FLIGHT SAFETY OBJECTIVES AND OBJECTIVE FLIGHT SAFETY

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1. As well as the main subject of this paper, I would like to give you some background on the Training and Safety Panel (TSP) which is the 'youngest' of the OSTIV Panels.

2. The concept of such a panel arose in 1972 from discussions between Fred Weinholtz and myself. As a result, the first meeting of "European Coaches" (Coaches in this context means instructors with a national responsibility) took place at Oerlinghausen in 1973. Since then, there have been meetings in Denmark, Finland, Belgium, the Netherlands, the UK (2) and the USA. It was the initiative of Bernald Smith in inviting the European group to the SSA Convention in Reno which, effectively, made the group international with subsequent participation outside Europe of Australia, Canada and USA.

3. The number of countries involved has increased, and at the 1988 meeting in Rochester (UK) which was held in conjunction with the Sailplane Development Panel (SDP) with some joint sessions thirteen countries were represented. The form of the TSP meetings has developed from mostly discussions to the presentation of a limited number of papers, but still with much time for discussion.

4. The objective of the Panel is to exchange ideas on both training and safety, the one an indication of the effectiveness of the other. It took some time to establish a basis for comparative data; this was eventually agreed on fatalities and serious injuries compared with the number of pilots (members of clubs), the number of launches (starts) or the number of gliders. Alternative bases were necessary because some countries did not know how many launches they did or how many pilots they had.

5. Such statistical comparisons are not entirely reliable, being based on relatively small numbers, but were the best information available. As an indication one is looking at 1 fatal accident for approximately every 93,000 launches with a distribution from 1/35,000 to 1/180,000, although it should be noted that one country only made 12,000 launches a year. Detailed data can be made available to anyone who wants it, but I would ask, if your country is not involved with TSP that in return you provide data from your country. It is worth noting that some countries have improved their data collection as a result of their involvement with TSP.

6. Accident prevention measures have naturally concentrated on training and education, with particular emphasis on awareness. I believe that the Soaring Safety Foundation in the USA was stimulated by the involvement with the TSP.

7. Accident prevention measures are to some extent at odds or in conflict with soaring achievement. In the limit flying can only be made completely safe by stopping it, an approach which can sometimes be recognized in the policies of aviation authorities (CAA has been considered synonymous with 'campaign against aviation'). However, without some risk there would be no excitement, a sportsman is defined as "a person ready to play a bold game" and, therefore, accepting some degree of risk. Efforts to make gliding safer at any cost would, undoubtedly, reduce the quality of the sport as we know it. My basic philosophy is that "any glider pilot should get maximum fulfilment with a good degree of safety."

8. Often there is a lack of objectivity in accident prevention measures and problems arise:

— Anyone who states that his intention is to make flying safer is a "good guy" and anyone who argues against him is "bad."

— Risk analysis is a highly specialized field and there are good examples in the transport of hazardous chemicals and the location of nuclear power stations.

— Perceived risk is not sufficient grounds for radical action. Most people over-estimate or under-estimate the potential risk as the following "bias on judged frequency of death" data indicate (Ref. 1/see Figure 1).

Figure 1. Bias on judged frequency of death (from Fig.1).

Most under-estimated	Most over-estimated
Smallpox vaccination	All accidents
Diabetes	Motor vehicle accidents
Stomach cancer	Pregnancy, childbirth & abortion
Lightning	Tornadoes
Strokes	Flood
Tuburculosis	Botulism
Emphysema	All cancer
	Fire and flame
	Venemous bird and sting
	Homicide

Human factors are also very relevant:

— "In discussion of perceived risk people cling stubbornly to a view once they have selected it. Research has shown that they will go to any lengths to adapt information they receive to the view they have already chosen, and if not, to reject it."

9. Some "make-it-safer" examples which may not achieve their objective:

UK

— Light aircraft engine failure, the pilot survives but the passenger is killed. Data show that 1 in 50 engine failures result in serious or fatal accidents.

— Questions asked about flight safety in Parliament.

— In a particular year (1987) there were many more fatal accidents — 27 compared with 15 average over 8 years (see Figure 2).

— CAA set up a study group on general aviation flight safety — scientists (statisticians) conclude that "no conclusions can be substantiated by statistical tests."

— An accident review (CAP 542) has almost four pages of conclusions and one page of recommendations — based on data that cannot be substantiated.

Australia

A proposal to require gliders to call on the radio when:

— climbing above 5,000 feet or

— descending below 5,000 feet and

— when requested to do so by air traffic control giving height, position, speed and destination

would generate 100+ radio calls on a 500 km. flight. Would this make flying safer? I think not. Increased reliance on radio and on radio or radar to maintain separation results in a decline in airmanship, especially lookout.

USA

The proposed requirement for all aircraft including gliders to carry transponders has been stopped by concerted action. The implications for soaring were disastrous, see Judy Lincoln's paper (Ref. 2) "Of Elephants in the Rain Forest and Other Airspace Issues."

10. From all this one can only conclude the need for objective flight safety measures. Objectivity requires data and careful analysis. Here, briefly, are gliding accident data from the UK publication Accidents to Gliders 1987 (Ref. 3, see Figures 3 and 4) and the following comments:

— the number of accidents each year do not show marked variation.

— the serious injury and fatal accidents show the sort of fluctuations one might expect when dealing with small numbers.

— although the trend is downwards the 3-year sliding average on fatalities is 3.33 (for 1988) and has varied from 2.66 (1982) to 3.66 (1985).

— increased activity makes for an improved rate, again the 1988 figures show a further downward trend.

— the accident data are computer based and can be sorted on a number of criteria, glider type, pilot age, experience, etc.

Very careful and detailed analysis would be required to decide what action, if any, to take. It is likely that targeting those accidents which cause serious injury or death by education rather than regulation would be appropriate.

Airspace and Risk

11. The introduction of controlled or regulated airspace may be bsed on either perceived risk, controller workload or traffic capacity; for the first two there should be either a logical approach or an alternative solution. Some UK examples are:

(a) Upper Heyford

The USAF operate up to 100 F111s from an airfield in Oxfordshire, a fairly busy area for general aviation and glider activity;

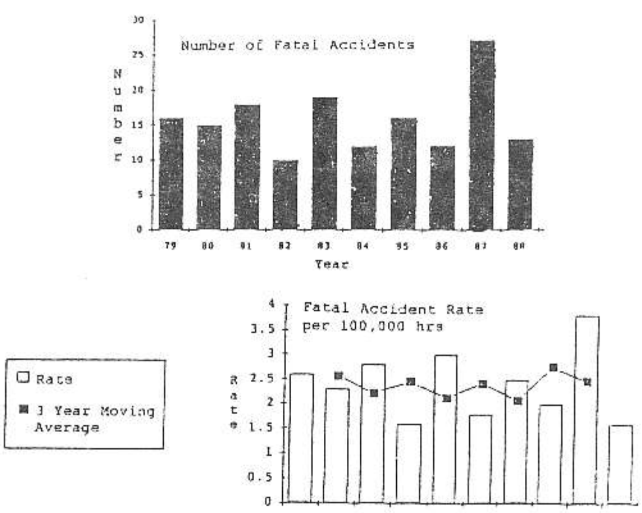
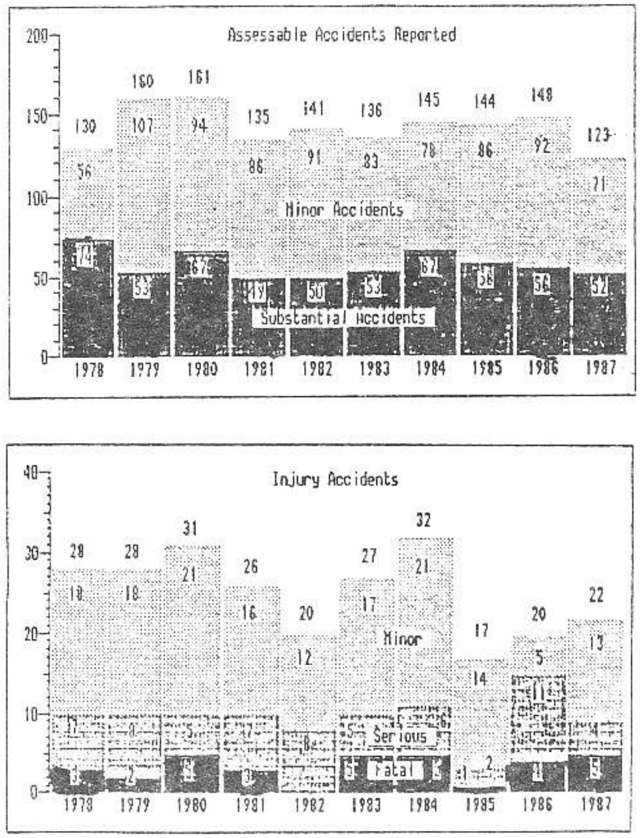


Figure 2. Number of fatal general aviation accidents for the period 1979-1988 in the U.K.

Figure 3. Assessable gliding accidents, injuries and fatalities reported for the period 1978-1987 in the U.K.



— There was a perceived risk on the basis of the "poor fenestration" of the F111.

— The previous protection was a Radar Advisory Service Zone (RASZ) which was optional to transit traffic.

— The USAF sought better protection but National Air Traffic Services did not think it was warranted, however, the Minister had been persuaded of the risk.

— The risk of collision between gliders and F111s was calculated at 1 in every 830 years.

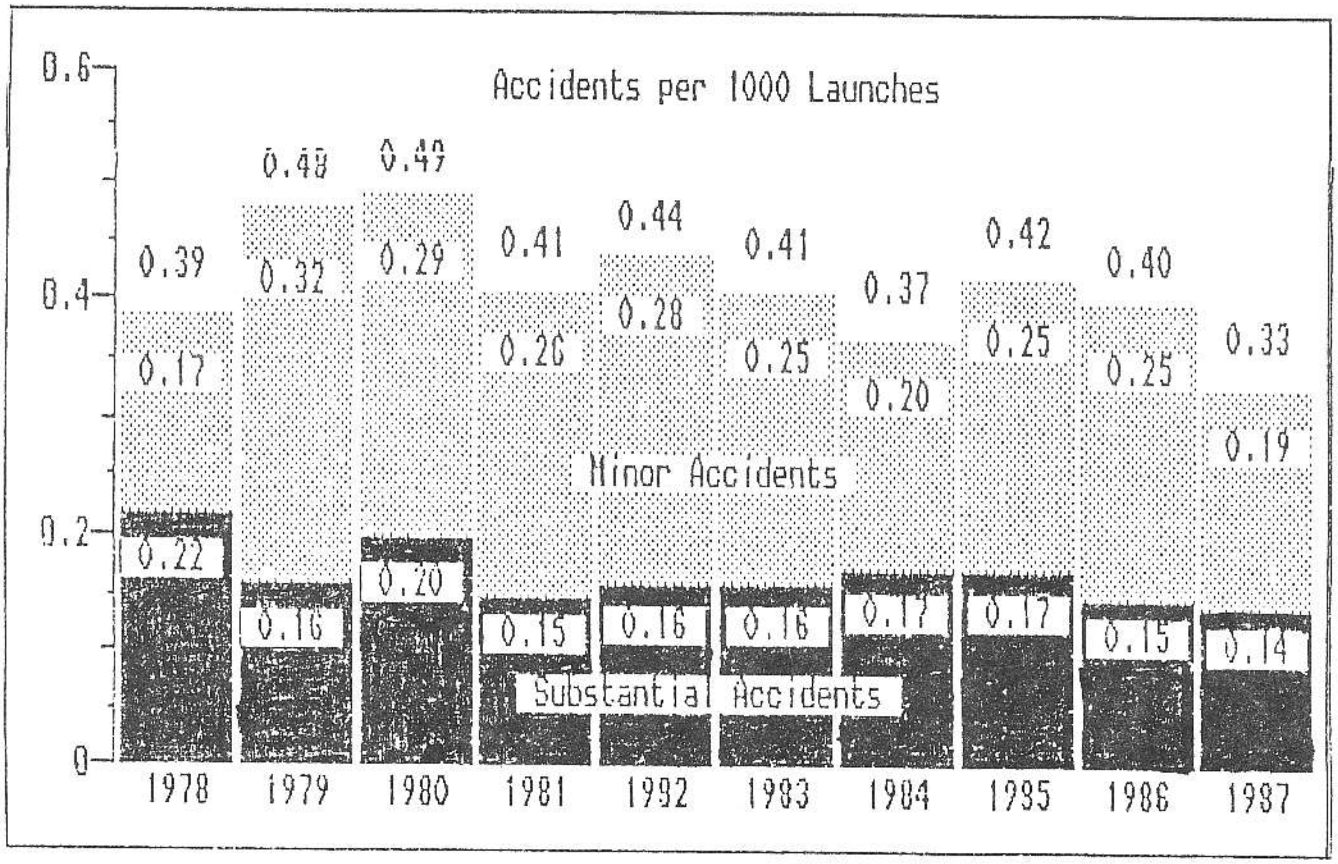
— The CAA statisticians said this figure might be an order of magnitude wrong. That is 1 in 83 years (or 1 in 8300 years).

— The solution, a new type of airspace (Mandatory Radio Area) to which entry to gliders cannot be refused and they cannot be controlled.

(b) Airway B2

Traffic generated by the oil industry in the North Sea could not be separated on the basis of 'quadrantals' and distance/

Figure 4. Accident rate per 1,000 launches for the period 1978-1987 in the U.K.



time/speed criteria. As a result a new airway was created, initially over one of the busiest wave-soaring sites. The airway was re-routed around the site as a result of 'political pressure'. Given the levels of commercial air traffic and gliding activity, there was a risk of collision 1 in every 1802 years. It is incidental that the direct route over the gliding club but not in the airway is still used by a lot of commercial traffic. By way of contrast, the Civil Aviation Authority basing their estimates on airmiss data calculate a collision risk in controlled airspace between controlled aircraft at one in every 6.1 years (Ref. 4).

(c) Defense against such irrational decisions might reasonably be based on objective criteria, not perceived risk or acceptable levels of risk.

12. Accident awareness and improved training are not the only means of improving the safety record. Robert Weien in his paper (Ref. 5) reasons that not all accidents can be prevented and that the objective must be to limit injury and death. Combining examples from public health and automotive safety he examines alternative accident prevention using "Haddon's Matrix." This combines the pre-crash, crash and post-crash phases, the human, the glider and the environment giving nine permutations or cells each of which has its own accident prevention considerations (see Figure 5).

	Human	Glider	Environment
Pre-Crash	CELL 1 Improved training Health Care: - No drinking - No flying if unwell	CELL 4 Preparation for Flight - Rigging - Connections	CELL 7 Airfield maintenance: - Obstructions - Long grass
Crash	CELL 2 Protection: - seat belts - helmets?	CELL 5 Features worsening injuries: - knobs - insecure ballast - headrests	CELL 8 Essential obstructions: - are they fail-easy?
Post-Crash	CELL 3 - First-aid facilities - Education to avoid further injuries	CELL 6 Features worsening injuries: - Ease of baling out	CELL 9 The emergency system: - ease of access to airfield

Figure 5. Haddon's Matrix.

Cell 1 (human/pre-crash) relates to flying training and health care (drinking, flying while unwell, etc.).

Cell 2 (human/crash) improved seatbelts are relevant, so would helmets which have reduced injury in motorcycling and hangliding.

Cell 3 (human/post-crash) relates to survival, good first aid facilities and sufficient understanding of injuries to avoid making matters worse.

Cell 4 (glider/pre-crash). Even with simple-to-rig modern gliders pilots still take off with the elevator disconnected. What price an auto-coupling elevator? (Now included as a standard in OSTIVAS and as an Acceptable Means of Compliance in JAR22 — Editor).

Cell 5 (glider/crash) relates to those aspects of the glider which might worsen injury.

Cell 6 (glider/post-crash) concerns aircraft factors which might worsen injury — how easy is it to get out after a mid-air collision?

Cell 7 (environment/pre-crash). Improving the environment might seem obvious but ground or approach obstructions contribute to many accidents, even failing to cut the grass.

Cell 8 (environment/crash). The airfield environment can, to some extent, be made safer (collapsible sign posts, no barbed wire, etc.).

Cell 9 (environment/post-crash). The post-crash phase needs managing; does anyone have first aid training, are there first aid supplies, can an ambulance find its way into the airfield.

13. Conclusion

Safety awareness is a matter of stimulating the imagination and providing structured training in all aspects of flying and operation. Much is being done as several papers at this Congress have shown, but heightened awareness could do much to save lives and injuries. I believe our sport could be much safer with a little effort from more people.

More importantly, there is an urgent need to encourage regulatory organizations only to act when their case to regulate and "make flying safer" is based on genuine evidence of the need and some indications that the measure may achieve its desired effect.

References:

1. 'Collision Risk in the Wide Open Spaces' by W.G. Scull and W.A. O'N. Waugh published in Aerospace (Dec. 1986) the Journal of the Royal Aeronautical Society.

2. 'Of Elephants in the Rain Forest and Other Airspace Issues' by Judy Lincoln, SSA Government Liaison Chairman (March 1989).

3. Accidents to Gliders 1987 (a British Gliding Association publication).

4. CAA Paper 75001 — An Analysis of the Civil Airmiss Situation in the United Kingdom and its Relation to Collision Risk.

5. Soaring Safety, an Alternative View by Robert W. Weien published in 'Soaring' March 1988.