



**HPAC/ACVL Club Flight Safety Officer Guide
Version 1**

1 March 2003

Foreword

I have always considered myself a safety-oriented pilot and I am a strong believer that each club should have a flight safety program. I decided to write this guide when I noticed that there was no concise source of information for flight safety officers. Since the vast majority of flight safety officers are volunteers without a professional background in flight safety, they need a suitable reference to help them put together a flight safety program. I hope that this guide partly fills this void.

I do not have a professional background in flight safety myself and I will not claim that this manual is exhaustive or completely accurate. I consider this guide to be a work in progress and the intent is to review and improve it over time. I welcome any assistance and suggestions for improvements. If you have comments, please send them to me at andre.nadeau@rogers.com. Your contribution may help make our sports safer.

Acknowledgment

I want to acknowledge the contribution of Robin Sather who kindly reviewed a draft of this manual. I am also in debt to xxx who provided the cartoons for the manual.

I hope to be in a position to express my thanks to those of you who will provide suggestions for improvements in future draft of this manual..

Disclaimer

No liability is assumed with respect to use of the information herein, nor is endorsement of any product implied or intended.

Copyright

First Version Copyright © 2003 by HPAC/ACVL.

All rights reserved, including the right to reproduce this guide or portion thereof in any form or by any means, electronic or mechanical including photocopying, recording, or by any information storage or retrieval system without written permission from the HPAC/ACVL, except for the inclusion of brief quotations in a review or for reproduction for sole use by members of the HPAC/ACVL.

Andre Nadeau
Author

TABLE OF CONTENT

1	INTRODUCTION	1
1.1	Objective of this Guide	1
1.2	The Pilot and Flight Safety	1
1.3	The Scope of Flight Safety.....	1
1.4	What Flight Safety is Not	2
1.5	What is a Flight Safety Program?	3
1.6	What are the Responsibilities of a Flight Safety Officer?	3
1.7	What are the Qualities of an Effective Flight Safety Officer?	3
2	DESIGNING A FLIGHT SAFETY PROGRAM.....	5
2.1	General.....	5
2.2	Establishing the Needs for a Flight Safety Program.....	5
2.3	Selecting Activities	5
2.4	Scheduling Activities	5
2.5	Where to Conduct Activities.....	6
2.6	Promoting your Flight Safety Program.....	6
2.6.1	Articles in Local Newsletter or Email Lists.....	6
2.6.2	Safety “Well-Done” Award	6
2.6.3	Catchy Safety Phrases	7
2.6.4	Posters	7
3	FLIGHT SAFETY ACTIVITIES	8
3.1	General.....	8
3.2	Promote Self-Education.....	8
3.3	Seminars and Clinics.....	9
3.3.1	Parachute Packing Clinic	9
3.3.2	Extreme Manoeuvre Clinic	10
3.3.3	Tree Rescue Clinic	11
3.3.4	Water Landing Clinic	12
3.3.5	Equipment Inspection Seminars	12
3.3.6	Others topics	14
3.3.7	Some Guidelines in conducting Seminars and Clinics	14
3.4	Awareness of Other Air Sports	15
3.5	First-Aid Courses	15
3.6	Site Improvement Work Parties	16
4	INCIDENT/ACCIDENT REPORTING AND INVESTIGATIONS.....	18
4.1	The Transportation Safety Board of Canada and the HPAC/ACVL.....	18
4.1.1	Definitions of an Accident and an Incident	18
4.1.2	Flight Safety Officer Obligations	19
4.2	Accident Reporting	19
4.3	Accident Investigations.....	19
4.3.1	How to conduct an Accident Investigation.....	20
5	RISK MANAGEMENT.....	22
5.1	Purpose of Risk Management	22
5.2	Risk Identification.....	22

5.2.1	What is risk identification?	22
5.2.2	Tool and techniques for Risk Identification.....	22
5.3	Risk Quantification.....	23
5.3.1	Risk Probability.	23
5.3.2	Risk Impact	23
5.3.3	Risk Prioritization.....	24
5.4	Risk Response	25
5.4.1	Risk Avoidance	25
5.4.2	Risk Mitigation	25
5.4.3	Risk Acceptance.....	26

1 INTRODUCTION

1.1 Objective of this Guide

The objective of this guide is to provide you, a flight safety officer, with the information you need to develop and manage a flight safety program for your local club.

1.2 The Pilot and Flight Safety

Few pilots will argue that flight safety is important. However, flight safety it is not an end in itself. It is one of many criteria that pilots must consider when making decisions. Perfect flight safety can only be achieved by not flying at all but that would not be that much fun.

A HG pilot that flies without wheels is making a conscious decision to do so. That pilot has decided to trade some safety against performance, ego or some other perceived benefit. Thus, that pilot is taking a calculated risk based on some risk-benefit analysis that he has conducted for himself. This is not different than a cyclist who decides not to wear a helmet or a driver who decides not to wear a seat belt. There is nothing intrinsically wrong with that (unless a law or regulation is broken) and every pilot has to make these decisions for himself/herself. We are all different individuals and we all have some different tolerance level towards risk.

What really matters is that pilots who are making decisions based on the weighting of safety against other criteria have a good understanding of the risks they are taking and the consequences of those risks. This ensures that the decisions they make are informed and based on factual information and not on false beliefs or misconceptions. Many pilots may unknowingly be taking more risks than they would normally tolerate because they may not have the information to fully understand and evaluate those risks.

Caution. It is important to understand that the right of pilots to take risks must be balanced against the welfare of the local pilot community. For example, a bad accident may threaten the availability of a flying site. Pilots should take that into account when flying at those sensitive sites and accept fewer risks than they may otherwise do.

Note that flight safety is not limited to launch, flight or landing. For example, pilots or participants could be injured while hiking to launch on a treacherous path, or while riding a motorcycle to retrieve the line for a stationary winch. These events are not associated directly to flight but they are connected to it. You should consider these risks in your flight safety program.

Trivia. Do you know that slips and falls are the single leading causes of injuries in the workplace? Is that true of HG and PG as well?

1.3 The Scope of Flight Safety

Accident prevention is an important aspect of flight safety and it is the one aspect that pilots will recognize. There are a number of measures that pilots and club can take to prevent accidents,

many of which you are already familiar with. Hang checks fall into the category of well-known practices.

Example. Although some practices are well known, they are not always followed. I have witnessed one friend of mine taking off unhooked. Fortunately for him, he was launching from a stationary winch and just got pulled down on the snowy ground where he released promptly with no damage except for his pride. I have also witnessed a paraglider pilot taking off without his leg loops. At the 2001 HG Nationals, I witnessed two pilots that were about to launch without donning their leg loops. Sharp-eyed observers undoubtedly saved them from a few scary moments.

Let's not fool ourselves however. In a sport like free flight, with the many variables involved, accidents will occur. What happens during an accident is as important as what was done to prevent the accident. Pilots have died or been needlessly hurt during accidents because they did not use the right equipment, use the equipment improperly, use the wrong techniques, etc. For example, a parachute that deploys improperly or is too small is likely to lead to more severe injuries than a parachute that functions properly and is sized correctly. How a pilot behaves during an accident may also have an impact on the degree of injury to the pilot. Thus, flight safety is also concerned with the prevention of injuries during an accident.

Finally, what happens after an accident can make the difference between life and death. Pilots may die or get injured more severely following accidents if they do not have the right equipment (e.g. gear to climb down a tree safely, radios to call for help), if they do not get the right medical care or if they do not get medical care in a timely manner. Flight safety must include the planning and preparation to react to accidents to minimize the impact of these accidents.

So, in a nutshell, flight safety is concerned with the prevention of accidents and of injuries to people resulting from accidents.

1.4 What Flight Safety is Not

Flight safety **IS NOT** the introduction of safety-related regulations. Regulations have their place and may be necessary in some cases but they are seldom effective by themselves. For example, have you seen people driving over the speed limit lately? Speed limit is a regulation but we all know that it is not very effective. A much better approach to promote speed limit is to educate people about the consequence of their actions. If people are told that their chance of survival are 30% better if they have a front-end collision while driving at the speed limit of 90 km/h than if they drive 20 km/h above the speed limit, they are more likely to listen than if they are just told to stay under the speed limit¹. People will often act when consequences can be quantified – at least for a while as memory is fickle.

Another problem with flight safety regulation is that they are unenforceable in most cases. A flight safety officer does not have the authority to stop pilots from flying if they wish to do so. The HPAC/ACVL does not have that authority either. Even Transport Canada does not have that authority unless specific CARs are broken. Because the CARs do not deal with many aspects of HG or PG flying (not a bad thing), there are few CARs to break. The only people that

¹ These numbers are used only for example and to illustrate a point. They are not accurate.

have this authority are site owners and they can best exercise that authority by closing sites altogether. This is certainly not what we want.

1.5 What is a Flight Safety Program?

A flight safety program consists of a number of activities that aim at improving flight safety within a community of pilot. A flight safety program is developed and managed locally and is more effective if tailored specifically to the local community.

1.6 What are the Responsibilities of a Flight Safety Officer?

The primary responsibility of a flight safety officer is to develop, maintain and co-ordinate a flight safety program. This involves identifying the activities that are part of the program, finding volunteers and subject-matter experts to plan and lead those activities, and ensuring that those activities are promoted throughout the pilot community to maximize participation. Of course, a flight safety officer may want to organize and lead some of the activities himself, but that is not his primary responsibility.

A flight safety officer may also want to be involved with investigation and report of accidents. Local pilots are more likely to listen and learn from local accidents and incidents and abide with recommendations that result from these investigations because they can visualize better how it could happen to them.

Example. I once took a tow off a payout winch. After I reached 40 feet, I found myself overtaking the vehicle even though the driver was accelerating hard to increase separation between the vehicle and my glider. At that point, my glider was oscillating wildly and I was not climbing so I released and managed to land safely - barely. Upon investigation, we found that a segment of the towline was off the drum and jammed in the drum-driving belt so the drum could not pay out. Double-checking the towline on the drum before every tow is now part of the checklist and pilots who have witnessed my flight are especially sensitive to that inspection because they saw the incident and know it could easily have happened to them. It is just their good luck and my bad luck that it was my turn to tow.

1.7 What are the Qualities of an Effective Flight Safety Officer?

Before anything else, a flight safety officer must be an effective communicator. He must encourage dialogue but should not be perceived as preaching or directing as these approaches tend to turn people off. He should have a positive attitude and focus on the benefits of increased safety as opposed to the drawbacks of poor safety. He should be a good motivator as he must encourage pilots to participate in the safety program.

A flight safety officer must also be patient and realistic in his expectations as progress is inevitably slow. The fact is that most people pay lip attention to safety – until they get hurt in an accident. It is a trait of people that they learn from their own misfortunes² and not from other

² Some people do not seem to learn from their own misfortunes and will partake in the same dangerous behaviour that got them hurt in the first place. Pilots with this behaviour are unlikely to grow into old pilots unless they have unusual good luck.

people's misfortunes. Although most pilots believe that safety is important, they also believe that accidents will not happen to them. If they did, most would not be flying - that is called self-preservation.

Example. I know an ex-pilot who scared himself during a botched launch. The pilot truly believed that he was not in control for a moment and could have injured himself badly. He has never flown since because he believes that the incident will happen again and that he may get injured badly if it does. I also know an ex-pilot who injured himself many times before he finally decided to call it quit. He never learned from his accidents and always assumed that it was just bad luck and would not happen to him again. We, who were witnessed to his accidents, believe that the problem was that he was flying a high-performance glider that was beyond his abilities. That pilot also had an intermediate glider but, despite all our prompting, he insisted on flying his high-performance glider.

An effective safety officer must also have good planning and coordinating skills so he/she can develop and manage an effective safety program.

2 DESIGNING A FLIGHT SAFETY PROGRAM

2.1 General

Each flight safety program should be unique because it needs to be tailored for the local pilot community. A flight safety program should also be flexible so it continues to meet the need of the pilots if conditions change. For example, a club might decide to introduce a new type of towing. You may want to adjust your flight safety program to take that new activity into account.

2.2 Establishing the Needs for a Flight Safety Program

The first step in designing a flight safety program is to determine the need for your program. There are many activities that can be included in your program but it is unlikely that you can conduct them all. Consequently, you need to identify those activities that will be most beneficial to your local community. What are you trying to achieve? Are you trying to raise your member's general awareness of safety or are you trying to address specific areas that have been problematic in the past?

Example: If tree landings are common in your area, you may want to focus your safety program on activities that will lead to a reduction of tree landings (e.g. site improvements or better pilot decision making) and/or lead to fewer injuries resulting from tree landings (e.g. tree-climbing clinics, safety equipment clinic, etc.).

2.3 Selecting Activities

Conducting a risk analysis is very useful in identifying your priorities. Guidance on how to conduct a risk analysis is included in Section 5 – Risk Management. It is useful to involve your local members when you conduct a risk analysis because it is educational all in itself and your members are more likely to accept the benefits of, and partake in a flight safety program, if they have participated in identifying the need for the program in the first place.

Once you have conducted a risk analysis, you can then select the activities that will be most beneficial. You should try to select activities that address accident prevention, accident mitigation and accident response.

Section 3 – Flight Safety Activities discusses many of these activities and you can pick and choose from that list and add your own to it.

2.4 Scheduling Activities

It is important to schedule activities at the right time during the year to get maximum participation from your fellow pilots. There are not hard and fast rules about scheduling activities. Use common sense and listen to the feedback from participants and non-participants. A little experience should be enough to allow you to schedule activities at the most appropriate time.

The winter is a good time to conduct many seminars and similar activities because flying is not a distraction³. Some seminars, such as a seminar on how to select a cross-country landing field, are better held early in the flying season because pilots can immediately apply this knowledge. If this type of seminar is held too soon before the flying season, pilots may forget a lot of useful information.

Some activities such as site improvements are subject to weather conditions are usually held during the flying season. Site improvement activities should not be scheduled so they compete with flying or few people will show up. There will be many times when pilots will be sitting unproductively at launch or the LZ waiting for conditions to get good. With proper planning and motivation, this time can be used productively for site improvement. However, it is important to ensure that pilots are given the opportunity to fly when the conditions get good or they will not volunteer again.

2.5 Where to Conduct Activities

There is a right time to conduct an activity and there is a right place to do it. Theory-based seminars should be conducted in a quite comfortable classroom or similar location where students can focus on the topic at hand. Distraction must be avoided. Conducting such a seminar in an LZ is not going to be productive because there are too many distractions there especially if some pilots are flying. Do not let pilots convince you of doing so as you will not like the result.

Practical seminars should be conducted at an appropriate location where the pilots can practice the skills. For example, a knot seminar should be conducted where pilots can tie up knots as some skills are better learned through demonstration and practice than on the blackboard.

Of course, site improvement parties have to work at the site that needs to be improved.

2.6 Promoting your Flight Safety Program

Once you have developed your flight safety program, it is time to promote it. This is not as easy as it sounds because people tend not to pay attention to what does not interest them. Let's face it; many pilots consider safety to be a boring topic so you have your work cut out for you.

2.6.1 Articles in Local Newsletter or Email Lists

If your club has a local newsletter and/or Email list, take advantage of them. Newsletters are usually distributed to all members so everybody will have access to your material. Email lists are not as good as many pilots may not subscribe to them. If the club is not too big, you can e-mail your promotional material to each pilot individually.

2.6.2 Safety "Well-Done" Award

Recognition is a powerful incentive. An individual who has significantly contributed to a flight safety program or has prevented a serious accident that could have resulted in injury or damage

³ Scheduling seminars during the winter give your members an opportunity to meet during the off-season and give them plenty of time to correct real or potential deficiencies with their equipment.

should be properly recognized through a local “Well Done” or similar award or commendation. An award or commendation not only commends an individual but also promotes safety awareness as well as encourage the local pilots to participate in the local safety program.

To be truly effective, these awards or commendations should be given during club meetings or other club activities when most pilots are present. Visibility is key.

2.6.3 Catchy Safety Phrases

There are many catchy safety phrases that you should be using in your program. These phrases are easily recognizable and they help drive a message across. Some well-known catchy phrases include:

- If you think safety is too expensive, try an accident!
- There are old pilots and there are bold pilots but there are no old bold pilots.
- It is better to be on the ground wishing to be in the air than being in the air wishing to be on the ground.
- A superior pilot is one who stays out of trouble by using superior judgment to avoid situations that might require the use of superior skill.
- Skip today and fly tomorrow. Fly today and skip the summer.

Feel free to develop your own catchy phrases.

2.6.4 Posters

Posters are a useful part of an efficient safety program. Most people would prefer to look at a poster than read a leaflet and a well-designed poster can has an immediate and lasting effect.

TC has a number of flight safety posters available for a nominal cost. Although none of these posters relate specifically to HG or PG, many could be useful because our sports are not that different than other forms of aviation in many respects and the safety messages are the same. If you are operating out of an aerodrome that you share with other members of the flying community, then some of these posters can prove very valuable.

For maximum effectiveness, posters should be displayed in prominent locations such as launch, the LZ or a clubhouse.

3 FLIGHT SAFETY ACTIVITIES

3.1 General

This section provides information on various activities that can be included in your flight safety program. The list is not complete but it is representative. Note that this section is not intended to be an exhaustive treatise of each activity and you should recruit subject-matter experts to lead those activities. If there are no such experts locally, there is information available in the references or on the Internet.

3.2 Promote Self-Education

The majority of accidents are caused by poor pilot decisions and inadequate skills. Thus, it is logical that better educated and better-trained pilots will lead to fewer accidents. The onus clearly rests with pilots to educate themselves about the sport and to hone their skills. This is what I refer to as self-education. There are many pilots who will educate themselves without prompting. Others need some encouragement. Encouraging pilots to educate themselves about the sports is important because they will better understand the risks they are taking and, consequently, make better decisions.

Although pilots are responsible to self-educate, you can assist them in doing so in many ways. For example, you may want to compile a list of references. There are many good books about hang gliding and paragliding and they all contain material that is relevant to safety. The best safety-oriented book that I know of is “The Art of Skysailing – A Risk Management Manual for Hang Gliding” written by Michael Robertson. This book contains the Charts of Reliability and is an excellent source to identify and quantify risks. In my opinion, this is a must-read for every novice pilot and many more experienced pilots could benefit from it as well. Of course, there are many other books. For example, if the club practices towing, then the Towing Aloft book by Bill Bryden and Dennis Paggen should probably be included on that list.

Videos are an excellent source of information as well. There are excellent and entertaining videos that focus on safety-related topics such to react when paragliders enter extreme attitudes. This video complements an extreme manoeuvre clinic quite well and is the next best thing to one for those pilots unlucky enough not to have participated in such a clinic.

Because books can be expensive and cost is a deterrent to many people, building a local library of HG and PG material may be a useful undertaking. From my experience, there will be people who are willing to donate some material to get the library going. By committing a few tens of dollars every year, the club library will quickly grow to a respectable size. You can generate some of that money through borrower fees. Of course, the library should not focus solely on safety material but adding safety material to the mix may encourage pilots to look at it.

<p>Hint. If you create a library, make sure that you instigate a way of ensuring that pilots who borrow material will bring it back or your library will quickly become depleted. Borrowers have often the best of intentions but some are likely to suffer from a short memory and procrastination. I have lent some of my personal books to new pilots and did not bother to take down their names. I have lost two books that way.</p>
--

3.3 Seminars and Clinics

Safety-oriented seminars and clinics focusing on various topics are an excellent way to both promote and practice safety. The archetypical example of such an event is a parachute-packing clinic. Other examples include tree rescue clinics and such.

It is not your responsibility to organize and teach all clinics. There are subject matter experts within the flying community who have the knowledge, experience and interest to teach or facilitate these activities. The Safety Officer role should be to promote the need for these clinics and seek volunteers to plan and organize them. Be aware that some people like to organize events and other like to teach or direct events. Often, these people are not the same. It is only by combining the talents and interest of both types of people that you get successful activities.

Example. A local pilot may be a wizard with knots but may have no interest in the logistic and administration involved with organizing a clinic. Thus asking this individual to organize a clinic will not work. On the other hand, another member may be interested in organizing the clinic but not in teaching it. Have that member organize the clinic and the knot master will be more than happy to teach it. After all, that's what he really wants to do.

3.3.1 Parachute Packing Clinic

Most manufacturers and suppliers recommend that parachutes be repacked every six months. Yet, there are many pilots who fly with parachutes that have not been repacked for years because they do not know how to repack their chutes, do not know where they can get it repacked or they do not want to pay to have it repacked. Of course, there are many pilots who do not have those problems but procrastinate and never seem to get it done.

One way to encourage pilots to repack their chutes is to hold a parachute-packing clinic. Most clubs that do hold such clinics do so once a year usually in the winter or in the spring. This ensures that pilots commence the flying season with freshly packed parachutes.

A parachute-packing clinic also provides an opportunity to rehearse parachute drill. Pilots should be encouraged to perform this drill and be debriefed on their performance by their fellow pilots. The drill consists of:

- Pulling the parachute out of the harness;
- Throwing the parachute in clean air (preferably while being subject to wild motions to simulate a out-of-control glider);
- Pulling back the parachute and re-throwing it to simulate instances when the parachute did not deploy properly after the first throw;
- Collapsing the parachute or separating from the parachute in order to avoid being dragged on the ground in high wind situation.



© Ivan Budimir

It is preferable to book a gymnasium for the clinic as plenty of space is required to repack many parachutes simultaneously. The gymnasium should be booked for a few hours as it takes about an hour and a half to two hours for an inexperienced pilot to repack his chute.

You should try to invite a certified rigger or an experienced parachute packer present to answer pilot questions and repack pilot chutes on the spot for those pilots who do not feel comfortable doing it themselves. It is quite proper to allow those individuals to charge for repacking chutes.

Finally, a parachute-packing clinic can be used for some emergency drill since the pilots will be hanging in their harnesses. For example, a pilot could practice how to tie his leg loops in flight.

3.3.2 Extreme Manoeuvre Clinic

In my opinion, this is a must-have clinic for every paraglider pilot as paragliders have been known to enter extreme attitudes with little pilot input. The time to learn how to react to extreme attitudes is not after the paraglider misbehaves especially if it happens close to terrain but beforehand. The knowledge of having recovered successfully from such attitudes in a controlled environment will provide pilots with the confidence and ability to do it again when it happens for real. Another benefit of an extreme manoeuvre clinic is that it teaches pilots how to

recognize the signs that precede extreme attitudes and may help them avoid unintentional attitudes by making the correct preventive controls.

Unfortunately, such clinics are rare in Canada mostly because they are expensive to run, there are few instructors with the knowledge and experience to teach them properly, and sites where they can be conducted safely are few and far between.

Hint. A nice big lake (or other body of water) with a beach to take off or land from can make an excellent site if you have a payout winch mounted in a boat. Turbulence over the lake will be minimal allowing you to conduct flight throughout the day.

If there is a suitable site in your area and enough pilots express interest, then it may be possible to invite a qualified instructor to teach the clinic at your local site. The cost of bringing the instructor may be substantial, especially if the instructor must fly in, but the benefits may well be worth it.

Caution. If you organize an extreme manoeuvre clinic, collect deposits from the interested participants before you invite the instructor. The last thing you want is holding the bag after only half the pilots showed up as promised. Collecting in advance will ensure that you have the money you need and will also encourage pilots to show up since they have already paid for the clinic.

3.3.3 Tree Rescue Clinic

With the advent of paragliding, tree landings have multiplied in Canada. Some paraglider pilots even consider tree landing perfectly normal. I may not agree with this opinion but I have witnessed enough tree landings to know that they are not rare occurrences. Thus, most paraglider pilots can benefit from a clinic on tree rescue.

Example. I once landed on a tree myself. This incident was described in a past edition of the AIR magazine.

The clinic should cover how to land in a tree, how to get a pilot safely down from a tree and how to get equipment safely down from the tree.

Tree clinic should be hosted by individuals who have climbing experience. Getting up or down a tree is not flying, it is tree climbing. Thus, instructors need not be pilots. Many outdoors type companies can provide suitable instructors with the required experience.

Every tree climbing clinic should also discuss the emergency equipment that pilots should carry with them in case they land in a tree and how to use that equipment effectively.



© Ivan Budimir

3.3.4 Water Landing Clinic

Water landings are dangerous to say the least. Although water can cushion a crash, it introduces the problem of getting away from the glider before the glider sinks. Doing this and finding your way out of the water may provide significant challenges. If your local sites are located close to water, it may be a good idea to include such a clinic in your safety program.

Water-landing clinics can be dangerous if not planned and conducted properly. Those clinics put pilots in jeopardy and there is always a danger that a pilot will drown during the clinic. It is necessary to have experienced divers in the pool with a back-up air supply just in case a pilot needs assistance. Equally important is to ensure that a pilot can successfully request and use the emergency air supply under water before he attempts the water drill with a harness and glider. A practice session with divers acting as pilots should be held by the emergency divers beforehand so the divers can get familiar with the various scenarios they will have to deal with and be adequately prepared for them during the clinic itself.

Warning. A West Coast club who organized a water-landing clinic decided to discontinue the practice because it discovered that the clinic itself was dangerous even though divers were on hand to assist pilots. This clinic did prove that water landings are not trivial since pilots had difficulties getting away from their gliders in the controlled and benign environment of a swimming pool.

3.3.5 Equipment Inspection Seminars

Safe equipment is vital to safety. To ensure that equipment is safe, it must be inspected regularly as many materials deteriorate with time. Every manufacturer includes an inspection and part replacement schedule in their user manual. Yet, I do not know of a single pilot who actually

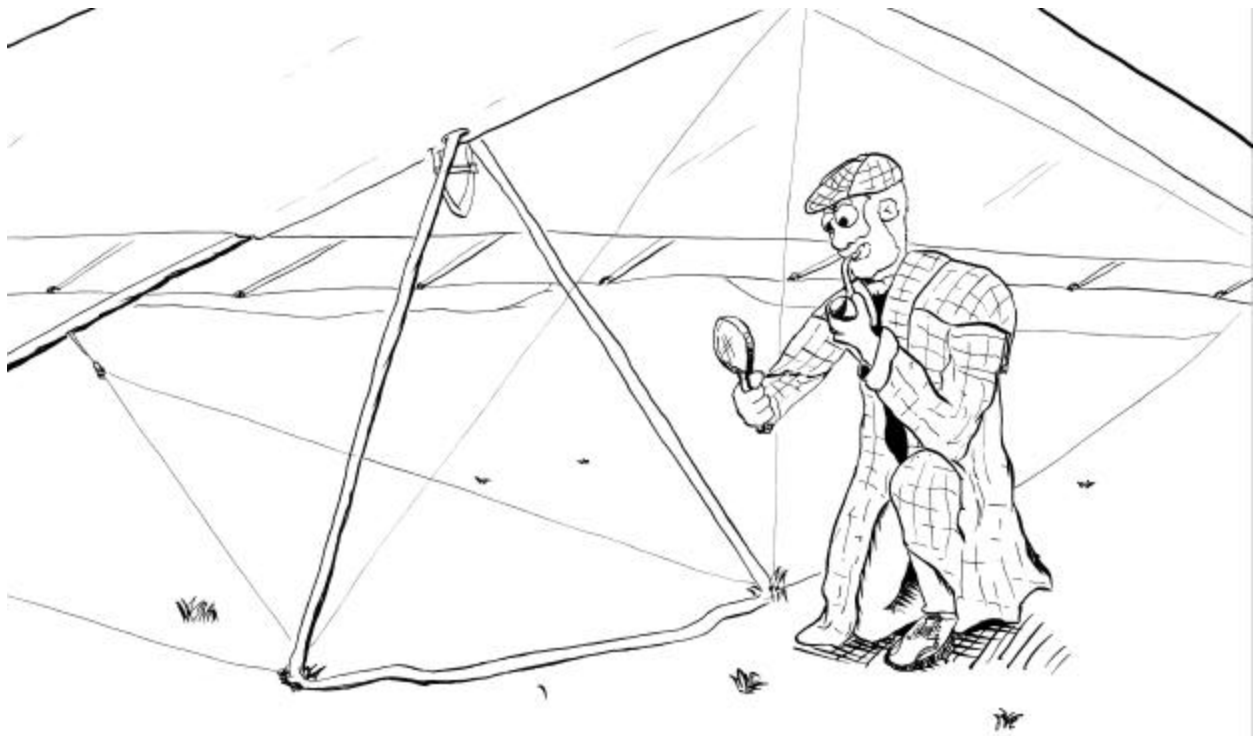
follows that inspection and part replacement schedule. Once in a while, we hear of a glider breaking up in the air or of one that could have fallen apart at any time.

Examples. I was recently shopping for a used hang glider. I looked at some gliders that were about 10 years old with upwards to 300 hours and I was flabbergasted to find that they were still flying with the original side wires. Some of these owners guaranteed me that they would not sell their gliders until the wires were replaced and that is certainly warranted. What I find difficult to fathom is that those owners actually cared more about the safety of the buyer (assuage potential guilt?) than their own.

There are a number of reasons why pilots do not inspect, or have their glider inspected regularly. Some of them are as follows:

- Many pilots do not have access to a dealer with the expertise to inspect their glider. Some are reluctant to pay for the service.
- Many pilots do not trust themselves with conducting the inspection themselves since, at least in the case of hang gliders, it involves disassembling the glider.
- Some pilots have no ready source of aviation hardware so they prefer not loosening nuts and such since, once loosened, these nuts should not be re-used.

What pilots may need to encourage them in conducting equipment inspection is a seminar. There are seminars about bicycle maintenance, small engine maintenance, car maintenance so why not about glider maintenance? A dealer or experience pilot who is familiar and comfortable with glider maintenance could be incited to offering such a seminar.



3.3.6 Others topics

There are many other topics that you can make part of your safety program. The real limit is your imagination.

One strategy that can prove useful is to organize seminars and clinics that do not deal directly with safety but contain a safety element. For example, a seminar on cross-country flying is likely to generate interest. That seminar can include safety-oriented material such as selecting a safe landing site, determining wind direction from aloft, etc.



© Ivan Budimir

3.3.7 Some Guidelines in conducting Seminars and Clinics

Safety talks are more effective if the presenter is well prepared and understands his subject matter well. Good talks just don't happen! They take work. If you work at giving top-notch talks, people will sense your commitment to them and do their best for you. Of course, this applies not only to you, but to all other people you recruit to lead activities. The following guidelines can help you and other volunteers prepare better activities.

The "Six P" plan is a simple and effective technique to help a presenter prepare a safety talk. The six Ps stand for: Prepare, Pinpoint, Personalize, Picture, Prescribe and Participate.

- Prepare. A good speaker should always be prepared.
- Pinpoint. This simply means that you should not try to cover too much material. Focus on the specific topics you are trying to cover and stick to them. Preferably, each lecture should

focus on one topic only such as a first aid hint, one unsafe practice, one main idea, etc. If you talk about everything, your listeners will remember nothing.

- Personalize. Establish a common ground with your audience. Get real interest and bring it close to home by making it meaningful to your listeners and by making it important to them. Relate to their attitudes, abilities and aspirations.
- Picture. It is important that you create crystal clear mental pictures for your listeners so they will “pay attention” to what you say, “understand” what you mean, and “remember” your message. If you do, you will make them use both their ears and their eyes. People pay attention, understand, and remember much better when they both hear and see.
- Prescribe. In choosing your talk, answer the question that your listeners always have in mind... so what? What does it mean to me? How is it going to help me? What do you want me to do? Always think of your listeners as having a question in mind and answer it for them. Tell them what you want them to do.
- Participate. Design your talk to encourage participation from the audience. A few well placed questions or group exercise can enliven your talk and help retention.

The “Six P” plan is one of many methods to help you develop a talk. There is plenty of literature on how to prepare good presentation. Feel free to do your own research and select the method that best suits you.

3.4 Awareness of Other Air Sports

If your club is sharing an aerodrome with other segments of aviation (ultralight aircraft, balloons, sailplanes, etc.), overall safety will be enhanced if pilots are more knowledgeable about those other sports. It is much easier to predict the reaction of a pilot if you know what that pilot is thinking or what his normal operating procedures are. Knowledgeable pilots from these communities will usually be more than happy to discuss their sports with your members as they benefit equally from this exchange of information and get a free opportunity to promote their sports.

Of course, you should reciprocate by offering HG and PG presentations to their members.

3.5 First-Aid Courses

It is highly recommended that every pilot take a first-aid course. Although these courses are mandatory for instructor and recommended for the intermediate and advanced ratings, any pilot can benefit from one. After all, would you not rather receive care from somebody who knows what he is doing if you were injured in an accident? Many flying sites are remote and medical evacuation can take a while. The care from fellow pilots can make all the difference between a benign injury and a serious injury or even death.

There are many sources of first-aid courses. The two main sources are St John ambulance and the Red Cross. Keep in mind that there are other suitable sources of first aid training that might be as good and less expensive.

- St John Ambulance at http://www.sja.ca/english/health_safety_training/index.asp
- Red Cross at <http://www.redcross.ca/english/firstaid/index.html>
- Toronto EMS at <http://www.city.toronto.on.ca/ems/>

If enough pilots are interested, it is often possible to arrange for a dedicated course that can focus on the types of injuries that are more prevalent with hang gliding and paragliding (wrist, forearms, shoulder, neck, legs, back, etc.) All courses have a curriculum that must be covered but practical exercises can focus on the topics of most interest and value to pilots.

There is plenty of useful first-aid information on the Internet. The Princeton University Outdoor Action site at <http://www.princeton.edu/~oa/resources/outother.html>. has many links under the title First-aid and Safety Information. You should not have too much problem finding others.

3.6 Site Improvement Work Parties

Site improvements can improve safety considerably. Putting together work parties of members is the preferred way of doing site improvements because the participants will be more respectful of your sites as they recognize how much work is required to maintain them.

There is no firm rule about the size of a work party except that their size should be commiserated with the amount of work to be done. Too many people doing too little work is not productive. Too few people and the work will not get done. Also, there is always the danger of having too many workers and not enough supervisors. What is even worse is having too many supervisors. Make sure that everybody understands who the supervisors are and make sure that they are people with some experience with the type of work that will be done.



© Ivan Budimir

It is important to make sure that the proper mix of tools is available. There is nothing worse than having a lot of willing workers milling around because they have no tools to work. Ensuring that each worker has the proper tools requires some ground work.

4 INCIDENT/ACCIDENT REPORTING AND INVESTIGATIONS

4.1 The Transportation Safety Board of Canada and the HPAC/ACVL

The Transportation Safety Board (TSB) of Canada is responsible for the investigation of accidents and incidents in Canada. By law, pilots must report all aircraft accidents to the TSB. However, the HPAC/ACVL entered an agreement with the TSB in the late 1980s under which hang glider and paraglider pilots could report accidents to the HPAC/ACVL instead, and the HPAC/ACVL would submit a yearly, consolidated report to the TSB. Thus, pilots have the option of reporting accidents to the HPAC/ACVL or to the TSB but they **HAVE TO** report accidents. It is not optional.

The TSB position is that it will not investigate HG or PG accidents. Once again, the HPAC/ACVL has entered an agreement with the TSB under which the TSB may agree to investigate a HG or PG accident involving a fatality if requested to do so by the HPAC/ACVL providing that the HPAC/ACVL provides technical expertise if requested.

Note. The TSB has no obligation or sufficient staff to investigate all aircraft (non HG and PG) accidents. They basically pick and choose which one they investigate. Commercial accidents are top on the list. The TSB may investigate HG and PG accidents if another type of aircraft is also involved. This includes collision between a HG/PG and another aircraft, aerotowing since an ultralight is involved, etc.

Of course, the HPAC/ACVL may want to conduct their own accident investigations since there are often practical lessons to be learned from them. Regional and local organizations may also want to conduct such investigations.

4.1.1 Definitions of an Accident and an Incident

The TSB actually defines occurrences that include accidents and incidents.

Accident. The TSB definition of an accident is as follows:

- An accident resulting directly from the operation of an aircraft, where:
 - A person sustains a serious injury or is killed as a result of
 - Being onboard the aircraft'
 - Coming into contact with any part of the aircraft or its contents, or
 - Being directly exposed to the jet blast or rotor downwash of the aircraft.
 - The aircraft sustains damage or failure that adversely affects the structural strength, performance or flight characteristics of the aircraft and that requires major repairs or replacement of any affected component part; or
 - The aircraft is missing or inaccessible.

Definition. A serious injury is defined as an injury, other than fatal, that:

- requires hospitalization or medical treatment at any time from injuries received;
- results in the fracture of any bones except simple fractures of fingers or toes;
- involves lacerations which cause severe haemorrhage, nerve, muscle or tendon damage;
- involves injury to any internal organ; or
- involves second or third-degree burns, or any burns affecting more than five percent of body surface.

Incident. The TSB definition of an incident only applies to aircraft with a maximum certificated takeoff weight greater than 5,700 kg. Since we are not aware of any HG or PG that falls under this definition, there is no obligation to report HG or PG incident to the TSB. However, the HPAC/ACVL and is interested in incidents since there are lessons that can be learned from them.

4.1.2 Flight Safety Officer Obligations

Flight safety officers have no legal obligations to report accidents or conduct accident investigations. It is a pilot responsibility to do so. However, a bit of prompting does not hurt.

4.2 Accident Reporting

The HPAC/ACVL maintains a form for incident and accident reports. This form can be found on the HPAC/ACVL web site. The form is intended to be forwarded by the pilots directly to the HPAC/ACVL office that forwards it to the HPAC/ACVL Safety Officer. The information in the form is treated confidentially.

Local clubs may want to create their own incident and accident reporting system since this information is very useful for risk identification and quantification. One easy procedure that could be implemented is to funnel all HPAC/ACVL accident reports from club members to the safety officer so that he can extract the pertinent information before forwarding the forms to the HPAC/ACVL. This way, the pilot only complete one form and both the local club and the HPAC/ACVL benefit from the information. Alternatively, local clubs may want to implement their own special-purpose forms.

Note that local clubs may want to widen the definition of accidents and incidents to suit their own needs. The local club may want to collect accident and incident reports associated, but not limited to flight, since its safety program will likely encompass more than flights. For example, a gust of wind that flips a parked glider over could be classified as an accident or incident by a local club.

4.3 Accident Investigations

The purpose of an accident (or incident) investigation is to determine the caused of an accident and recommend corrective actions to prevent similar accidents in the future.

Flight safety officers are under no obligations to conduct accident investigations. Nevertheless, the findings of accidents investigations may identify deficiencies that, if corrected, may lead to increased safety for local pilots. When it appears that this could be the case, you may want to

conduct accident investigations. Note that it is not necessary or practical for you to conduct the investigation yourself. Somebody else who is qualified can conduct the investigation instead.

Every accident is an indication that a fault in personal action or procedure or a defect in equipment, etc. has gone uncorrected. In spite of the efforts of everyone, there may still occur because of the failure to detect or recognize defects in the system, dangerous situations or behaviour. Careful investigations assist in identifying these problem areas and implementing corrective measures.

4.3.1 How to conduct an Accident Investigation

The degree of investigation should be based upon the potential for damage or extent of injury and the probability of recurrence, rather than the seriousness of the accident. This can normally be determined by an examination of the circumstances. It should be emphasized that to successfully determine causes and contributing factors, investigations must be directed toward fact finding, not fault finding.

Investigation entails a search for unknowns. All factors must be uncovered and evaluated to correctly determine what happened and why it happened. It need not be complicated. The investigator should have the following qualifications and exercise the following principles to achieve the desired results:

- Be familiar with the equipment, its operation and the procedures involved;
- Understand the types of conditions or situation likely to produce accidents;
- Collect the facts, weigh the value of each and reach conclusions based on the evidence;
- Explore all factors, however remote;
- Consider unsafe conditions as well as personnel actions/inactions; and
- Recommend effective corrective measures.

In general, the investigator should:

- Visit the incident/accident scene;
- Conduct interviews;
- Gather and record evidence;
- Evaluate the evidence and draw conclusions; and
- Make recommendations.

It is important that investigators go to the scene of an accident as soon as possible in order to familiarize themselves with the circumstances. Conditions can change quickly and witness viewpoints can be altered with the passage of time.

Whenever possible, witnesses should be interviewed as soon as possible while events are still clear in their minds. The person(s) directly involved, including the victim if practical, should be interviewed first. The interviewer should observe the following:

- Put the person at ease. Do not appear condescending or officious, but remind the witness of the constructive purpose of the investigation. Reassure the witness that your main purpose is

to find and eliminate the causes of the accident in order to prevent a recurrence. Make sure the person understands that your intention is not to apportion blame for the cause of the accident;

- Interview at the location of the accident if possible. This allows both the interviewer and the witness to more accurately relate circumstances and details involved.
- Interview the witnesses separately so that the statement of one will not be coloured by overhearing the statement of another.
- Ask the witness to relate his or her account of the accident. Listen closely and carefully and do not interrupt at this time. This gives the witness an opportunity to formulate the story in his or her own mind, and gives you a preview of what they know. Do not take notes or record interview at this point; it tends to distract the witness.
- Have the witness tell the story again. Ask questions to fill the obvious gaps. This time, take notes, but not in a secretive manner. Simply write them down in such a manner that the witness is able to read what you are writing. Ask further specific questions if required. Avoid questions that lead the witness or imply answers. Rather than asking "Was the wind gusting?" ask "How was the wind?"
- Encourage the witness to give all information regardless of how obvious it may be or how insignificant it may seem.
- Ask the witness for suggestions as to how the accident could have been avoided.
- As you interview witnesses, ensure that you do not fall into any of these traps:
 - Believing carelessness is a cause of accidents
 - Assuming conflicting evidence indicates falsehood
 - Conducting interviews as if in a courtroom
 - Asking for a signed statement from the witness
 - Looking for only one basic cause
 - Forgetting about the feelings of others.

Accidents seldom have a single cause. The most apparent and evident cause may not be the real cause – they may be symptoms.

5 RISK MANAGEMENT

5.1 Purpose of Risk Management

Risk management is the systematic process of identifying, analyzing and responding to risks. It includes maximizing the probability and impacts of positive events and minimizing the probability and impacts of adverse events. Risk includes both threats to flight safety, and opportunities to improve on safety. Known risks are those that have been identified and analyzed. Unknown risks, by their nature, cannot be managed.

A risk is an uncertain event or condition that, if it occurs, has a positive or negative effect on flight safety. A risk has a cause, a probability of occurrence and, if it occurs, an impact.

Example. Here are examples of risks with negative and positive impacts.

Negative impact. If a hang glider tumbles and falls apart and the reserve parachute is too small, the pilot may be injured by hitting the ground with too high a velocity.

Positive impact. If the landowner removes the fence between two fields, the LZ size will increase significantly and there will be fewer accidents because pilots will be less likely to undershoot or overshoot the LZ.

5.2 Risk Identification

5.2.1 What is risk identification?

As its name imply, risk identification deal with the identification of risks. There can be a seemingly infinite number of risks and the idea is not to identify them all; that would be pointless because you would be incapable of dealing with all of them anyway. When conducting risk identification, you are trying to capture the most obvious risks. When doing so, think about facilities, equipment, processes (eg. going through a check lists), pilot skills, etc.

5.2.2 Tool and techniques for Risk Identification

Brainstorming sessions between local pilots is the best method to identify and quantify risk. This is a case where many minds are better than one as different pilots will have different perspectives and ideas on what the risks are.

This is not to say that one individual cannot identify and quantify risk. However, one individual is more likely to miss some risks or mis-quantify them. Furthermore, brainstorming sessions are also valuable because it involves the pilots and they are much more likely to buy into the safety program if they participate actively in risk identification. After all, the whole purpose of the safety program is to address the risks.

Brainstorming sessions should be held regularly, maybe once or twice a year as risk can change with time. The local safety officer should facilitate these brainstorming sessions.

5.3 Risk Quantification

All risks have a probability of occurrence and an impact if they occur. The purpose of risk quantification is to assign a probability and an impact to the risks that have been identified. Quantifying risks makes it easy to prioritize them so they can be addressed in an effective and efficient manner.

5.3.1 Risk Probability.

Many schemes can be developed to assign a probability to a risk. There are few advantages for developing a complex scheme. Usually, it is sufficient to sub-divide risk into high, medium, and low probability. The definition of each level of probability could be as follows⁴:

- a. **High.** There is a high probability that the risk will occur. Numerically, this translates to a probability of 15%+ that the risk will occur;
- b. **Medium.** There is reasonable probability that the risk will occur. Numerically, this translates to a probability between 6% and 14% that the risk will occur; and
- c. **Low.** There is a low probability that the risk will occur. Numerically, this translates to a probability of less than 5% that the risk will occur.

Example. The risk that a pilot lands in the trees after a botch launch could be medium or high depending on the site while the risk that a pilot tumbles in a hang glider could be low. Generally, there should be sufficient data about events at the club to be able to quantify some of the most important risks. Accident and incident reports can provide the data necessary to make this estimation.

5.3.2 Risk Impact

The impact of a risk is based on its effect if it were to occur. As for the probability, many different schemes can be developed to quantify the impact of a risk. Once again, a simple impact scale of high, medium and low should be sufficient.

The more difficult question is what is the impact measured against? In the case of flight safety, this is measured primarily against the injury to individuals and damage to equipment. Table 2 proposes simple definitions for injury and damage. Those definitions are not cast in stone and could be adapted locally. For example, the impact could take into account the possibility that a landowner would withdraw access to a site if there were too many accidents even if these accidents did not lead to injuries.

⁴ This is a guideline only and the scheme should be adapted locally. Note that a high risk of 15% or more is actually on the high side since it means that the risk occurs every six events. That points to dangerous practices.

	Low	Medium	High
Injury	Minor injuries excluding broken bones and internal damages.	Broken bones and minor internal damages that do not require an extended hospitalization.	Major injuries requiring a prolonged hospitalization and lengthy recovery.
Damage to Equipment	Small damage, easily repairable.	Significant damage requiring significant effort (and \$?) to repair.	Extreme damage. Not repairable.

Table 2 – Possible Impact Definitions

5.3.3 Risk Prioritization

Once risks have been quantified based on probability and impact, they should be prioritized. There are two main reasons why risks are prioritized. The first one is to do a preliminary filtering of the risks. At this point, it should be obvious that there could be tens of risks. Trying to deal with them all is overwhelming. By filtering the significant risks from the trivial ones, the number of risks that need to be dealt with at first can be paired down to a reasonable number. The second reason for prioritizing risks is to determine which risks should be addressed first based on the resources available.

Once risks have been quantified, they can easily be prioritized. Figure 2 is a simple table that is commonly used for that purpose. The table shows the probability of a risk on the horizontal axis and the impact of a risk on the vertical axis. Each risk is placed in the table based on its probability and its impact. The risks in the high-probability, high-impact red quadrant i.e. risks F and D are the risks that would usually be assigned the highest priority. The risk in the orange quadrants would normally be tackled next.

It is often useful to assign a high priority to a risk that does not fall in the high-probability/high-impact quadrant if it is easy to address it. For example, adding an extra item on a checklist is easy to do and may be all that is required to address a risk.

		Probability		
		Low	Medium	High
Impact	Low	P Q G	O	C
	Medium	A N I	H R	J M
	High	E	K L B	F D

Table 2 – Risk Prioritization

5.4 Risk Response

Once risks are identified, they have to be dealt with. There are three options; risks can be avoided, mitigated or accepted.

5.4.1 Risk Avoidance

Risks can be avoided by taking some action that eliminates the risk or the conditions that lead to the risk. For example, the risk of getting a paraglider blown back into a tree can be avoided by cutting down the tree. The risk of tripping over a rock can be avoided by removing the rock.

5.4.2 Risk Mitigation

Not all risks can be avoided entirely. Pilots can mitigate many risks by taking actions that reduce the probability of occurrence and/or impact of those risks. This is the most common risk response and it can be very effective if the right measures are taken.

Example. The risk that pilot take off without hooking in or putting on their leg loops can be mitigated by following a pre-flight check. The risk will not be eliminated altogether because pilots may forget to conduct pre-flight checks or forget steps in the pre-flight check. However, the risk will be reduced because most instances should be corrected before pilots take off.

Risk mitigation can usually be achieved in many ways, some better than others. In addition, there can be multiple mitigations to address a single risk. Most of those mitigation measures are already known and have been captured in various publications.

Pilots should be involved when choosing risk mitigation measures especially if they are needed to implement these measures. For example, a mitigation measure may involve making

improvement to a launch site. Since pilots are likely going to do the work, it is preferable that they contribute in identifying the work required so they can feel it is reasonable.

5.4.3 Risk Acceptance

Some risks cannot be mitigated or avoided. These risks must be accepted. When that occurs, measures should be planned to deal with the impact of the risks should they occur.

Example. A club may have a single launch with a runway full of jagged, protruding rocks and the landowner may have forbidden the club to make any improvement to the launch. There is a risk that a pilot could trip during his take-off run resulting in a crash that could propel a pilot and his glider over a cliff (high impact for injury and damage). Avoiding the risk would require the club to cease using their only launch. Since the landowner does not allow any site improvement, there is no risk mitigation possible. Thus, the club has no choice but to accept the risk or cease flying altogether. What they can do is pre-position a first-aid kit and rescue equipment at launch to react quicker to accidents should they occur.