of the landing shock using your leg muscles like the springs of shock absorbers, bending them enough to cushion and slow your landing.

You might get pulled over by the parachute or you might fall over if you're drifting across the ground, but if you absorb most of the landing with your feet and legs, you are less likely to receive severe upper body injuries, especially to your head. Practice jumping off something 3 to 5 feet high and you'll get the idea.

Once on the ground, you must get out of the parachute harness as quickly as possible to avoid being dragged across the ground. Get out of your parachute harness even if there is no wind, just in case a gust suddenly comes up. It only takes about 5 to 6 mph to drag a light person. Being dragged over rough terrain in strong winds can be deadly in a short distance.

Practice getting out of your harness. If your harness has a chest strap, get in the habit of removing that first. If you're being dragged and you unfasten the leg straps first, the harness could strip off of you and the chest strap could strangle you.

Some harnesses are more difficult to get out of than others. If you have difficulty getting out of yours, you might need to collapse the parachute by reaching up and grabbing no more than two lines that are side-by-side and reel them in hand-over-hand until you get the parachute under control.

If you are injured, this may not be an option either (remember the broken arm from earlier?). You might consider a hook knife or even a survival kit that attaches directly to your parachute harness. I make one that has a hook knife on the outside of the kit within easy reach. With one hand, you can use a hook knife to quickly cut off a riser to collapse your parachute.

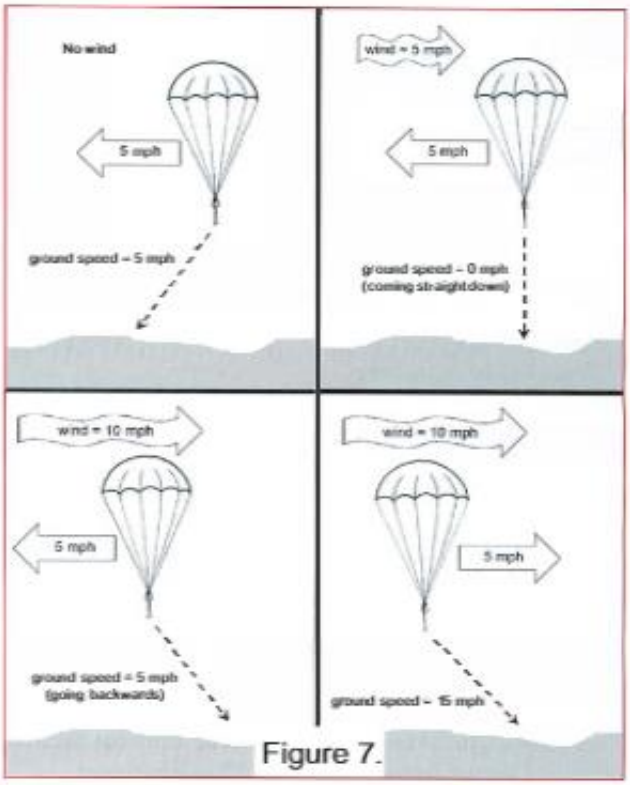


Figure 7.

Once out of your harness, spread out your parachute so someone can find you. Use your signal mirror, whistle or whatever survival equipment you have to summon help. If you have your cell phone with you, maybe it will work. If it does, call for help and maybe call your favorite pizza place that guarantees delivery in 30 minutes or less.

Take some time to think about possible emergency scenarios and practice your procedures. In an emergency, seconds can mean the difference between life and death. If the unthinkable happens, you'll be able to take quick and correct action. You owe it to yourself and your loved ones to practice, practice, practice.

SSA

About the author: Allen Silver is the owner of Silver Parachute Sales & Service, serving aerobatic and glider pilots worldwide since 1972. He is an FAA Master Rigger, a Designated Parachute Rigger Examiner, and has served as chairman of the Parachute Industry Association's Rigging Committee. Allen also has over 40 years of skydiving experience and has amassed more than 3,200 jumps as a sport and professional skydiver. He is always happy to discuss parachute safety and can be reached at 510-785-7070 or online at www.SilverParachuteSales.com.

SAFETY CORNER

BY GEORGE THELEN

FOR LACK OF THE RIGHT STUFF

On a beautiful winter day early last February, my 21-year-old nephew Scott left work early to get a little exercise. He was raised in Truckee, California and he was used to the high mountain conditions there. By the time he was 15 years old, he had climbed El Capitan, the biggest rock in Yosemite National Park. Later, he climbed high volcanoes in Mexico and the Chilean Andes. To say he was in superb physical shape is an understatement.

It was late on this particular day and the avalanche danger was "moderate" when Scott parked his truck near the Sierra Crest ski area and rode the chair lift up to the high divide. He intended to climb up a bit from there and ski down the 9,000-foot drop on the back side of the mountain to Donner Lake — the site of the historic Donner Party tragedy. As on other occasions when he had done the same thing, he brought his cross-country skis, which don't have releasable bindings.

As you may have guessed by now, Scott inadvertently triggered an avalanche. He rode it down to just above the spot where the transcontinental railroad - built by Chinese coolies built back in the 1800's – goes over Donner Pass. There, the avalanche swept Scott into the branches of the last tree above a huge cliff. He was hanging upside down by one ski.

Some 3,000 cars passing each hour on Highway 80 were in plain view, only a couple of miles away and the sun was going down.

After a while, Scott was able to work his way free, lower himself down to the snow and retrieve his boot. The big problem was that 5 of the 6 tendons that connect the lower leg to the knee were torn away. He crawled caterpillar-like back up the mountain, reaching back at every step to drag his leg roughly into normal position so he could go on.

As darkness fell, Scott's father called Search and Rescue. To pursue his own search, Scott's brother, an pre-Olympic downhill skier at the University of Nevada-Reno, raced to the mountain with survival equipment. He climbed the mountain with a headlamp, followed Scott's tracks and found the marks left as Scott dragged himself through the snow. He didn't find Scott, though.

It was about 11 P.M. by the time Scott had dragged himself back to the ski lift, passing out near a ski patrol shed. He came to at the sound of an approaching snow grooming machine and flagged down the driver. A big cheer went up among the volunteers searching the mountain when the news was radioed out.

Days later, after repeated surgeries on Scott's injured leg, I asked him how many of his "nine lives" he had used up in his 21 years.

"Uh, about eleven," he told me.

The Uncle in me won out over compassion as I asked, "Where

The Parachute Survival Kit: *It only makes sense to plan for the unexpected.*

The Essentials: *A Ziploc® bag, good quality sunglasses and head protection "George Moffat Style" to shield from the sun. In time, you will compile your own list of necessary survival gear.*

was the snow beacon your mother bought you?"

"At home in the drawer," Scott said.

And so I queried, "Where was your cell phone?"

"Uh, Michelle had it," he said.

Oh, for the lack of the right stuff!

Think about the similarities to what we do in gliders. Flying local… done it before… an opportunity presents itself…

You're just making a local flight, when something great comes along… perhaps [pick one: a] a cloud street; b] a lenticular cloud; or c] a shear line moving over the airport.

Too often, what thought process there is goes something like this: "Hmmmm… aw, what the heck! I've done this before, although in this case, the car keys are in my pocket and I don't have [pick one: a] much drinking water on board; b] a map; c] my cell phone or my handheld; d] my landout kit; e] any oxygen in the cylinder; f] a coat, walking shoes, a hat, long pants, parachute or a crew]"

In my view – based in part on thinking about Scott's experience – here's a partial list of the "Right Stuff" for glider pilots:

Parachute Survival Kits

"Safety Corner" fans know about the pilot who parachuted to safety after a mid-air collision with another glider. In that case, the pilot landed in trees and wiggled out of the parachute harness. His next problem was being 50 ft up in the air.

Other issues can arise after a wave flight bail out or in any instance involving high winds on the surface. The moral: you need to think about making it safely to the ground and the possibility of being dragged along at 25 to 30 mph, unable to get out of the parachute harness and unable to collapse the chute. This is serious business, and may even be fatal.

I use Allen Silver's survival kits hooked to my parachute straps. Available in two different versions, both include the all-important items: a shroud line cutter, metal signal mirror, and whistle. The kits are available from Allen Silver Parachutes, Box 6092, Hayward CA 94540 (510) 785-7070. E-mail: silver@pia.com or www.pia.com/silver.

Hats

The traditional "soaring hat" isn't a good choice for pre-flight tasks like assembly - it isn't big enough to really shield the head and face. (Think de-hydration… right before flying… bad news!) These days, my rigging chapeau is a cheap straw hat with a wide brim.

In the air, the traditional hat has a built-in flaw when you look directly up, as you often do in gaggle flying. The back of the hat hits your upper back or shirt collar, pushing the hat brim down and cutting off your vision. I've seen John Sinclair flip the back of his hat up "fedora" style to avoid this.

Other solutions include cloth sun visors ala George Moffat. Carefully selected narrow-brim ball caps without the button may be a choice for those of you with more exposed scalps.

Ziploc®Bags

There is nothing elegant about either urinating or vomiting in a glider, but the big problems I've had arise after the fact. A garden variety Ziploc® bag takes two hands to close and it opens if it hits the leading edge of the wing. On more than one occasion, I have flown for hours with a plastic bag flapping on my left wing, a big smear across the fiberglass behind it. Most of my problems are solved by using gallon sized Ziploc® Easy Zipper plastic bags with the plastic pull-tabs.

Sunglasses

My favorites are Serengeti "Drivers" for their superior optics, protection and comfortable frames. Here are the things to consider when choosing what's right for you: Is the glass area big enough to give you enough protection from U.V light? Are the frames small enough on the sides not to block your peripheral vision? Are your frames black to cut down reflection? Are the frames spring loaded to stay on your face with a nasal cannula looped over your ears too?

Experience and some thought will guide your "right stuff" list. Let my nephew (now fully recovered) be an example of how to be unprepared. I'm not out to sell anything here, but let me know this winter what you carry in your cockpit, and why. In a future column, I would like to share your ideas of what you feel are essentials.

—George Thelen

PARACHUTES FOR

A visit to a parachute manufacturer yields some useful advice for sailplane pilots.

By John Good

During a trip to Florida, I accepted an invitation to visit the Orlando factory of Strong Enterprises, one of the leading parachute manufacturers in the U.S. Ted Strong founded his company in 1960 and since then has produced nearly 40,000 emergency parachutes, not a few of which have been sold to glider pilots.

I met with Ted Strong and Bob Gilmour (Operations Manager) for a tour of their factory and a discussion of parachutes and their use in gliders. Here are some observations that emerged from this interesting afternoon.

Why wear a parachute?

For soaring pilots, the basic answer to this question is "midair collisions." Gliders routinely fly close to each other; inevitably, close sometimes becomes too close. All around the world, parachutes are required for pilots in glider competition, so all gliders built for competition will have a cockpit that accommodates one. Since most single-place gliders were at one time considered competition-capable, room for a parachute is pretty much standard. (Some gliders built principally for training may not be set up for parachutes, though they can usually be adapted.)

Another reason is the possibility of in-flight structural failure. Gliders are strong, but also slippery – they can build up speed rapidly in a dive, and at high speed, flutter and even normal control deflection can cause failure. There is at least one case of two pilots successfully bailing out of a glider that was badly damaged by a lightning strike.

The need for parachutes is not merely theoretical, nor even especially rare. I have met four pilots that have made successful parachute jumps from disabled aircraft, and I know of a number of others. I'm a member of the Caterpillar Club, having bailed out of a disabled LS-4 in 1988.

Modern Parachutes

The typical modern parachute is made of coated ripstop nylon fabric, selected for strength, durability, low weight and low porosity. It is packed in a heavy and durable nylon container and attached to the pilot with a strong harness of nylon webbing.

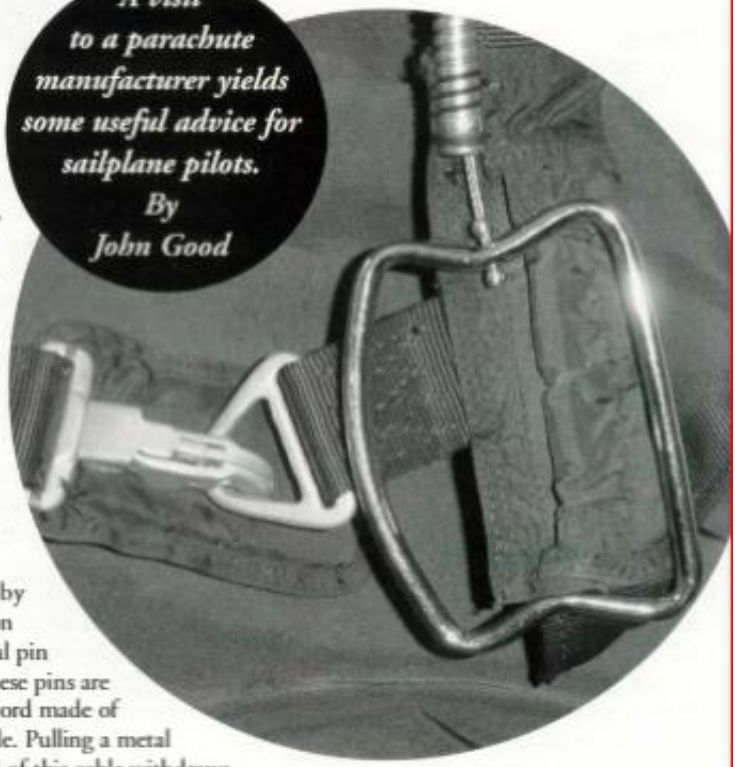
It's held closed by one or more nylon loops with a metal pin through each. These pins are attached to a ripcord made of stainless steel cable. Pulling a metal handle at the end of this cable withdraws the pins and allows a spring-loaded pilot parachute to leap out into the airstream. When this inflates, it stretches out the main canopy, which itself then quickly inflates. Normal deployment happens in perhaps 200 - 300' of descent, and slows the pilot from a descent rate of up to 10,000 fpm (typical terminal velocity in freefall) to around 1000 fpm.

Parachutes are reasonably expensive — around $1000-$1200 new. This reflects moderately expensive materials, but also the amount of skilled labor (mostly sewing) needed to assemble one. Properly cared for (see below) they have a very long life.

They are exceedingly reliable in service. They do not require great skill of the rigger who packs them, they presume no skill of the user beyond the ability to pull the ripcord, and they deploy properly in an extremely high percentage of cases.

Selecting a Parachute

The basic principle is that a parachute should fit the pilot, the aircraft and the type of flying that the two of them do. Parachutes are rated by the weight of the suspended load they can safely carry (modern ones have a sewn-on tag that gives this information), and you should take care that yours will safely carry a pilot of your weight (or the weight of anyone who'll use it). Parachutes also have speed ratings – the maximum airspeed at which a safe opening



To open a parachute, the pilot pulls on a ripcord handle like this (shown here outside of its pocket).

is assured: this rating should be high enough to cover the normal (and abnormal) speeds of which the aircraft is capable.

The parachute should certainly fit the aircraft well, and contribute to a relaxed and comfortable seating position. Most manufacturers sell various models (Strong sells 14 versions of its ParaCushion model) to ensure that almost any pilot can be happy in nearly any aircraft. It's sometimes said that a skilful rigger can pack any parachute so it's comfortable, but this may be an exaggeration – riggers are supposed to pack according to the manufacturer's instructions, and have only limited freedom to improvise. It is true that a lumpy repack can make a parachute uncomfortable for the pilot.

In a sense, the comfort of a parachute is secondary to its ability to perform in an emergency. But a truly uncomfortable parachute may get left on the ground, and will thus be of no value at all.

Maintenance

"Rigger" is the term that applies to the person who repairs and packs parachutes. In the U.S., emergency parachutes worn by anyone in an aircraft must have been inspected and repacked within the previous 120 days. You need to find a qualified rigger to do this.

In most areas, you can take a fellow pilot's recommendation — glider pilots will know the local riggers who work with emergency parachutes. You should establish that the rigger you plan to use is licensed and familiar with your type of parachute (some riggers may specialize — say, in skydivers' rigs). You should save the owner's manual which includes the repack instructions, and have it ready for use by your rigger. A competent rigger will always refer to the manufacturer's repack instructions, and will check to see if any Airworthiness Directives apply.

If you are having trouble locating a rigger, your parachute manufacturer will almost certainly know of the qualified riggers in your area. Another option is to send the parachute back to the manufacturer. This involves some shipping cost and delay, but is a sure-fire way to get an expert repack. In addition, the manufacturer will be very aware of modifications that may apply, and will probably be at least as thorough as the best independent rigger in inspecting for possible problems. It's a good plan to send a rig back to the manufacturer every 3 years or so for this sort of inspection.

Every emergency parachute has a "repack card" on which repacks and maintenance are recorded; it's analogous to an aircraft's logbook. If the repack card is missing, there is no way to tell the history of a rig or what modifications have been accomplished. Such a rig would be a good candidate for a repack by the manufacturer. (If you are considering buying a used rig without a repack card, it would be a good plan to make the purchase conditional on a factory inspection and repack.)

Pilots have some misconceptions about riggers and repacking. Parachutes are extremely reliable. It does not take enormous skill to pack a parachute properly — you do not need a rigger with 15 years experience in order to have confidence that your parachute will work. (Over the years, Bob Gilmour has inspected and packed about 5000 parachutes; of these, only a couple looked as if there might be some question whether they'd open reliably.)

It's worth pointing out that what a rigger does every 120 days is called "I & R" – Inspect and Repack. Of these, the inspection is the more important (though it can't be done without also repacking). A parachute that wasn't repacked for a very long time would not be legal to fly with, yet if you could be certain it had been well stored, you could depend on it to work reliably, even after a period measured in years.

Wear and Damage

The main threats to a parachute rig are ultraviolet light (UV) and contamination. UV is surprisingly effective at degrading the strength of synthetic fabrics – one test showed that 24 hours of exposure to direct sunlight can reduce the strength of certain thin synthetic fabrics by over 40%.

Of course, in normal service an emergency parachute sees very little light of any kind – it spends nearly all its life packed inside a reasonably light-tight container. But the same can't be said of the harness and risers – pilots are not always careful about keeping their parachute rigs out of direct sunlight, and these often show some fading, which is one typical effect of UV.

Ted Strong holds a typical spring-loaded pilot parachute. When the ripcord is pulled, the pilot chute springs out, inflates, and pulls the main parachute out of the container.

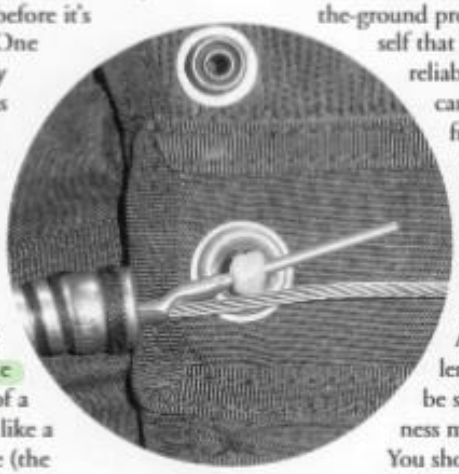
An emergency parachute is repacked by stretching it out on a long table and carefully inspecting and folding each section.

The careful pilot will use a canopy cover to ensure that his parachute container and harness see a minimum of UV exposure.

Contamination can take many forms, but the most common are water and dirt. A parachute that gets truly wet (perhaps from a water bottle that spilled or a pee-bag disaster) will probably need to be opened and thoroughly dried (indoors – never in direct sunlight). If left wet for a long time, damage is possible.

Dirt can be insidious, since the thick nylon of which harnesses are usually made can hold a lot before it's apparent to the eye. One effect is that normally supple fabric becomes stiff. You should ask your rigger to check for this and to consider washing a harness or container that appears to be dirty.

The best long-term storage for a parachute is not in the cockpit of a glider, but someplace like a clothes closet at home (the proverbial "cool, dry place"). You'll sometimes hear that parachutes should be opened and "aired" for best results, but modern fabrics have made this advice pretty much obsolete.



This close-up view shows how a pin swaged to the stainless steel ripcord cable engages a small nylon loop to hold the parachute container closed.

Bailout Advice

Lots of glider pilots wear a parachute each time they fly. Surprisingly few of them have thought carefully about what they should do in case they needed to use it. Here are some points:

Pilots have an understandable reluctance to leave their aircraft, even when it isn't "perfectly good." Yet in some situations you'll be seriously compromising your safety if you have to spend time convincing yourself of the wisdom of bailing out. You can deal with this in part by some on-the-ground preparation. Tell yourself that your parachute is a reliable piece of gear that can be counted on to function as designed. (if you truly feel otherwise, it makes little sense to put yourself to the expense and trouble of wearing one).

Admit that if a problem arises, time may be short and decisiveness may be important. You should know (and occasionally practice) the emergency exit procedure for your glider. There may be some special canopy-jettison knobs to pull, and the sequence may be important — in the air when seconds may matter is no time to be puzzling out the right procedure. You'll need to release your belts, but not the parachute harness straps. This is obvious, but many pilots are in the habit of undoing both when they exit from a glider after landing. Practice getting out of your cockpit with your parachute on.

A common question pilots have is how to avoid being hit by the glider's tail once they have bailed out. At airspeeds less than 250 knots or so, this should not be a concern: as you leave the glider you are going the same direction and speed it is, so you'll tend to fall away cleanly. If your glider is out of control to the point that a bailout looks challenging, consider extending the spoilers, lowering the gear and using positive flap settings – in general, extra drag is your friend here.

You should not be concerned with your position as you pull the ripcord. Sport parachutists learn an arched, belly-to-earth freefall position, but this is a refinement that is unimportant in an emergency bailout. You should look at the ripcord, pull it with both hands, and keep pulling until its free end appears.

How high is high enough? If you are actually pulling the ripcord while 1000' or more above the ground, your chances are excellent. Below 500', they are deteriorating rapidly. To this must be added the altitude you lose while getting out of the glider (practice in exiting can reduce this).

Most emergency parachutes are steerable, by pulling on certain shroud lines (they will

A lot of skilled sewing is needed to make a parachute. Every inch of every seam is inspected.

Square Parachutes?

A question that occasionally comes up is whether a "square" (ram-air) emergency parachute is suitable for a glider. Such parachutes are much more maneuverable than round canopies, and can usually be somewhat smaller for the same suspended weight. In experienced hands, they can give a gentler landing.

But they are not a good choice for anyone who is unfamiliar with their use (fewer than 20 jumps on a ram-air canopy), who expects to lend his parachute to another pilot, or who might be incapacitated during an emergency. In short, they aren't of much interest to glider pilots – it's best to leave them to sport parachutists.

Static Lines?

A static line is a line attached both to a parachute and to an aircraft from which the wearer might jump. If he did, the act of falling would cause the static line to open the parachute, without the need to pull a ripcord. Some gliders provide a strong ring (usually near the pilot's left shoulder) intended to be the attachment point for a static line — typically, a lanyard of nylon webbing also clipped to the ripcord.

But this arrangement does not find favor with parachute manufacturers. Static lines are widely used on sport parachute rigs for student training, but they are never attached to a ripcord handle – they pull more directly on pins specially designed to handle this kind of opening. Ripcord handles are designed to withstand a pull of 300 pounds – a force that can easily be exceeded by a body falling to the extent of a static line if the sudden pull comes in an awkward direction. You should probably not use a static line except with a parachute rig specifically designed for one.

Retire an Older Parachute?

One view is that a parachute has a limited service life and should be retired once this has expired. There are riggers who'll refuse to pack an emergency parachute that is older than 20 years (most will be quite happy to sell you a replacement). Ted Strong and Bob Gilmour do not agree with this notion. Their view is that a competent inspector can tell the condition of a parachute, so there is no need to impose a limited service life on an emergency parachute.

There is an analogy with older aircraft – materials can age and weaken, but reliable methods exist to determine whether the spar in a 1946 J-3 Cub is airworthy, so there is no sound reason to impose an age limit on the Piper Cub. 50-year-old nylon parachutes exist that under test show that they retain a high percentage of their original strength. New designs offer many advantages, but a well-maintained parachute need not be retired simply because it is old.

Reliable materials

One of the challenges of manufacturing parachutes is ensuring that suppliers do not change the specifications of fabric and other materials. There have been some notable problems in the past. Probably the best known one involved the accidental use of acid-treated nylon mesh in Security parachutes. This treatment was found to weaken adjacent fabric over time, and required an expensive repair on each parachute affected.

Strong Parachutes encountered a less serious but still troublesome problem about 25 years ago. A supplier of material for shroud lines began using a latex coating, without noting that any change had been made. In service, this coating would soften and sometimes cause adjacent lines to stick together. The problem could be eliminated simply by washing the affected canopies, but this was a huge job. The Strong factory shut down production for a couple of weeks and rented dozens of washing machines which were kept busy washing parachutes that had been recalled from their owners. No doubt there were a number of sharp discussions with the supplier about the importance of disclosing even the smallest change in material specifications.

be colored, or have small handles). The technique is obvious – if you pull the right line, you turn right (usually rather slowly). A round parachute isn't very maneuverable, though it may give you a chance to steer away from obvious dangers, such as powerlines. As you get near the ground, plan to steer so you're facing into the wind well before touchdown.

Serious parachutists learn the "PLF" (parachute landing fall) – a sort of "tuck and roll" technique to soften a landing. If you haven't learned this, it would be unwise to try to improvise it. Instead, plan to touch down with your feet and knees together, your knees bent, and your leg muscles tensed. You must not look at the ground as you touch down – the sight of it approaching will make you involuntarily straighten your legs, which often leads to broken ankles. Having your leg muscles relaxed may mean that much of the impact is taken in your rear end, which can lead to back injuries.

Your problems may not be over once you're on the ground. If there's any real wind, there is a chance your parachute

Ted Strong sits in his latest parachute "harness" – a 4WD all-terrain vehicle. This can be launched out of a small cargo plane with four people aboard, then flown (under a giant ram-air parachute) to a precision landing. Note the two small winches at the front, used to steer the parachute.

may drag you across the ground; you can deal with this by grabbing some shroud lines and hauling them in hand over hand. Those running shoes you wear because they're so comfortable in the cockpit may not have done much to protect your ankles during your landing. You may be far from any civilization, or even a road. Your glider may have come to earth nearby, or far away. You'll do well to have some sort of survival kit attached to your parachute harness (some manufacturers, including Strong, offer a pocket for this purpose). A really well-equipped kit would probably include a personal ELT (switch it on before you land) and perhaps an aviation radio – transmitting "Mayday" on 121.5 MHz, it's usually possible to raise an airliner within a few minutes.

Practice Beforehand?

In principal, it would be a good idea to learn how to use a parachute before needing one during an emergency. But this may not be practical. A couple of jumps are not sufficient – figure on 15 or 20 to reach the point that you are relaxed and becoming competent in controlling the canopy and landing. Most glider pilots are probably not going to make 20 jumps.

A compromise might be to make a "tandem" jump. You and an instructor use a special harness designed for two, and a large "square" canopy that can handle the combined weight (it was probably designed and built by Strong Enterprises, as they are the pioneer and foremost manufacturer of this type of rig). You should explain to the instructor that you are looking for an experience somewhat different from the typical thrill ride – that you'd like some instruction in flying the canopy and setting up for a landing. It won't be the same as a landing under a "round" reserve parachute, but the experience will certainly be of some value.

Thanks go to Ted Strong and Bob Gilmour for taking the time to meet with me and to show me their factory. They are responsible for most of the useful information in this article; any errors are my own.

About the author: John Good has been flying gliders since 1980. His current glider is a Discus 2a and he has approximately 1500 hours and holds a Commercial Glider rating. John instructed for several years and has served as SSA Regional Director from Region 1 and Chairman of the Contest Committee. John is now the Associate Editor for *Soaring* Magazine. <johngood@ssa.org>

Take Care Of You So It Can Take C

By Allen Silver

Care and maintenance of your emergency parachute system goes far beyond the repack and inspection performed every 120 days by an FAA rigger. What you, the consumer, do between the repack cycles is the most important aspect of parachute care. Manufacturers generally agree that their parachutes can last up to 25 years. In order to insure that longevity, there are several things you can do.

As a rigger specializing in the service of emergency parachutes I receive parachutes in my shop on a daily basis. Many show almost no signs of wear over long periods of use while others only a few months old look as if they are ready to be retired. Both of these conditions are due to the amount of care taken by the owner during use and storage.

In order to protect your parachute from damage the first place to look is in your cockpit. If the seat is bare wood or aluminum it should be covered. Aluminum can turn a container black within a few flights. A piece of tight woven carpet or other substantial padding can be used on the bare seat. Make sure all areas that might come in contact with the parachute are free of sharp objects, pop rivets, weld joints, nail/screw heads or the hook portion (scratchy side) of Velcro.

The component parts of your parachute system should be checked often, preferably prior to every flight. Leg and chest snaps should operate easily and be free of dirt or grease. The ripcord cable should move freely in the cable housing insuring that no debris impedes the pulling of the pins. Velcro tends to attract twigs, threads, etc. and should be picked clean often. Make sure there are no nicks or cuts on any portion of the harness webbing. Your parachute should always be stored in its carrying bag between flights in order to protect it from dirt as well as UV exposure. If your parachute did not come with a carrying bag, any nylon or canvas bag will work. This is the first line of defense in protecting your investment.

Probably the biggest threat to a parachute's service life is damage by UV rays. Leaving your parachute in an aircraft exposed to sunlight for hours on end is extremely harmful over time. The cumulative damage caused by UV light will weaken your parachute harness and the canopy inside. UV light can penetrate through the outer container. Cover your chute if you plan on leaving it in your aircraft, even for a short time. The carrying bag, canopy cover or even a jacket or shirt will help. A lightweight space blanket is ideal and will also reflect some of the heat on those hot flying days.

Improper storage is another danger to your parachute system. Always store your chute in a cool, dry place free from extreme temperature changes. A locker in a hangar is fine, but beware that mice can crawl through small air vents and do costly damage. More than one parachute has been chewed up for nesting material and ruined by droppings and urine.

Keep your parachute away from heat sources, such as water heaters, furnaces, washers or dryers. If storing your chute in the vicinity of any of these things, always keep it off the floor to prevent water damage in the event of a leak. The trunk of your car can reach extremely high temperatures. Over time prolonged storage in your trunk can cause deterioration of the fabric. Make sure that any battery acid from jumper cables or batteries is no where near your parachute. Acid residue can be instant death to your nylon parachute.

Humidity and dampness can cause severe, irreparable damage to the parachute if not repacked according to FAA regulations. Mold may appear which, gone unnoticed, can require major repairs or worse. More importantly humidity can hasten the breakdown and sometimes meltdown of the rubber bands used to retain the lines of your parachute. Unfortunately, I have condemned out many parachutes ruined by rubber bands stuck to the lines and canopy after being unopened for

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months or years. There is just no way to remove them. Once this happens the entire mess is often stuck to the inside of your container preventing your parachute from opening properly. If you are lucky, you will discover this during a repack, not a bailout.

If you live in a high humidity climate, I strongly urge you to strictly follow the FAA requirements of servicing your parachute every 120 days. If you intend not to use your parachute for six months or more, I recommend the following procedure for prolonged storage. Open the parachute container and remove the lines from the rubber bands. Take care not to snag the lines on any Velcro on the container. Remove the rubber bands from the container and throw them away. Put the canopy in a large plastic bag separate from the container to prevent the Velcro from damaging the lines and fabric.

If you ship your parachute to a rigger for servicing, you can pull the ripcord at home for practice. Don't stand too close to your priceless heirlooms because the pilot chute should fly out several feet. Box it up using the guidelines above. Use a good box that the chute will fit into tightly. Do not put styrofoam, shredded paper or wood chips into the packing box. It can clog the ripcord housing and most riggers will be ready to holler at you because of the mess.

The FAA certifies two rankings of parachute riggers. A senior rigger can do repacks, spot-clean your parachute and replace elastic keepers or hand-tackings that may have come loose. Only minor repairs that do not affect the structural integrity of your parachute can be performed by a senior rigger. Any other repairs, which do affect the structural integrity of a parachute (including changing connector links) must be done by a master rigger. In order to be certified as a master rigger, a minimum of three years experience is required. Any rigger should always have access to the proper manual for your particular parachute and all the equipment necessary to do the job.

Parachute riggers have an FAA issued license that looks like a pilot's license. It will say if he or she is a senior or master rigger and what parachutes they are rated to pack (seat, back or chest). Don't be afraid to ask to see it. Any rigger worth his or her salt won't mind the request.

As a master rigger, I relate a regular repack and inspection cycle to an annual on your aircraft. It's preventative maintenance. If there are AD's or factory service bulletins on your chute, the work can be done on a timely basis. Often, I recommend upgrading an older parachute with factory improvements that appear on newer models. It could be an improved steering system or using four connector links instead of two. These items may not be critical to the proper functioning of your chute, but even the slightest upgrade may enhance your chances of survival in an emergency.

Doing your own parachute rigging can backfire costing you money and possibly your life. Once I received a parachute with a home sewing job that had sewn the canopy to the inside of the container! I don't think the parachute could have opened. Do not wrap any kind of tape around webbing to secure loose ends. All adhesive will eventually deteriorate nylon. Occasionally, I receive a parachute whose owner has glued some padding to the harness or container. Glue will also eat up the fibers over time. Please consult your rigger before using any home remedies.

My goal is that your state-of-the-art emergency parachute will last up to 25 years and be an effective life saving device should the need arise. The vast majority of pilots will never need their parachute to save their lives. Proper care and maintenance will help assure a positive outcome in the rare event of an emergency bailout. Always practice your emergency drills before and after each flight to keep everything fresh in your mind.

I strongly recommend wearing a rigid helmet on all flights. If your wing snaps off and your head impacts the inside of the aircraft rendering you unconscious, having a properly maintained parachute is a moot point. When considering the purchase of a new aircraft, take your parachute and helmet to see if their is room for both in the cockpit.

Please check out my other safety articles on the Silver Parachute Sales & Service website at www.pia.com/silver. I am always available for safety seminars providing in depth emergency bailout procedures. Call or e-mail me with your questions. Remember, there is no excuse for putting your safety at risk with an improperly maintained parachute.

ABOUT THE AUTHOR: Allen Silver owns and operates Silver Parachute Sales & Service, a parachute loft, in the San Francisco Bay Area. He has been an FAA Master Rigger since 1974 and in 1991 was designated as a parachute Rigger Examiner, for the FAA. He also is the chairman of the Parachute Industry Association (PIA) Rigging Committee. This is a world wide organization that represents the parachute industry.

IS YOUR LIFE WORTH $50.00 A YEAR?

BY ALLEN SILVER

The phone rings or a potential customer comes into a typical parachute rigger's shop and the usual barrage of questions regarding the purchase or maintenance of an emergency parachute begins. Most people are eager to learn and ask very good questions. But rarely does a week go by that at least some of the following is not heard:

"Do you have anything cheap? Twelve hundred dollars is way too much. I'm never going to use the parachute anyway. Oh, yeah, did I mention, it must be cheap?"

"What do you mean you won't pack my parachute? It was my grandfather's. Can't you just wash the oil and grease off it? The UV damage doesn't look that bad, does it?"

"I'm 6'2" and weigh 220 pounds. My aircraft doesn't have room for a parachute. The military surplus chutes won't fit. What do you have that's lightweight, comfortable and small. Oh, yeah, it must be cheap."

"But I just purchased the aircraft and the previous owner threw in the chute for $500.00. I know he wasn't a parachute rigger, but he said it was okay. Now, you're telling me it only has about five years service life left and

needs a lot of work to make it airworthy."

Unfortunately, these or similar scenarios are heard far too often. Probably the most common excuse pilots use to avoid purchasing a stateoftheart parachute is the cost. A new rig will run in the neighborhood of twelve to thirteen hundred dollars. Yes, this is a major investment, but it is a direct investment in your life. Compared to the cost of many aircraft in which you will be using the parachute, the price is a drop in the bucket.

Today's parachutes will last twentyfive years with proper care and maintenance. This works out to approximately $50.00 per year. Even though the total sum is paid out initially, a prorated cost of $50.00 per year is pretty cheap insurance. For many pilots that is not even the cost of an hour of flight time. Very few airplane parts can be purchased for fifty dollars but for that amount you can own one of the safest parachutes on the market. Your life is worth $50.00 a year. You owe it to yourself and your loved ones to make it home for dinner.

No one ever intends to bail out of his or her aircraft and the huge majority of pilots never will. But you need to remember that someday you may have to use your parachute for real. That cheap, UV damaged, uncomfortable cushion may catastrophically fail. Is the satisfaction of knowing you saved a few hundred bucks on your parachute worth it?

The size of the parachute is another factor that affects many pilots. Unfortunately, the strongest, safest parachute for some, probably will not be the smallest. Comfort and size may have to be sacrificed somewhat in order to enhance your chances of survival in an emergency. Current, stateoftheart parachutes usually give the average pilot a number of choices as to the style and size of the parachute while still maintaining a high level of safety.

Before you purchase a parachute, whether it's new or used, please find a parachute rigger that you trust to help you make this important decision. Education is the key to making an intelligent purchasing decision. You're not expected to know everything about parachutes. That's the rigger's job. When you bought your aircraft or selected a mechanic, didn't you ask around and get expert advice? Only then did you consider spending your hardearned money. Read some of the author's previously published articles from Soaring magazine or pull up his website at <www.pia.com/silver> if you have access to the Internet. Call the author or talk to another competent rigger, but communicate with someone who is knowledgeable about emergency parachutes. Ask questions until you are satisfied.

Many pilots today are stepping up to faster and faster aircraft. If you fall within the parameters of aircraft speed (usually up to 150 knots) and pilot weight (usually up to 250 pounds) at which most manufacturers rate their canopies, you will be fine. The problem arises when the speed or weight exceeds the maximums. There is a tradeoff, but no testing has been done to determine, for instance, how fast a 130 pound pilot could safely deploy his parachute. My best advice is to discuss your personal situation with a rigger. In general, by purchasing one of the best parachute systems available, you will be giving yourself the best chance of a successful bailout.

Many companies in the parachute industry are currently developing and testing even stronger, lighter weight parachutes. However, as of this writing, no time frame is available as to when they will be on the market.

If you purchase one of the modern, higher speed, standard category parachutes on the market today with the advice of a competent rigger, chances are that parachute will be able to move from aircraft to aircraft with you. You run into trouble when trying to get by with something old and cheap that really doesn't fit you or the airplane. Often times over a period of years, you may end up spending more money by changing parachutes several times.

Advice from the author and many other riggers is free, please ask for it. If you can, attend a safety seminar on emergency procedures. During that time discuss the various equipment options available. If there has never been a safety seminar in your area, arrange for one. The author does several seminars each year and would love to do more. The only cost to your organization would be to cover his expenses. Many groups offer the safety talk in conjunction with their monthly meeting.

There are no short cuts or substitutes for purchasing a safe, reliable parachute – one that will save your life. Unfortunately, when it comes to parachutes, the old axioms ring true "if it sounds too good to be true, it probably is" and "you get what you pay for". You need to decide that your life is worth $50.00 a year. You need to learn the emergency procedures that are proven effective and practice them over and over. Then you will have every opportunity to survive an emergency bailout. Hopefully, this article has provided you with some information to live by.

ABOUT THE AUTHOR

Allen Silver owns and operates Silver Parachute Sales & Service, a parachute loft, in the San Francisco Bay Area. He has been an FAA Master Rigger since 1974 and in 1991 was designated as a Parachute Rigger Examiner, for the FAA. He also is the chairman of the Parachute Industry Associations (PIA) Rigging Committee.

The majority of Allen's business is devoted to providing inlepth, personal parachute service to acrobatic and glider pilots. He is one of the largest dealers nationwide for the Softie line of emergency parachutes manufactured by Para-Phernalia Inc.

Allen retired after 25 years of service with the California Air National Guard and has over 35 years experience and more than 2700 jumps as a sport and professional skydiver.

Feel free to call or write with questions or parachute needs at: Silver Parachute Sales & Service, P.O. Box 6092, Hayward, CA. 945406092, Tel. (510) 7857070, FAX (510) 7859213, email to silver@pia.com or look for Allen at the 1998 SSA Convention. ■

All Parachutes Are Not Created Equal

by Allen Silver

There are many things over which you have no control if you have to make an emergency bailout.

Questions arise such as, am I going to land in the rocks? Am I going to hit trees? Or am I going to get lucky and land in a soft field and have someone hand me a cold beer? Is the wind going to be zero mph, or is it going to be howling at twenty mph? Although you have no control over these things, you do have control over the parachute that you are wearing. And that can be all the difference you need to land safely.

When you are preparing to purchase a parachute or if you need to re-evaluate your existing parachute, you must ask some very pertinent questions. There are two important questions you must ask. First, what is the parachute rated at in knots or miles per hour? And second, what is the rate of descent with my weight?

One very important fact that you need to know in order to make an informed choice and select the best parachute for yourself is what speed the parachute is rated at.

Unless you are quite lightweight (under 140 lbs.), I strongly urge you to choose a parachute that is rated at 150 knots or higher. This means the canopy can withstand an opening shock while you are traveling at 150 knots without sustaining major damage, with the maximum recommended suspended weight on it. Even though a parachute with a lesser rating will probably save your life, it's nice to have a little extra in reserve–just as it is preferable to have premium tires on your car as opposed to retreads. Under normal conditions things may work fine, but an emergency bailout is far from normal.

You may argue, "But I fly a very slow glider or aerobatic aircraft, I don't need a high speed parachute." True, but let's assume your aircraft was just involved in a mid-air collision, leaving you with no wings. It will come out of the sky like a lawn dart. Even the most docile aircraft can come down quite rapidly under adverse conditions. When you look up, you need to know that the parachute you chose to save your life will be open above you. Most certainly this is not the time to wish you had purchased a stronger canopy.

There are also several factors which will affect the rate of descent of your parachute with your weight suspended under it. Ideally, I would like to see you descend at a rate of 16 feet per second or slower under an open canopy. Most manufacturers will say as an example, "This canopy has a rate of descent of 16.3 feet per second with a 205 pound person." With these figures from the dealer or manufacturer you should be able to determine if you will come down faster or slower depending on your weight. Your size and weight may dictate what will fit into your aircraft, but you always want the strongest parachute with the slowest rate of descent possible.

Other factors that affect the rate of descent and speed rating of your parachute include such things as:

- inflated dimension
- length of suspension lines
- tensile strength of suspension lines
- materials used in manufacturing
- type of reinforcements for strength
- method used to construct the canopy

People are often under the assumption that a 24' diameter parachute is the same size no matter which company manufactured it. Another misconception is that the bigger the canopy (26' or 28' in diameter), the slower it will come down. As you may have guessed, that is not always the case.

A simplified way that many people use to explain the size of your canopy is to say that if the distance from the skirt of your parachute to the apex is 12' up and 12' down, it is a 24' diameter parachute.

Using the above canopy as an example, what could be different about it? If the inflated dimension (how wide it's open across the bottom) is only 10' across or 17' across instead of about 21' across, is this still a 24' parachute? Yes, but probably one with a very fast rate of descent.

The length of the suspension lines can and does vary greatly. Some canopies have lines 3' - 5' shorter than others. The longer lines are desirable because this increases the inflated dimension, thus lowering the rate of descent.

Another factor in increasing the speed rating of a parachute is the tensile strength of the suspension lines. If one canopy has lines rated at 400 lbs. and another at 600 lbs., choose the 600 lb. lines.

The nylon cloth used for canopy construction has varying degrees of porosity and permeability. Porosity is the ratio of open space to covered area of a drag surface, not to be confused with permeability, the measure of a volume of air that will pass through a given area of cloth in one minute at a given pressure. This is usually measured in cubic feet per minute (cfm). What I'm trying to say is a smaller zero-porosity parachute constructed of material with a cfm of 0-3 may come down slower than a larger, higher porosity parachute with a cfm of 40-50.

Most manufacturers use concentric bands of tape or webbing (of various strengths) on the canopy for added reinforcement. Some may sew 4"- 6" of suspension line directly to the canopy while others may sew 10" or more. The stronger the reinforce-

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The majority of Allen's business is devoted to providing in-depth, personal parachute service to aerobatic and glider pilots. Allen also manufactures a 5 point safety belt, with or without a ratchet, for non-certified aircraft.

He is a dealer for the Softie line of emergency parachutes manufactured by Para-Phernalia Inc. Giving lectures and safety seminars to interested groups about parachutes and emergency procedures is a service Allen enjoys and provides at no cost other than travel expenses.

Allen retired after 25 years of service with the California Air National Guard. Seventeen of those years were spent as a Survival Equipment Technician. This background has been beneficial in obtaining his current contracts with NASA and other aerospace companies requiring services for sophisticated and specialized parachutes.

He has over 33 years experience and more than 2625 jumps as a sport and professional skydiver. For three seasons he performed a wingwalking/skydiving routine at airshows throughout the western United States. After retiring from wingwalking Allen remains on the airshow circuit as an airshow announcer.

Allen is usually available Monday-Friday at (510) 785-7070, and will be happy to help, if possible.

will greatly reduce the oscillations and allow you some maneuverability. There should be steering handles on the parachute to help you identify what and where to pull. They should be a contrasting color. This will allow you to quickly identify them and miss life threatening obstacles and face into the wind on landing.

When you are considering a particular brand of emergency parachute to purchase, remember to ask the speed that the parachute is rated at, with 150 knots or higher being a good speed rating for the average weight person. And, also ask what the rate of descent is, with 16 feet per second or less being ideal. Don't forget to check the packed dimensions of the harness and container to be sure it will fit in your aircraft, with your height and weight.

This is why all parachutes are not created equal. And this is also why you need a trusted parachute rigger to help you make the best choice for your particular needs. ■

ments and the more line sewn directly to the canopy should yield a stronger parachute.

Finally, the construction of the canopy (how all the pieces are assembled) is vital to its size and strength. The size of each pie wedge gore of material that makes up your parachute and how many are used on the same size canopies often varies. If each wedge gore is a few inches narrower at the skirt (or bottom), the inflated dimension will be narrower.

Your parachute should be modified (mesh covered openings in the rear of your parachute to vent air and make it steerable). A modified parachute

XC TIPS

BY GARRET WILLAT

Survival

Allen Silver has been in the parachute business since 1972 (http://silverparachutes.com/). He also produces the SMAK PAK and specialized aerobatic safety harnesses. Allen has written about where to attach things to your parachute (go to Allen's homepage and scroll down for the article: **"How to correctly attach a survival kit to your parachute harness"**). If you already have one or carry a SPOT or similar device, the question is whether you have it in a safe area. I would guess roughly 25% of pilots have it secured incorrectly.

When you start thinking about bailing out, what will you have on you when you hit the ground (notice I didn't say do a beautiful stand-up landing)? Allen has a great motto: "Survival Equipment must be carried on you. If it's stored in your aircraft, it's called camping gear."

I carry a lot of camping gear. I try to keep enough that I can be comfortable to spend the night. Lots of water, tie-downs for the glider, first aid kit, food, rope, flashlight, etc.

When SPOT came out, I got a first generation unit. I am a big believer in them. Actually, we are such big believers, we require our private owners going cross-country to carry one. We are in an area where cell service is very limited and the road traffic in the summer can be very limited. Even if you land at a county airport, there might not be any way to contact anyone. It also gives us the ability to see if we can leave at 5:00 pm, or if someone needs to stay late to make sure everyone gets home.

There was a nearby site that had someone crash/land on the side of the mountain and nobody knew it until the next day; then they had no idea where to start looking. With everyone registered on glideport.aero, you can see where everyone is.

Later when the InReach came out, I switched to that system because of the ability to have 2-way communication. Plus, you're able to type in different contact information, which happened when I landed out in Finland after only being in country for less than 8 hours and wasn't really prepared. If I had my SPOT, I could have sent a message back home while everyone was asleep, but my crew had not arrived, so home would not have known whom to contact in Finland. Thankfully Adam knew I was going to be landing out and was able to check his email, and I was able to send him a message from my InReach. Thanks, Adam Woolley, for picking me up.

I clip my InReach to my chest strap but I always look at that little plastic clip and wonder if it is really strong enough. Turns out ... it is not. Which really puts a damper on my great safety plan. Which got me wondering, how should I attach it?

I have seen some people have their SPOT mounted in their glider. However, it will not help you if you bail out. You might not be near the glider wreckage. You could be close but not know where it is; you could be in a different canyon and really not close enough to get the attention of ground personal.

The ELT is going to help the rescue crew find the glider, but let's make it easiest for them to find us.

XC Tips is excerpted from the Wings & Wheels e-newsletter, published weekly. Subscribe at wingsandwheels.com/newsletter.