THE SOARING SAFETY FOUNDATION

The Soaring Safety Foundation (SSF) was founded in 1986 for the purpose of promoting soaring safety through pilot education, program development, information dissemination, and participation in areas of general aviation safety pertinent to soaring. The stated goals of the SSF are to reduce the accident rate in soaring and to make soaring as safe as a sport can be.

The scope of the SSF includes all activities of the Soaring Society of America relating to the subjects of flight training and safety. The SSF is responsible for the development and maintenance of the ABC Training Program, appointment of SSA Instructors, review of manuals, development of procedures, accomplishment of specific programs, data compilation and review, and dissemination of information relating to flight training and the promotion of soaring safety.

One of the most important functions of the SSF is the dissemination of safety information to the soaring community. To meet this responsibility, the SSF obtains accident data from the National Transportation Safety Board and the Federal Aviation Administration and distributes that information through various mediums including Sailplane Safety and the SSF Web Page. Information of a time critical nature may be disseminated through the issuance of a *Safety Alert* to inform pilots of potential aircraft or operational safety issues.

Funding for the SSF is obtained through donations from individuals and organizations interested in the promotion of soaring safety. These funds are then used to develop and promote programs such as soaring safety seminars, flight instructor refresher clinics, posters, safety-related articles in *Soaring* Magazine, the SSF Web Page, and the newsletter of the SSF, *Sailplane Safety*.

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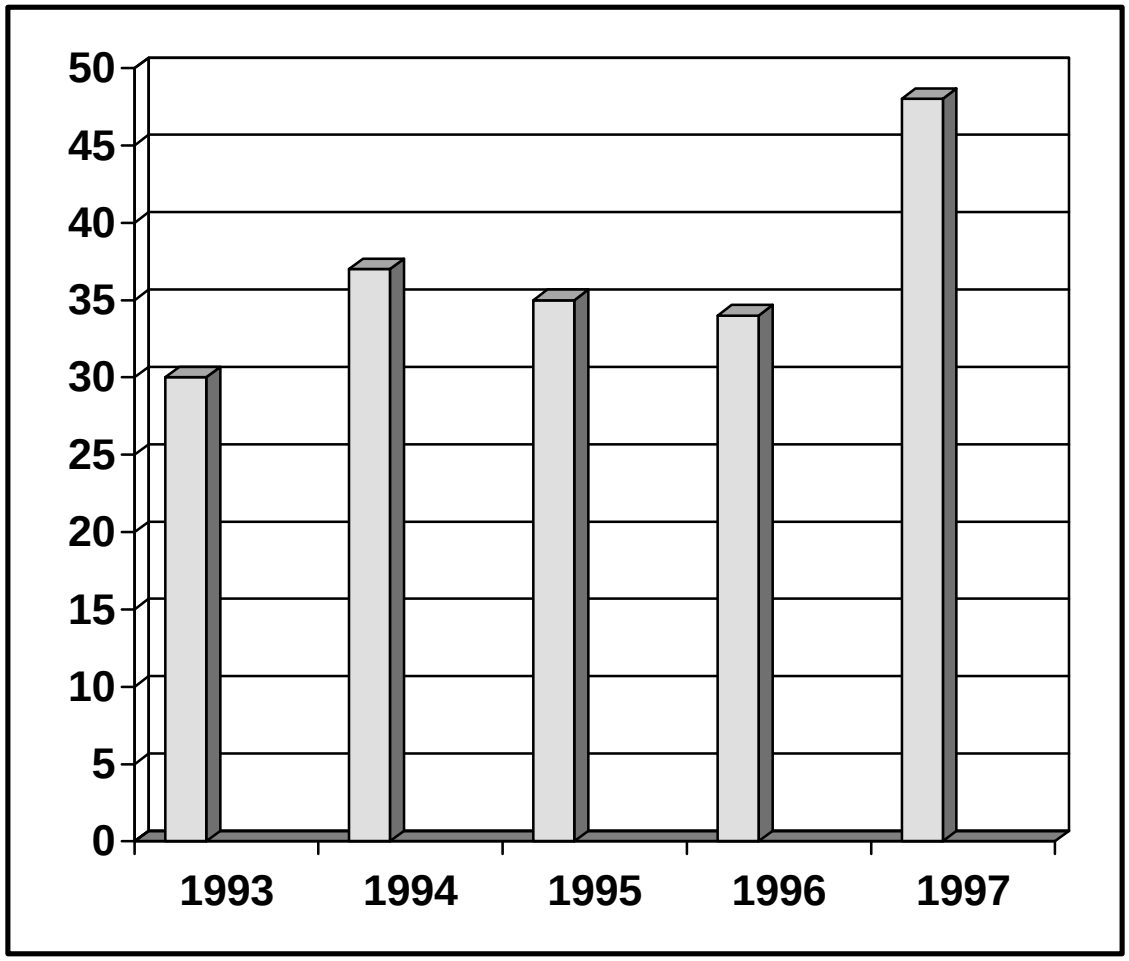
1997 ACCIDENT SUMMARY

NUMBER OF ACCIDENTS

For the twelve month period ending December 31, 1997, 48 glider accidents meeting the reporting requirements of Part 830 of the Code of Federal Regulations were reported to the NTSB. This represents an increase of 41% over the 34 accidents reported for 1996.



SOARING ACCIDENTS

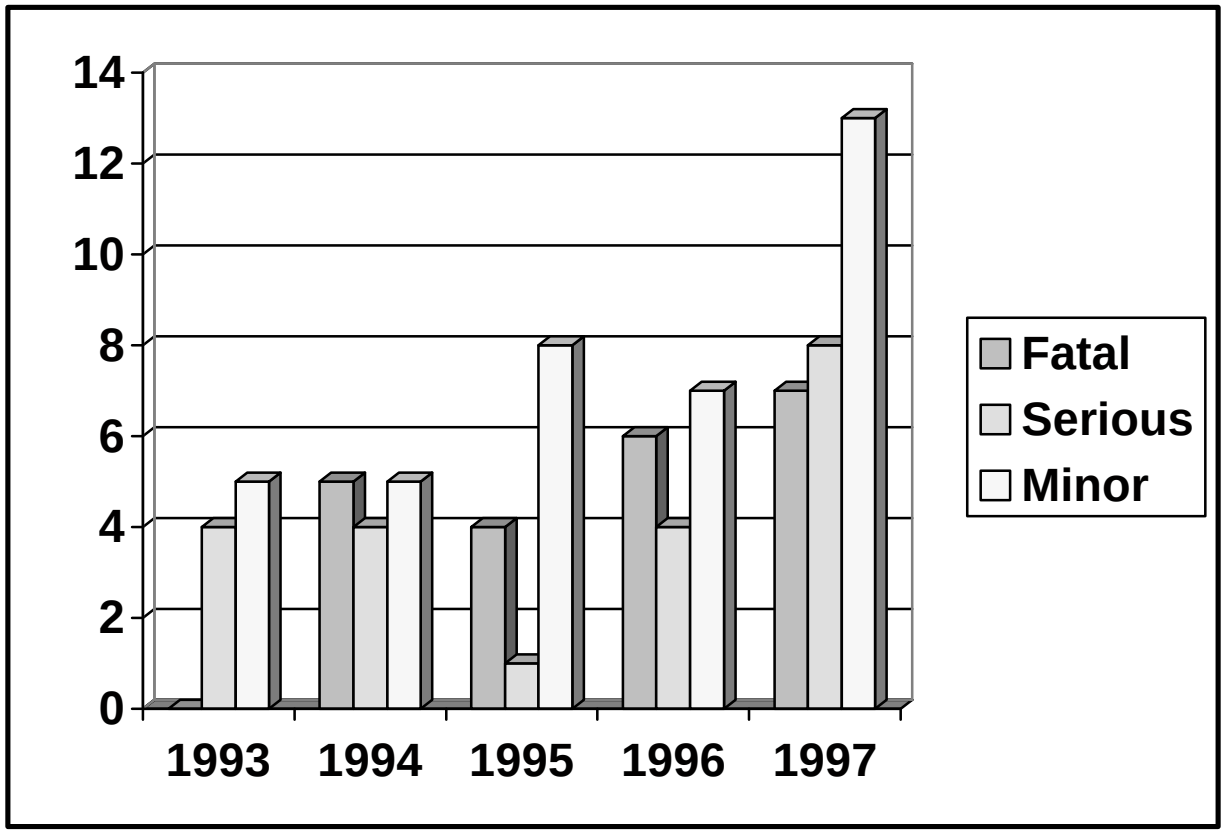
1993 - 1997

Although the number of reported glider accidents appears to have increased dramatically in 1997, it is important to consider two factors that may influence this data. First, the SSF has recently obtained access to additional sources of information that have greatly increased our ability to identify and track glider accident data. As recently as two years ago, much of this information was not readily available to the general aviation community. Access to this information allows the SSF to more accurately determine the number of accidents each year and, consequently, increase our ability to identify emerging safety trends. A second variable that must be considered is the number of glider operations conducted each year. With the large number of individual glider operations throughout the country, it is very difficult to obtain accurate data relating to the total number of yearly operations. Consequently, the SSF must make an estimate of glider activity each year based on numbers received from various sources that include commercial operations, operational data obtained from the FAA, and other indicators of overall general aviation activity.

While the SSF attempts to be as accurate as possible in determining the level of soaring activity each year, it is important to point out that this is an *estimate.* Although the number of accidents for 1997 did increase, it is important to view this statistic in relation to the number of operations conducted during the same period. At this time, the SSF does not yet have an accurate accounting of the level of activity for 1997. It is important to stress, however, that it is the position of the SSF that even one glider accident is excessive. The Trustees of the SSF are committed to devoting every resource available to the prevention of glider accidents.

FATALITIES

Not only did the 1997 soaring year end with an increase in the number of reported glider accidents, but in the number of fatalities and serious injuries to pilots and to other occupants of the aircraft as well.



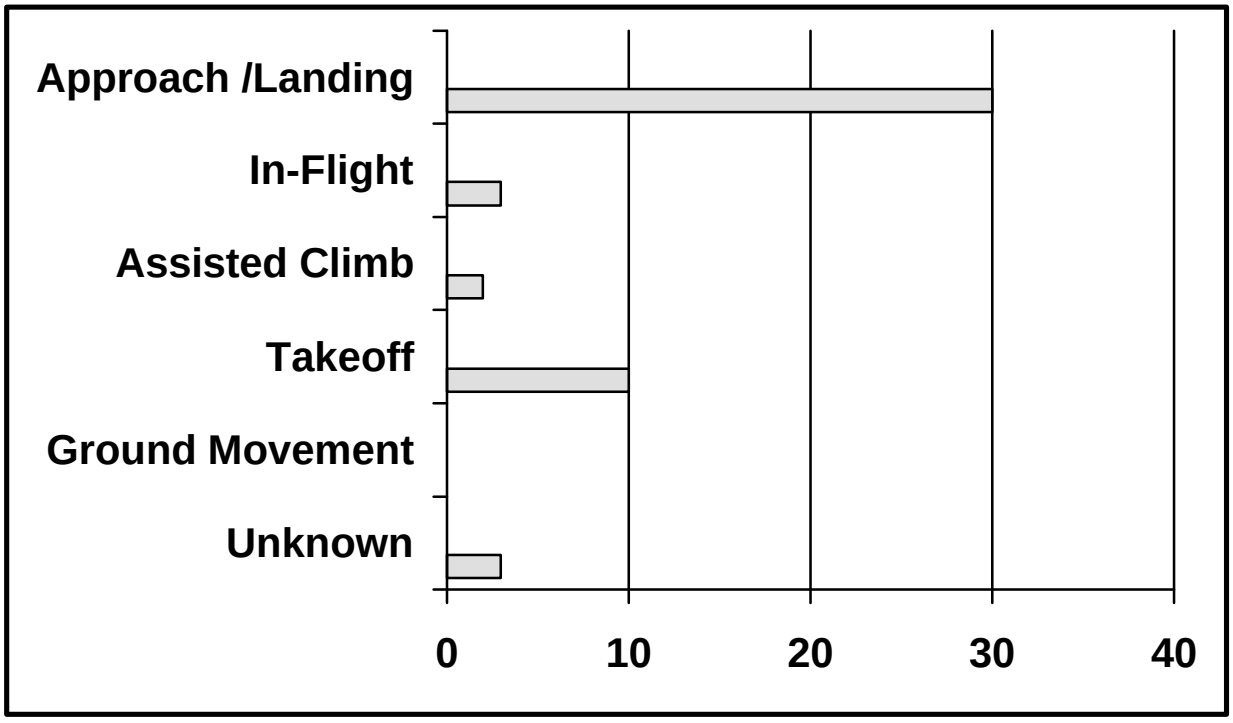
INJURIES TO OCCUPANTS

1993 – 1997

Seven pilots were fatally injured as a result of glider accidents in 1997. This represents an increase of 17% over the six reported fatalities in 1996. For the five-year period 1993 – 1996, 22 pilots were fatally injured in glider accidents, resulting in an average of 4.4 fatalities per year. This represents a significant decrease in the yearly average of 10.71 fatalities per year in 1987. After remaining relatively stable over the past five years, the number of serious and minor injuries reported also increased during 1997. For the year, eight pilots reported serious injuries while thirteen incidents of minor injuries were recorded.

PHASE OF FLIGHT

The number of accidents occurring during the landing phase in 1997 again far surpassed those recorded during any other phase of flight. In fact, the number of landing accidents was more than double the combined total of accidents occurring during all other flight phase. For the year, accidents occurring during the takeoff and landing phases of flight accounted for approximately 83% of the accident total for 1997.



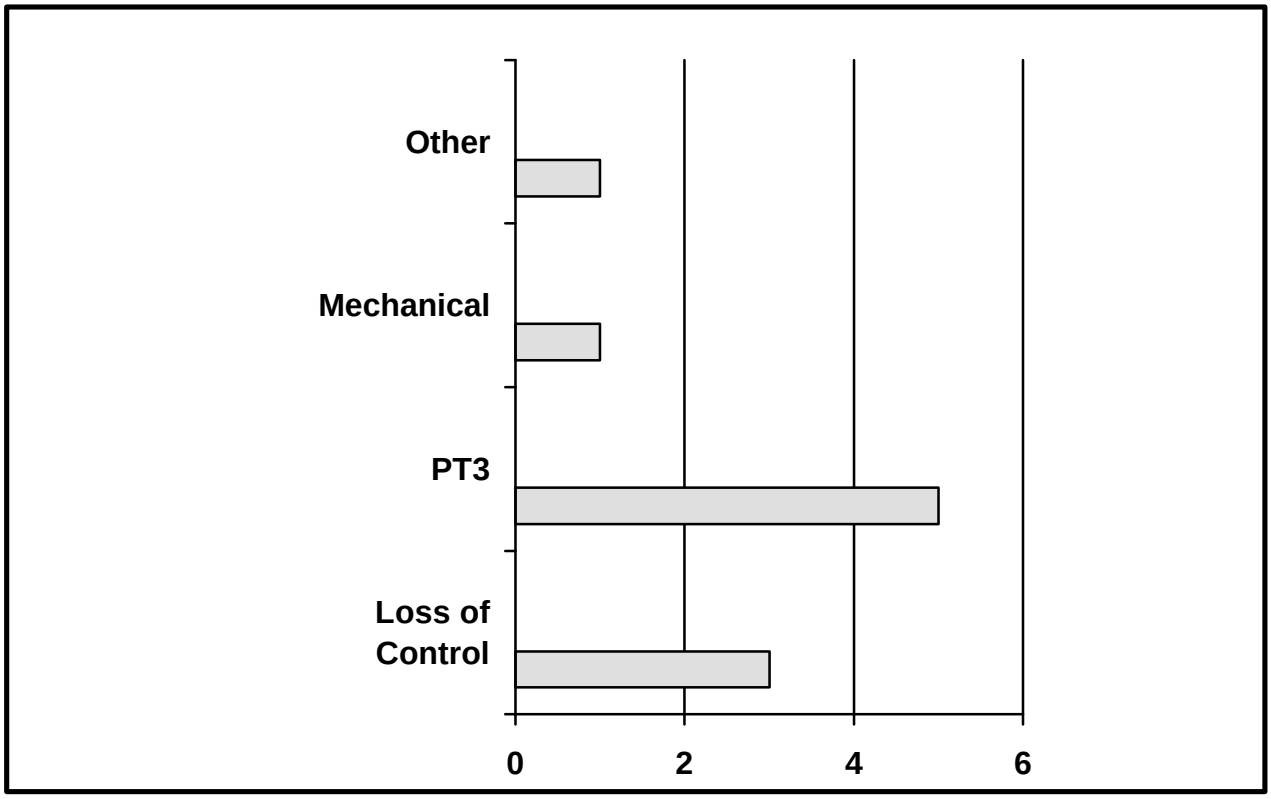
PHASE OF FLIGHT
1997

It should come as no surprise that a majority of accidents occur during takeoff and landing, where the tolerance for error is greatly diminished and opportunities for pilots to overcome errors in judgment become increasingly limited. This trend coincides with a 1985 National Transportation Safety Board study initiated to determine the phases of flight in which aircraft accidents are most likely to occur. The study concluded that approximately 60% of all aircraft accidents *occur during the first two minutes or the last four minutes* of the average flight, even though these phases typically account for less than 16% of actual flight time.

The two accidents that occurred during the **Assisted Climb** involved BG-12 gliders that experienced apparent unrelated mechanical failures. As a result of these accidents, the SSF issued a *Safety Alert* to advise pilots operating gliders of older design and/or construction to be especially cognizant of the possibility of internal structural damage when conducting preflight activities and periodic maintenance inspections. The SSF further advised that any questions or concerns relating to the structural integrity of the aircraft should be immediately referred to a certified aircraft maintenance technician.

Accidents occurring during the **In-Flight** phase included aircraft hitting obstructions while ridge soaring and one structural failure. Both of these accidents remain under investigation.

TAKEOFF ACCIDENTS

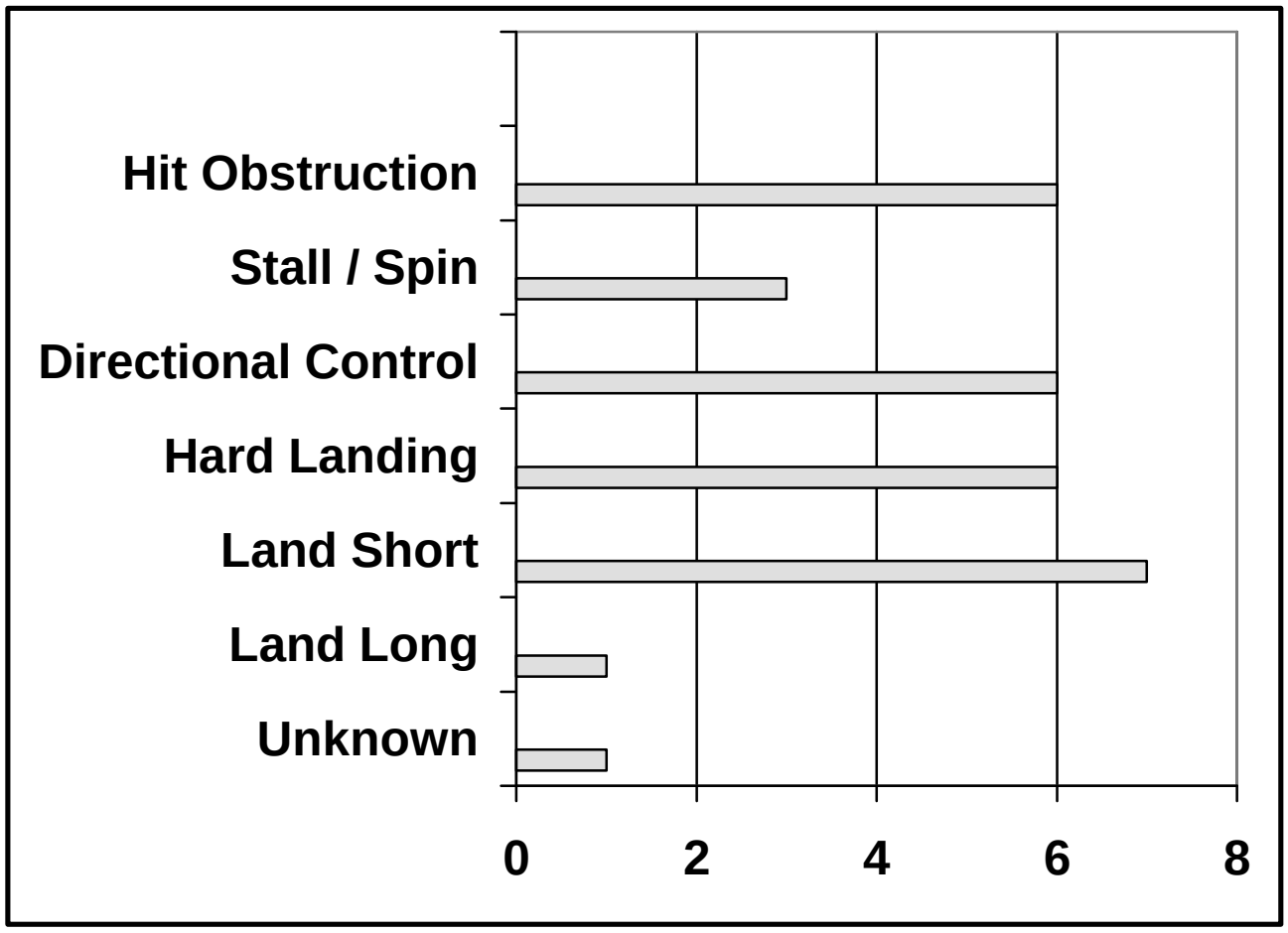


TAKEOFF ACCIDENTS
1997

Premature termination of the tow (PT3) again accounted for the majority of the takeoff accidents that occurred in 1997. Contributing factors in the PT3 accidents included spoilers open on takeoff, an open canopy, and broken towlines. Two of the takeoff accidents that were reported during the year occurred during ground launch operations. Additionally, a SGS 1-26A was damaged after the pilot attempted a takeoff with the elevator controls of the glider improperly connected. The glider had recently undergone maintenance during which the pilot replaced the flight control cables. The pilot reported conducting a positive control check on the primary flight controls prior to takeoff. Examination of the wreckage by an FAA Inspector revealed that the elevator controls were rigged backwards.

Two accidents, one involving fatal injuries to the pilot, occurred in Monerai motorized gliders during the takeoff phase of flight. Both accidents were reported to involve loss of aircraft control shortly after takeoff. Investigations into both of these accidents are pending.

LANDING ACCIDENTS



LANDING ACCIDENTS
1997

Accidents occurring during the landing phase of flight again accounted for the majority of injuries to pilots and damage to aircraft. Gliders being landed short of the intended landing runway or area continues to be the most common factor in landing accidents. Six of the seven reported accidents in which gliders were landed short occurred at the completion of local flights at the pilot's home airport.

Of the 30 reported landing accidents, 10 occurred during off-airport landings. Surprisingly, five of these off-airport landing accidents occurred at the conclusion of local flights when the pilots involved realized that the glider had insufficient altitude to return to the airport. The remaining five off-airport landing accidents occurred during competition and other cross-country flights.

Loss of directional control during takeoff and landing continues to be a significant area of concern. In recent years, the NTSB has determined *the failure of the pilot in command to maintain control of the aircraft* has been cited as a recurring probable cause in a number of glider accidents. For the five-year period 1991 – 1995, for example, 26 glider accident investigations were concluded with this finding. This is especially troubling because control of the aircraft in all flight regimes is the very essence of pilot responsibility.

Hitting obstructions during the landing approach and roll-out again accounted for a significant number of

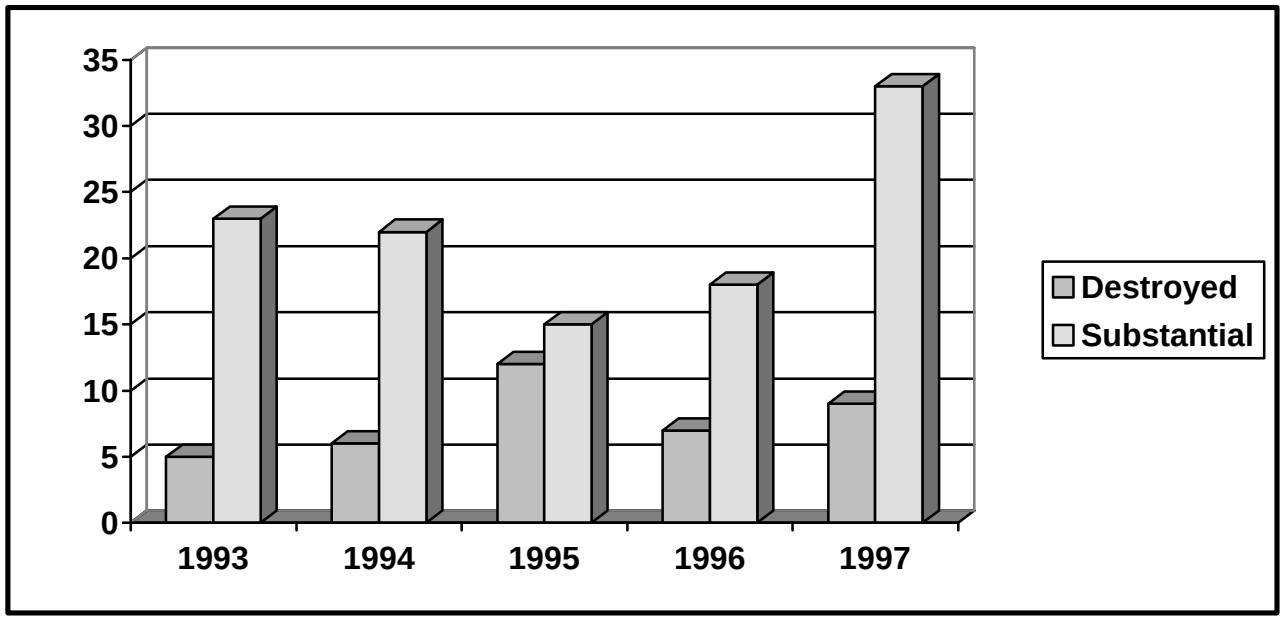
damaged gliders in 1997. Three of the six accidents this year occurred when gliders collided with obstructions located in close proximity to the runway. These obstructions included taxiway markers, automobiles, and other aircraft. The remaining accidents in which obstructions were a factor occurred during off-airport landings.

Stall / spin accidents showed a slight decrease in 1997 although at least one pilot was fatally injured as a result of this type of accident. Stall / spin events typically result in significant injuries to the pilot and substantial damage to the aircraft. Stall / spin awareness and avoidance will continue to be an important component of the SSF accident prevention efforts.

DAMAGE TO AIRCRAFT

Damage to gliders increased in 1997 as a result of the overall increase in the number of accidents. For the year, 9 gliders were destroyed and 33 gliders were substantially damaged. The number of gliders reported as substantially damaged in 1997 increased approximately 84% over the number reported during the previous year. As would be expected, landing accidents accounted for the majority of aircraft destroyed or substantially damaged.

It is worth considering that the increase in the number of fatal and serious injuries to pilots may be attributable to the large increase in the number of aircraft that were substantially damaged or destroyed in accidents. It is interesting to note that serious and minor injuries to pilots and passengers increased in almost direct proportion to the increase in substantial damage to gliders.



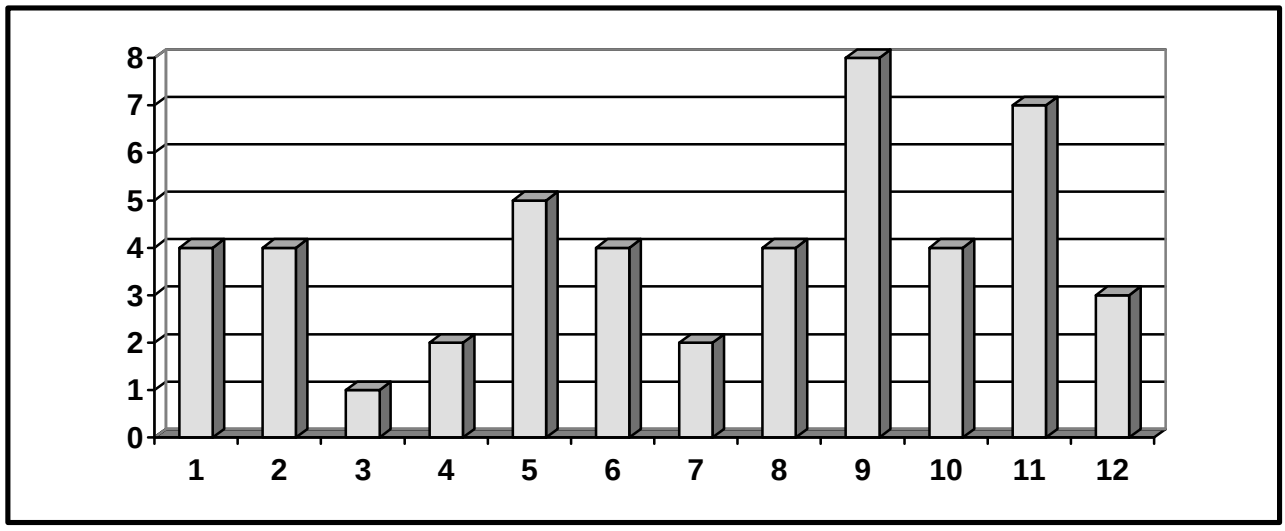
DAMAGE TO AIRCRAFT
1997

ACCIDENTS BY SSA REGION

A comparison of the geographic locations of accidents in relation to SSA Regions tends to reflect the geographic distribution of the SSA membership. In general, those regions having the greatest populations of SSA members and soaring activity tend to record the highest numbers of accidents.

SSA REGIONS

Region 1	Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont.
Region 2	New Jersey, New York (south of 42nd parallel), Pennsylvania (east of 78th meridian).
Region 3	New York (north of 42nd parallel), Pennsylvania (west of 78th meridian).
Region 4	Delaware, District of Columbia, Maryland, Virginia, West Virginia.
Region 5	Alabama, Florida, Georgia, Mississippi, North & South Carolina, Tennessee, Puerto Rico, The Virgin Islands.
Region 6	Indiana, Kentucky, Michigan, Ohio.
Region 7	Illinois, Iowa, Minnesota, Missouri (east of 92nd meridian), North & South Dakota, Wisconsin.
Region 8	Alaska, Idaho, Montana, Oregon, Washington.
Region 9	Arizona, Colorado, New Mexico, Utah, Wyoming.
Region 10	Arkansas, Kansas, Louisiana, Missouri (west of 92nd meridian), Nebraska, Oklahoma, Texas.
Region 11	California (north of 36th parallel), Guam, Hawaii, Nevada.
Region 12	California (south of 36th parallel).

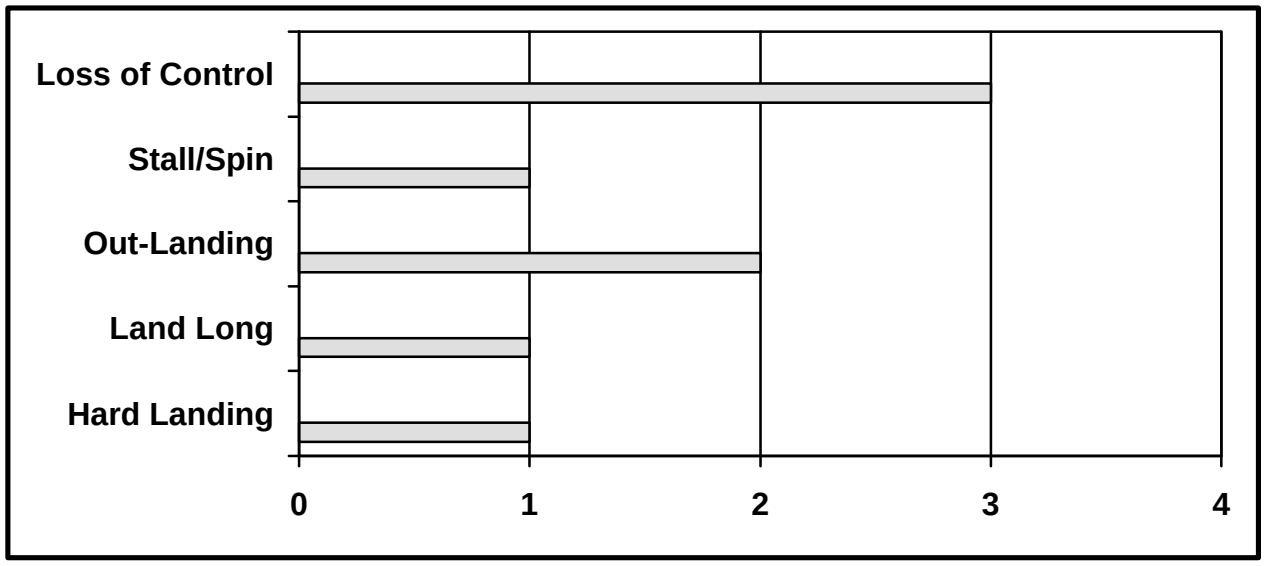


ACCIDENTS BY SSA REGION
1997

AUXILIARY-POWERED SAILPLANES

For the twelve month period ending December 31, 1997, eight accidents involving auxiliary-powered sailplanes were reported to the NTSB. Two of these accidents resulted in fatal injuries to the pilots involved while one other pilot sustained serious injuries. Three of the accident aircraft were destroyed while the remaining five aircraft received substantial damage. Although the investigations into these accidents are ongoing, preliminary reports indicate two of the aircraft were damaged during off-airport landings, one damaged as a result of a hard landing, and another aircraft damaged when the aircraft overshot the landing runway. Two Monerai powered gliders were involved in takeoff accidents that resulted in one fatality and one report of serious injury to the pilot. The remaining fatality resulted from an accident involving a Windex 1200 C that occurred at the conclusion of a test flight. The aircraft had accumulated approximately 4 hours since construction. The NTSB recently issued the probable cause of the accident to be *the failure of the pilot to maintain adequate airspeed, while maneuvering, which resulted in an inadvertent stall/spin and subsequent collision with terrain.*

Auxiliary-powered sailplanes accounted for approximately 17% of the reported glider accidents for 1997 and two of the seven reported fatalities.



AUXILIARY-POWERED ACCIDENTS
1997

SAFETY ALERT - 1997

Two 1997 accidents involving gliders of older design and construction may indicate the need for an increased level of vigilance by the pilot operator during preflight and maintenance activities. Both accidents involved BG-12 gliders that experienced apparent mechanical failures during aero-tow operations. The Soaring Safety Foundation strongly recommends that all pilots and operators of gliders of older design and construction be especially cognizant of the possibility of internal structural damage when conducting preflight activities and periodic maintenance inspections. Any questions or concerns that relate to the structural integrity of the aircraft should be referred to a qualified maintenance technician.

1997 NON-FLIGHT LOSSES

In addition to the compilation of accident data, the Soaring Safety Foundation monitors the number of non-flight claims (losses) each year in the SSA Insurance Program. These claims
are then categorized to define specific areas in which non-flight claims most commonly occur. Analysis of this data allows the SSF to focus its accident prevention efforts and resources to address the safety factors involved, which could concomitantly reduce losses.

Non-flight losses are defined as *any glider activity not directly involving a phase of flight*. Non-flight losses include taxiing, moving the glider by hand, or towing by car / tractor from one spot to another, regardless of whether the movement is in preparation for flight. Additionally, non-flight claims include ground damage to gliders due to weather (hail, wind, etc.) and theft or vandalism. These claims do not include damage incurred during the takeoff or landing roll.

Over the past six years, non-flight claims have averaged 41% of the total number of claims. These claims represent a significant amount of dollar loss each year, comprising approximately 25% of the total dollar loss for 1997.

The following categories of non-flight losses represent the most common types of occurrences. The use of the term minor is relative and used in relation to the total amount of dollar loss incurred over the past year.

Figures given below are only for one year; one is cautioned that actual trends require the compilation and analysis of data for several years to draw accurate conclusions.

Claim Occurrence		**Number of Claims**	**Dollar Loss**
Assembly / Disassembly	-	Minor	Minor
Towing by Trailer	-	Significant	Moderate
Damage to Canopy	-	Major	Major
Vandalism	-	Significant	Moderate
Ground Handling	-	Significant	Significant
Towplane	-	Significant	Major
Motorglider	-	Minor	Minor
Wind Damage	-	Major	Major
Hail Damage	-	Minor	Minor
Damage by Automobile	-	Minor	Minor

It is readily apparent from this chart that carelessness during ground operation is a major factor in keeping gliders on the ground due to the necessity for repair of ground damage.

1997 – Supplemental Non-flight Loss Information

Note: The word *State* in the following information includes the District of Columbia, but no Territories.

- One state recorded 60% of the total number of losses due to vandalism in addition to 8% of the total number of non-flight losses.
- The state with 17% of the glider / motorglider fleet reported only 4% of the non-flight losses.
- The state with 7% of the glider fleet reported 13% of the non-flight losses.
- Twelve states with a very high ratio (over 50%) of gliders / motorgliders to SSA members had relatively low rates of non-flight losses; eight of these states reported no non-flight losses.
- Thirty states had no non-flight losses.
- More than one-half of the states that reported non-flight losses were located in the eastern section of the United States (East of the Mississippi River).

FLIGHT TRAINING AND SAFETY ISSUES

Major glider accidents occur because of predictable causes. By concentrating on two major aspects of flight training, flight instructors can make a major impact on reducing the number of glider accidents.

Takeoff Emergencies - Accidents occurring during the first few seconds of the launch account for approximately one out of every five glider accidents. The most common causal factor associated with a launch accident is premature termination of the tow or PT3. Most PT3 related accidents occur because of inadvertent extension of the divebrakes or spoilers. In 1993, the Soaring Safety Foundation adopted the use of a new visual signal to warn the glider pilot that the aircraft's dive brakes or spoilers were extended. Implementation of this signal has resulted in several letters to the SSF indicating that the *Spoilers Out* signal is working well. Potential accidents have been averted when the tow pilot used the signal to warn the glider pilot of the hazardous situation.

Many glider pilots as well as tow pilots do not know this valuable, life saving, signal. The SSF has recommended that clubs, chapters, and commercial operations host a special *Rudder Waggle Weekend* to promote pilot education of the signal. The idea is for each soaring group to sponsor a special event in which each glider pilot and tow pilot would be given the opportunity to give and/or receive the *Spoilers Out* signal at a safe altitude. This idea would further enhance safety if each group would have an open discussion of launch emergencies.

Emergencies will occur during the launch, but accidents need not occur if the pilot(s) expect the emergency and have a specific plan of action for each phase of the launch. This year, the SSF endorsed the addition of the letter "E", for *emergency plan* on the pre-takeoff checklist. Launch emergencies should be emphasized during club check rides, flight tests, flight reviews, and safety meetings.

Landings - The most common accident occurs during the landing phase. Many pilots believe that stalls and/or spins are the major causes of landing accidents. It is also true, however, that many, if not most, landing accidents are preceded by improperly flown landing patterns. Special emphasis should be placed on maintaining a proper distance from the runway while in the landing pattern. Maintaining a proper distance from the landing area on the downwind leg of the landing pattern will allow for a proper length base leg.

In addition to increased airspeed in windy or turbulent conditions, instructors should stress the importance of increased altitude during the landing approach. This additional altitude will help to avoid low altitude turns in strong wind gradient or turbulence and will help to prevent an upset of the glider.

Judgment - Finally, pilot judgment continues to be a major factor in glider accidents. An organized judgment training program can easily be added to flight training activities. It costs little, adds nothing to the number of flights or hours of training, and is fun! If your organization has not implemented judgment training to its flight training program, the Soaring Safety Foundation can help.

THE INTERNATIONAL CONNECTION

In 1993, the SSA Flight Training and Safety Board (FTSB) joined chief flight instructors from around the world for the first time, hosting a seminar at the SSA Convention in Reno, Nevada, and establishing the United States as a viable voice in training and safety issues. The Soaring Safety Foundation assumed the SSA's seat on the OSTIV Training and Safety Panel (TSP) from the FTSB in 1985, and has continued to represent the SSA and United States glider pilots at biennial meetings of the TSP in Holland, Belgium, Norway, England, Germany, and Denmark.

The scope of these meetings entails examining piloting requirements to offer a more *standardized* training syllabus as well as offering different methods to teach maneuvers and techniques. Additionally, the TSP gathers comparative information regarding launches, number of gliders, number of members, number of accidents, and number of fatalities, and issues statistics based on launches, members, and gliders per fatality. The SSF "normalized" this data by comparing each of the main categories to the total number to determine a ranking of countries in terms of perceived safety for a five-year period, 1991-1995. The *International Standing* chart shows the Netherlands as the overall number one country when considering all three categories. The USA is 5th and Canada is ranked as 12th.

Germany reports the largest glider population with 30,000 pilots, 7777 gliders and almost a million launches (many by ground launch) as well as the largest average number of fatalities. France has the second largest number of pilots and average number of fatalities, followed by the USA, which also shows the second highest number of gliders and the third largest number of fatalities. Belgium lists the smallest number of members, Norway the fewest gliders and fewest launches (See table).

As comparisons are made, it is important to remember that several of the countries have small numbers of members, small quantities of gliders, and some make more ground launches than aerotows. If annual information were to be examined, countries with a small glider pilot population would be struck very hard by one fatality, while Germany, for instance, would not. Consequently, a five-year average was used to be fair to all countries (notice that some countries have less than one fatality per year). Attempting to make the comparisons more meaningful, the table shows normalized numbers based on each of the three categories, all averaged over a five-year period.

Since no data regarding the amount of flying time each country performs has been compiled, the number of launches would seem to give a perspective of activity. However, there is no separation of ground or aerotow launches, so the data is skewed somewhat. Regardless, one could say that the more launches made, the greater exposure to accidents. Germany's 942,084 launches and average of 11.96 fatal accidents per year bears this out. The United States, with approximately 400,000 launches (about 98% aerotow) has about 42% as many launches as Germany and 40% of the fatality rate. Norway, with the fewest launches, also shows the lowest fatality rate.

Accident statistics kept by the Soaring Safety Foundation and found elsewhere in this report look more closely at different operational areas, regional areas, and glider types than those available from the TSP.

APPENDIX A

NTSB PART 830

The responsibility for investigation of aircraft accidents in the United States was mandated by Congress to the National Transportation Safety Board (NTSB) through The Department of Transportation Act of 1966. This act tasked the NTSB with determining the probable cause of all civil aviation accidents in the United States.

From 1991 - 94, the general aviation community alone accounted for approximately 1,800 aircraft accidents per year. Due to this high level of investigative workload and limited available resources, the NTSB often delegates to the Federal Aviation Administration (FAA) the authority to investigate accidents involving aircraft weighing less than 12,500 pounds maximum certified gross weight. Consequently, many glider accidents meeting the NTSB reporting criteria are investigated by representatives of the FAA.

All aircraft accidents involving injury to passengers or crewmembers or substantial damage to the aircraft must be reported to the NTSB.

The terms used in this report to define injury to occupants and damage to aircraft are included in NTSB Part 830 of the Code of Federal Regulations.

Definitions

Aircraft - a device that is used or intended to be used for flight in the air.

Operator - Any person who causes or authorizes the operation of an aircraft.

Aircraft Accident - An occurrence associated with the operation of an aircraft which takes place between the time any person boards the aircraft with the intention of flight and all such persons have disembarked, and in which any person suffers death or serious injury, or, in which the aircraft receives substantial damage.

Fatal Injury - Any injury which results in death within 30 days of the accident.

Serious Injury - Any injury which:

(1) Requires hospitalization for more than 48 hours, commencing within 7 days from the date the injury was received;

(2) Results in the fracture of any bone except simple fractures of fingers, toes, or nose;

(3) Causes severe hemorrhages, nerve, muscle, or tendon damage;

(4) Involves any internal organ; or

(5) Involves second- or third-degree burns, or any burns affecting more than 5 percent of the body surface.

Minor Injury - Injury not meeting the definition of fatal or serious injury.

Substantial Damage - Damage or failure which adversely affects the structural strength, performance, or flight characteristics of the aircraft, and which would normally require major repair or replacement of the affected component. Engine failure or damage limited to an engine if only one engine fails or is damaged, bent fairings or cowling, dented skin, small punctured holes in the skin or fabric, ground damage to rotor or propeller blades, and damage to landing gear, wheels, tires, flaps, engine accessories, brakes, or wingtips are not considered Asubstantial damage≅ for the purpose of this part.

Destroyed - Damage to an aircraft which makes it impractical to repair and return it to an airworthy condition. This

definition includes those aircraft which could have been repaired, but were not repaired for economic reasons.

Minor Damage - Damage to an aircraft that does not meet the definition of Substantial or Destroyed.

APPENDIX B

PHASE Of OPERATION

Ground Movement - Repositioning of the glider while on the ground. To meet the definition of an accident, occupants must be onboard the glider and movement must be conducted immediately preceeding or subsequent to a flight operation that demonstrates the intention of flight. Includes taxi operations of auxiliary-powered sailplanes.

Takeoff - Begins at initiation of the launch operation, including aero-tow, ground launch, and self-launch, and is concluded at the point the glider reaches the VFR traffic pattern altitude. For ground launch operations, the takeoff phase continues until release of the towline.

Assisted Climb - Begins at the conclusion of the takeoff phase or point at which an auxiliary-powered sailplane or a sailplane using an aero-tow launch climbs above traffic pattern altitude. This phase of operation is not included in ground launch operations.

In-flight - Begins at the point of release of the towline for all launch types and concludes at the point of entry into the traffic pattern or landing approach pattern for an off-airport landing.

Approach/Landing - Begins at the point of entry into the traffic or landing approach pattern and concludes as the glider is brought to a stop at the completion of the ground roll.

APPENDIX C
ACCIDENT CATEGORY DEFINITIONS

Hit Object - Accident occurring during a ground or flight phase as a result of the glider colliding with a fixed object. This classification does not include bird strikes or ground / in-flight collisions with other aircraft.

Ground Collision - Collision of two or more aircraft while being repositioned or taxied while on the ground.

Loss of Directional Control- Accident which occurs as a result of a loss of directional control of the glider during takeoff or landing operations.

Premature Termination of the Tow (PT3) - Any event, pilot, mechanical, or otherwise induced, which results in a premature termination of the launch process. This classification includes ground, aero-tow, and self-launch.

Mechanical - An event that involves a failure of any mechanical component of the glider. This classification includes accidents that result from faulty maintenance or a failure to properly install or inspect primary flight controls. Inflight structural failures caused by fatigue of structural components or pilot induced overstress of the airframe are included in this classification category.

Loss of Aircraft Control - An accident which occurs as a result of the loss of control of the glider for any reason during takeoff, assisted climb, in-flight, or approach / landing. This classification includes failure to maintain proper tow position during assisted climb.

Mid-air Collision - A collision of two or more aircraft which occurs during the takeoff, assisted climb, in-flight, or approach / landing phase of flight. This classification includes collisions involving gliders and other categories of aircraft (airplane, rotorcraft, etc.).

Land Short - Any accident which occurs as a result of the glider being landed short of the physical boundaries of the intended runway or landing area. This classification includes off-airport landing operations.

Overshoot - Any accident which occurs as a result of the glider being landed beyond the physical boundaries of the intended runway or landing area. This classification includes off-airport landing operations.

Stall / Spin - Any accident which results from the inadvertent stall and/or spin of the glider during takeoff, assisted climb, in-flight, or approach / landing phases of flight.

Hard Landing - Any accident caused by a hard landing during the approach / landing phase of flight.

Other – Any accident caused by factors not defined within the previous categories.