SAFE PRO HG
A Hang Gliding Safety and Training Program*

by Stein Arne Fossum - Raymond Caux - Dennis Pagen

Hang gliding developed very rapidly in the early years with new barriers broken nearly every day. It has developed into a mature activity comparable to any form of aviation in it's complexity and requirement for training and attention to safety. While most pilots seek to progress to more efficient gliders and more challenges (thermal and cross country flying), we must not forget that humans need time to perform new tasks in a safe manner. Most often, guided training takes place in the early stages while more advanced skills are learned more haphazardly.

Looking at the levels of flying already reached (limited to foot launch, no power) through the course of the history of hang gliding, we see 6 distinct stages. The following program keeps the safepro* philosophy, putting these stages together in a training system.

6 stages of hang gliding

1 **Ground Skimming** (Not flying higher than you would care to fall)
2 **Altitude Gliding** (Altitude and space to do manoeuvres, no soaring)
3 **Basic Soaring** (Soaring in non-turbulent conditions)
4 **Advanced Soaring** (Soaring in turbulent conditions)
5 **Cross Country** (Flying away from the local site)
6 **Competition** (Flying in heavy traffic)

Each stage is followed by a more complex one (a building block system) requiring new knowledge and skills. It is a natural "ladder", where a student should climb to progress safely in his hang gliding career. There are other steps, such as changing to another harness, or learning to fly a new site or a new glider.

Among additional stages are Aerobatics. They are considered as unsafe for the general pilots. They should therefore only be performed by specialists using a strict expert program, until safe methods are found to make them available to everyone.

To be very clear, there is no reason today to try to learn alone. All the previous experience would be useless and the chance of accidents very high. Some accidents were unavoidable because of the pioneering nature of the sport (Lilienthal was the first one), while others could have been avoided simply by proper training.

Analysing why most accidents caused by "pilot error" happen, one finds that either the pilot tries to perform a task or meet a condition he is not able to master, or he simply does something that should not be done. Seeing the hang glider plus its equipment like an aircraft as a whole can also help against classical errors like forgetting to hook in.

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* Note: This text was originally written by Stein Arne Fossum in the SAFE PRO system in 1980-1982, completed by Raymond Caux and Dennis Pagen in 2013 to suit different methods of instruction (slope, towing) and competition.

Today we have enough knowledge to avoid most of such accidents, either collected by the hang gliding community itself or available through other air sports. We know how a task should be performed correctly or what the limitations not to exceed are (any motor or glider pilot knows cloud flying is dangerous, and it is hence unnecessary to rediscover it).

Accidents are also most likely to happen when the pilot takes the step up to a higher stage. A training system should be designed to smooth out these steps with a natural progression to higher pilot ability. These steps are filled with instruction.

Pilot's Ability in hang gliding: It can be broken down to **4 Qualities**:

- **Skills**
- **Knowledge**
- **Experience**
- **Judgement**

Skills are the techniques of control in all the flying situations - taking off, turning, landing. These techniques are mainly acquired through practice and repetition with corrections being added by the instructor. **Knowledge** and **Experience** are only "tools" used to improve a pilot's **Ability**. They are however of good value in the learning process and as such can hardly be overestimated. **Judgement** is the the decision making required to remain within safe limits. Many decisions must be made before and during flight that bear on the ultimate safety and enjoyment of flight. Judgement is developed through constant feedback from the instructor and applying the knowledge and experience to the real and varied flying situations.

In the end, all the combined skills, knowledge, experience and judgement result in good **Airmanship**. This is the total awareness and ability to fly an aircraft safely through all the demands of terrain, conditions, air traffic and changing environment that a pilot encounters in flight. Good airmanship results in repeatable safe and enjoyable flights. Poor airmanship leads to accidents. It is the instructor’s duty to leave a student with good airmanship ability for the level of the particular course, but more importantly to leave the student with an understanding and attitude that continues to foster good airmanship as the pilot continues to develop.

For instance, **Airmanship** is expressed by the pilot having:
– either a **Student Licence**, when he lacks the necessary airmanship. As such he is under a training system, controlled by an instructor and all his flying shall be in accordance with the instructor's guidelines;
– or a **Pilot Licence**, showing he is mature enough to take care of his own flying, seeking further instruction when needed. He does not "know it all", but merely can take care of himself at his current stage. When he wants to progress to a higher stage, he seeks instruction before going out on his own flying.

Skills can best measure a pilot's ability, since hang gliding is a practical activity. It means his way of performing manoeuvres, links of manoeuvres, tasks, and how he masters flying conditions and new situations.

Based on the above statements, the training system proposed here is built as a natural progression, mainly developing and measuring the pilot's **Skills**, although the ultimate goal is to foster good airmanship.

Colour Codes: The stages are colour coded from yellow to brown for easy identification. The student can wear visible markings that identify him and his stage. Apart from being a good site control system, it gives the students and pilots insight in what they are up to.

Note: A "black" or Master grade may be considered as the top level. This grade should express the ultimate in Skills, Knowledge, Experience and Judgement.

SAFE PRO HG, general description

Objective: The program aids and assists the participants to progress safely and become true airmen. They must be able to enjoy the beauty and freedom of the sport, without risking injury or restrictions due to their own and others' lack of ability. The students need time to develop until they can operate alone within the objective above. This is developed most efficiently, enjoyably and safely through a motivating program. The students' operational freedom is expanded gradually, without jeopardizing safety, by breaking down the learning process into easily identifiable blocks attainable by most people.

Program: It consists of 6 natural stages, from the easy to the more difficult, from low to high, from basic to advanced, being careful not to leave any gap on the way. It also divides the participants into students and pilots, indicating whether they are autonomous or not. All previous stages will be reminded in the beginning of a new stage, for each chapter.

1	Ground skimming	Yellow	Student
2	Altitude gliding	Orange	Student
3	Ridge soaring	Green	Pilot (once stage 3 completed)
4	Thermal soaring	Blue	Pilot
5	Cross country	Brown	Pilot
6	Competition	Black	Pilot

Participants

Student: He is under training, and is considered to have limited ability to take care of his own and other people's safety. He is not yet able to evaluate all safety elements, make sound decisions and act accordingly without the supervision of an instructor.

Pilot: He can take care of his own and other people's safety within applicable rules, regulations and code of good practice. He can evaluate all safety elements, make safe and sound decisions and act accordingly on his own, or obtain further instruction, information and assistance at his own discretion.

Recommended limitations

Students shall always fly under supervision of an instructor, and before all ratings are reached, under direct supervision of an instructor. They shall use only hang gliders and harnesses suitable for them and on which they have been checked out by an instructor. Tuning and repairs shall be made only when approved by an instructor.

Pilots are expected to be familiar with and to follow all applicable national aeronautical regulations and local flying site rules. They shall not participate in demonstration, competition or other organised flying requiring higher standards than they are rated for.

Minimum age: The minimum recommended age is 14 years old, with a written permission of parent or guardian and a medical agreement* below 18 years.

SAFE PRO HG, stage elements

Skills

Students stages 1 to 3 shall be given the necessary instruction in each practical skill, once the basic theory, aim, normal procedure, mistakes, dangers and their corrections, and safety aspects are known. Each skill shall be practiced until the instructor is convinced it is mastered. The skills may be signed off progressively as the criteria are met, hence a special flight test may not be necessary.

Pilots stages 4 to 6 may at their own discretion, within acceptable safe methods, acquire the necessary instruction for each skill. Before they are signed off, they shall be demonstrated to an instructor, who shall be convinced they are mastered.

Knowledge

Students stages 1 to 3 shall be given the lectures, briefings, discussions and written tests to ensure the knowledge required at the current stage is acquired. The requirements should not restrict from giving more instruction, the pedagogy being left to the instructor. However one must not forget that especially beginners have limited capacity to "absorb" many advices, which should then be limited to those necessary for the very proposed task.

Pilots stages 4 to 6 may at their own discretion acquire the required knowledge, either attending lectures, briefings or through oral discussions and group or personal study.

Before a student or a pilot is signed off at an applicable stage, the instructor or observer must be convinced that he meets the required standard of knowledge. Before a completed stage 3, the student shall pass a written test on air law, applicable regulations and code of good practice, ensuring he has the necessary knowledge to operate alone, safely and correctly at sites and in the air.

Experience

Experience shall ensure that the knowledge, skills and airmanship have been practiced a minimum of times in various situations. Exercise, drill and practice are important to meet the objective of all true learning, which is to effect behavioral changes.

The experience requirements shall be documented by a logbook or reliable witnesses. The instructor or observer shall be convinced that the minimum requirements are met.

Judgement

The instructor or observer shall be convinced the student or pilot has the ability to make safe decisions and take care of his own and others' safety at the applicable stage, within applicable rules, regulations, recommended safety limitations and code of good practice.

* Note: based on minimum requirements (1,50 m / 4.90 ft, 45 kg / 99 lbs, no spine problem)

SAFE PRO HG STAGE 1, GROUND SKIMMING (YELLOW)

Ground skimming is gliding near the ground over smooth terrain, normally below 5 meters.

Instructional and safety recommendations

Objective: This stage introduces the student to hang gliding and enables him to discover the first feelings of flying within safe limits, as well as it prepares him for the next stage.

This stage is probably the most important in the whole progression, since here is founded the basis for good (or bad) decisions and habits. The student shall, in safe proximity to the ground, fly easy equipment in easy terrain and conditions, to gain confidence in flying, the equipment, also himself, and practice and learn the basic skills.

Methods: Teaching has traditionally been on training slopes. However, flying close to the ground asks for a precise control with little time to react and makes hang gliding one of the most demanding airsports. To start with the easiest practice (controlling a straight flying line before learning to take off and land), alternate methods are available now, like static flying (on a driven platform or in the wind, with assistants or links holding the glider in a defined volume), winch towing with low tensions close to the ground, or aerotowing with a complete method including tandem first flights and an adapted release system. Only a couple of minutes of in-flight control, or even just displaying a film from an onboard camera can dramatically ease the student's first steps.

Proper environment: It is smooth terrain, preferably snow, sand, grass or gravel, with a profile that allows for ground skimming with the hang glider in use. The take-off and landing areas and the space between should be free of obstacles and other hazards with a good margin to any side. It should be possible to do the whole flight in close to a straight line.

It is warned against attempts to take off and fly in unstable conditions, cross, down, strong or gusty wind. The student shall not practice slow flight and stalls (except for the landings) or more than gentle turns with only small diversions form the flight path.
To try to work any type of lift can be especially dangerous. The reason is the closeness to ground gives little time or altitude for corrections. He shall also avoid flying alone.

When all rating requirements have been met, the student shall, when flying without direct supervision of the instructor, only fly in beginner environment in stable conditions with light and smooth headwinds.

Before progressing to the next stage, it is of vital importance that the student know the basic theory and master all skills, since weaknesses here may lead to the most serious consequences when he gets higher and flies in more difficult conditions. It is especially important that he demonstrate correct procedures, routines and checks in his preparation before flight, to ensure nothing is forgotten, overseen, wrongly assembled or adjusted. Equipment failures, malfunctions or failures to hook in are best avoided by developing proper habits from the very beginning. He must be competent in good take-off techniques, speed and directional control, and landings. He should begin to understand the judgement required to choose safe flying conditions for his skills level.

SAFE PRO HG Stage 1, Skills requirements

1 **Transport, care**: Of hang glider and equipment.
2 **Equipment routines**: assembly (as much as equipment allows it, hook in harness before putting it on), adjustment, preflight checks, disassembly (as much as equipment allows it, remove harness before unhooking it).
3 **Ground handling**: Carrying, moving and parking hang glider.
4 **Final check**: Connection, conditions, visualising run or flight, glider attitude, clear area.
5 **Running, stopping a run**: On flat ground and in slope, using glider as a brake.
6 **Take-off**: Sight forward, smooth acceleration, feeling glider lift-off.
7 **Flight control**: Correct airspeed and directional control, smooth corrections.
8 **Landing**: Directly into wind, sight forward, using glider as a brake.

SAFE PRO HG Stage 1, Knowledge requirements

Human

1 **Physical factors**: Fitness and exhaustion, hydration, food, skin and eye protection, alcohol and drugs.
2 **Psychological factors**: Interest, motivation, fear of height, vertigo.

Aircraft

1 **Terminology**: Material and parts.
2 **Safe equipment**: Helmet, boots, gloves, clothing, wheels, nose skid.

Aerodynamics

1 **Nature of flying**: Always dependent on continuous forward airspeed.
2 **Driving forces**
  a **On the ground**: By running.
  b **In the air**: Weight (gravity).
3 **Lift**: Axes, difference in pressure from profile, airspeed, angle of attack.
4 **Airspeed, groundspeed**: Why take off and land into the wind.
5 **Control movements**: Weight shift, banking, turning, airspeed control.

Meteorology

1 **Wind**: Wind meters, natural indicators and signs.
  a **Velocity**: m/s, km/h, knots or mph.
  b **Direction**: Compass and quadrant (head or up, tail or down, crosswind).
  c **Force**: Increases with the square of the wind velocity, effects, dangers.
2 **Conditions**: Recognition of safe and dangerous conditions.
3 **Turbulence, gusts**
  a **Mechanical**: Behind or lee of obstructions, trees, buildings, hills.
  b **Thermal**: Tends to build as the day progresses until late afternoon.

Rules