British Hang Gliding and Paragliding Association

BOARD OF INQUIRY

REPORT

Investigation of a Paragliding accident
which occurred at Bo Peep, Sussex,
on 12th July 2005
in which the pilot
was fatally injured

Introduction

On 12th July 2005, the British Hang Gliding and Paragliding Association (BHPA) received reports of an air accident at Bo Peep, Sussex, that had resulted in the death of a Paraglider pilot.
The BHPA is required by the Air Accident Investigation Branch of the Department for Transport to carry out an investigation and produce a report under its delegated authority. The BHPA convened a Board of Inquiry under President John Watkins and member David Thompson, with authority to investigate the accident and submit a report to the Flying and Safety Committee (FSC) of the BHPA for ratification.

BHPA investigation serial number: IR 05/066

Summary

The Paraglider pilot suffered an asymmetric deflation to his glider, an Edel Response (medium size), shortly after take-off from a hillside, and whilst still close to the ground. The incident took place just after midday on 12th July 2005, at Bo Peep site in Sussex, UK. The glider turned towards the hill and the pilot impacted the ground. The pilot subsequently died of his injuries the same day.
The investigation found that the accident was due to the partial collapse of the glider and the behaviour of the glider following the collapse in turbulent conditions. The pilot was flying a glider that was categorised as having low inherent safety (DHV Rating 2/3). The glider reacted in a way that was predictable by its certification level.
The Board concluded that the incident was caused by the failure of the pilot to recover from a partial collapse of the paraglider occurring close to the ground in an area known to be turbulent, and exacerbated by the recovery characteristics inherent in this type of glider.

This Document is confidential until ratified.

Date ratified by the BHPA Flying and Safety Committee: 24th February 2006.

Contents

THE STRUCTURE OF THE REPORT

The structure of this report conforms to that recommended in the BHPA Technical Manual and is intended to follow the principles pertaining to AAIB reports. It is divided into four sections plus the Appendices:

Section 1 - Factual information

Section 2 - Analysis

Section 3 - Conclusions

Section 4 - Safety Recommendations

Date: _____ Signed_____

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SECTION 1 - FACTUAL INFORMATION

1.1 History of the flight

On 12th July, Pilot A travelled to a Southern Club paragliding site, Bo Peep, a site with which he was familiar and had flown numerous times previously. Witness A reports Pilot A as arriving at about 10am. Witness A described the local (hill) conditions to be "sunny skies, a medium strength wind from the north-east (I would estimate 14-16mph), with some stronger thermic gusts at times. I considered it to be fairly thermic, based on the appearance of the other pilots already in the air, and the way their wings were pitching around in the sky. At the time of my arrival there was about 2-3 other people flying. I considered the conditions to be challenging".

Witness A flew for approximately 30 minutes before resting on the hill for 1 hour. During this period it was observed that other paraglider pilots were in the air constantly.

Witness A undertook a second flight. Towards the end of flight he felt the thermic turbulence had increased to a point beyond that which he was comfortable with and a landing approach was initiated. It was in this phase of flight that the incident with Pilot A was observed.

At approximately mid-day, having just returned from a short (approx 5km) cross-country flight from Bo Peep to Newhaven, Pilot A took off from the hillside at an area known as 'Bostal Hill' and was seen to turn right, flying adjacent and along the side of the hill. Shortly after launch (less than 1 minute), Pilot A suffered a small (10%) deflation to the glider's left wingtip. The deflation re-inflated spontaneously and without the glider changing direction.

Immediately after this small deflation the right side of the glider deflated to an extent Witness A describes as "greater than 50%". The glider turned towards the deflation, which was also towards the hillside. Pilot A was already very close to the hillside - Witness A describes the period of time between the deflation and the impact with the hillside as being "2-3 seconds".

Other pilots ran immediately to offer assistance. The pilot was conscious with no obvious external injury but with pain from the legs and pelvic areas. Emergency services were summoned with the Air Ambulance attending. The pilot subsequently died.

1.2 Injuries to persons

Injuries	Crew	Passengers	Others
Fatal	1	-	-
Serious	-	-	-
Minor / None	-	-	-

1.3 Damage to the aircraft

No damage was sustained to the aircraft as a result of the impact. Significant damage was caused by both the initial first aid team and the emergency services cutting the victim from the equipment.

1.4 Other damage

There was no other damage sustained in the accident

1.5 Personnel information

The pilot was a 58 year old male. The BHPA records show he had attained the BHPA 'Club Pilot' rating in March 1994 though had chosen to downgrade his membership from 'Full Flying Member' to 'Magazine Subscriber' in December 2002. The post-mortem report does not include information pertaining to height or weight, although other club members estimated him to be between 75-80kg putting him toward the upper end of the glider weight range. The pilot did keep an up-to-date log book. This demonstrated an experience in excess of 300 hours and gave details of a number of glider models and sites flown. The pilot was both current and experienced, but had failed the BHPA Pilot exam in November 1999, failing both the 'air law' and 'meteorology' sections of the paper. The pilot had flown a number of times in the weeks prior to the incident.

1.6 Aircraft information

The paraglider was an Edel Response (medium size). It was one of three paragliders owned by the pilot, and the log book demonstrated it had been used on previous flights by the pilot. There are no records related to its service and inspection history.

Subsequent to the incident the glider was inspected by an independent paraglider 'service and repair' centre and also by a BHPA Technical Officer. Several poorly completed 'DIY' repairs to the internal structure were uncovered which, in the opinion of both the service centre and the Technical Officer, rendered the glider un-airworthy (see Appendix A). The glider was also found to be in a poor overall state with dozens of small rips to the upper surface (few if any as a result of the incident) and significant staining to the fabric.

The width setting of the chest strap on the pilot's harness is a contributing factor to the aircraft's performance. As part of the recovery and medical attention that the pilot received the chest strap was cut and it is not possible to establish if this displaced the buckle. As part of the equipment recovery the straps were tied together to support the glider and this further indicates that the chest strap width cannot be ascertained with any degree of confidence.

1.7 Meteorological information

Bo Peep site is situated between Eastbourne and Lewes. An aftercast was requested from the Met Office and comments related to the specific flying conditions at the time of the accident at the site were also taken (Section 1.1 above).

The conditions throughout the day were windy (gusty) and thermic, implying airborne turbulence to which a paraglider is susceptible. The aftercast showed low level winds of 07 knots, rising to 10 knots at 1000 feet, and blowing from a northerly/north northwest direction. Visibility was good at 15 kilometres or more. Conditions were concluded to be challenging but manageable with care for pilots with appropriate skills and experience.

1.8 Aids to navigation

Not Applicable

1.9 Communications

Not Applicable

1.10 Aerodrome and approved facilities

The Bo Peep ridge is a commonly used flying site by both hang glider and paraglider pilots. It is approximately 3km long is soarable along its whole length in a Northerly wind. There are a number of permitted take off and landing areas. Hang glider pilots tend to take off from the 'Bostal Hill' take off (see diagram in Appendix B) and the paraglider pilots from a few hundred metres further to the south east along the ridge, to avoid any turbulence from the trees as the foot of the slope. The Southern Club site guide describes the area at the Bostal Hill take off as follows; "*The trees in front of the Bostal Down launch also generate severe turbulence in strong winds. It is recommended that you launch from and land behind the East Bowl until you get to know the site well.*"

The site is for qualified hang glider and paraglider pilots of BHPA Club Pilot level and beyond. On 12th July 2005 the site was busy, with about forty paragliders and ten hang gliders on site. At the time of the accident there was about twenty five paragliders airborne and four or five hang gliders. These gliders were spread along the length of the ridge, at heights varying from ridge level to several hundred feet.

1.11 Flight recorders

Not Applicable

1.12 Wreckage and impact information

The impact area was a hillside with partial coverings of grass, gorse and other low vegetation

1.13 Medical and pathological information

The report of the post-mortem indicated the pilot died from Haemorrhage arising from multiple pelvic fractures sustained by trauma

1.14 Fire

No fire

1.15 Survival aspects

The pilot was attended to very shortly after the accident, and was immobilised and kept warm by first aid on site. There were no external injuries treatable by non-professionals and as such no active care was provided. The air ambulance arrived approximately 15 minutes after the accident and the pilot was evacuated to hospital promptly.

1.16 Tests and research

The glider was inspected after the accident. The inspection revealed that a number of repairs to the internal structure of the wing (vertical ribs) had been made using "gaffer" tape (see Appendix A). This is not a recommended or approved repair technique. Given the condition of the wing and the poorly completed repairs, the Board decided against test flying the glider. It is therefore not possible to fully establish the effect of these repairs.

1.17 Organisational and management information

Not Applicable

1.18 Additional information

The repair to the glider described in 1.16 would not, in the Board's view, have had the effect of improving the recovery characteristics of the glider once the partial collapse occurred – it may even have made matters worse. However, the Board also conclude that the behaviour of the glider, and its collapse, was in line with what could reasonably be expected of such a wing flown in the prevalent meteorological conditions on the day. It is for this reason that the effects of the repair have not been explored more fully. Put another way, under the same circumstances a glider without such a repair would almost certainly have impacted the hill in a similar way as the time and height for recovery was insufficient.

1.19 Useful or effective investigation techniques

Not Applicable.

SECTION 2 - ANALYSIS

It is clear from the evidence and the witness reports that the incident was initiated by a partial deflation of the glider, sustained in an area known to be turbulent and whilst close to the hill. This deflation caused a turn towards the hill and the ensuing impact. The Board considered the site, the deflation and the results thereof.

THE SITE:
The Bostal Hill area of the ridge is well known to be dangerously turbulent in breezy conditions. This is documented in the 'hazards' section of the Southern Club sites guide. This take off area is more normally used by hang glider pilots as it is the nearest to the car park and because hang gliders are not affected by turbulence to the same degree as paragliders. Pilot A had been a member of the Southern Club for some years and would have been well aware of the dangers at this area of the site in the conditions that prevailed on the day.
The Board found that the decision of Pilot A to launch from the Bostal Hill take off, rather than walk a further few hundred metres to the less turbulent take off areas, had a direct impact on this incident.

THE DEFLATION:
The deflation occurred as a result of an encounter with turbulent air. This turbulence would have been invisible to the pilot, but would have been an expected part of the flight given the meteorological conditions on the day, the area of the site chosen for take-off and for a pilot with the experience of the individual in this case. A paraglider will respond dynamically to turbulence based on a number of factors. As a paraglider wing does not contain any solid or rigid frame of support within its structure, it relies on the air pressure within its form to remain inflated and flying. As small parcels of air generated by wind, thermal activity, proximity to ground or other aircraft are flown through, they can act on and over the full expanse of the wing causing an imbalance and partial, temporary, deflation. These deflations, whilst disturbing if encountered suddenly, are an expected part of a paraglider's characteristics and hence are tested as part of the certification process.

The Edel Response glider flown in this incident is rated as DHV2-3. The definition of this class of certification by the DHV is;

"Paragliders with very demanding flying characteristics and potentially violent reactions to turbulence and pilot errors. Recommended for experienced and regularly flying pilots."

Further to this, the certification of the Edel Response includes the following comment regarding the behaviour following a partial (asymmetric) deflation;

Asymmetric collapse:	Turn tendency: 180 - 360 degrees
	Rate of turn: average (min weight) high (max weight)
	Loss of altitude: average
	Opening behaviour: spontaneous, delayed

Having considered the meteorological report, the site information and the reports of the witnesses the Board concluded that the conditions were typical of those likely to cause deflations. With this in mind the Board considered the resulting behaviour of the glider. The turn towards the right (and towards the hill) was a 90 degree turn. The witness reports stated that the glider impacted the hill very shortly after the collapse and with the glider still turning and descending. Given that the pilot was towards the upper end of the weight range of the glider these reports are in line with the information predicted by the wing's certification flight tests.

THE IMPACT:

The Board considered the very short period of time between deflation and the impact with the hillside. The Board did not consider that the impact with the hill could have reasonably been avoided once the deflation and ensuing change of glider direction had occurred.

SKILLS AND EXPERIENCE:

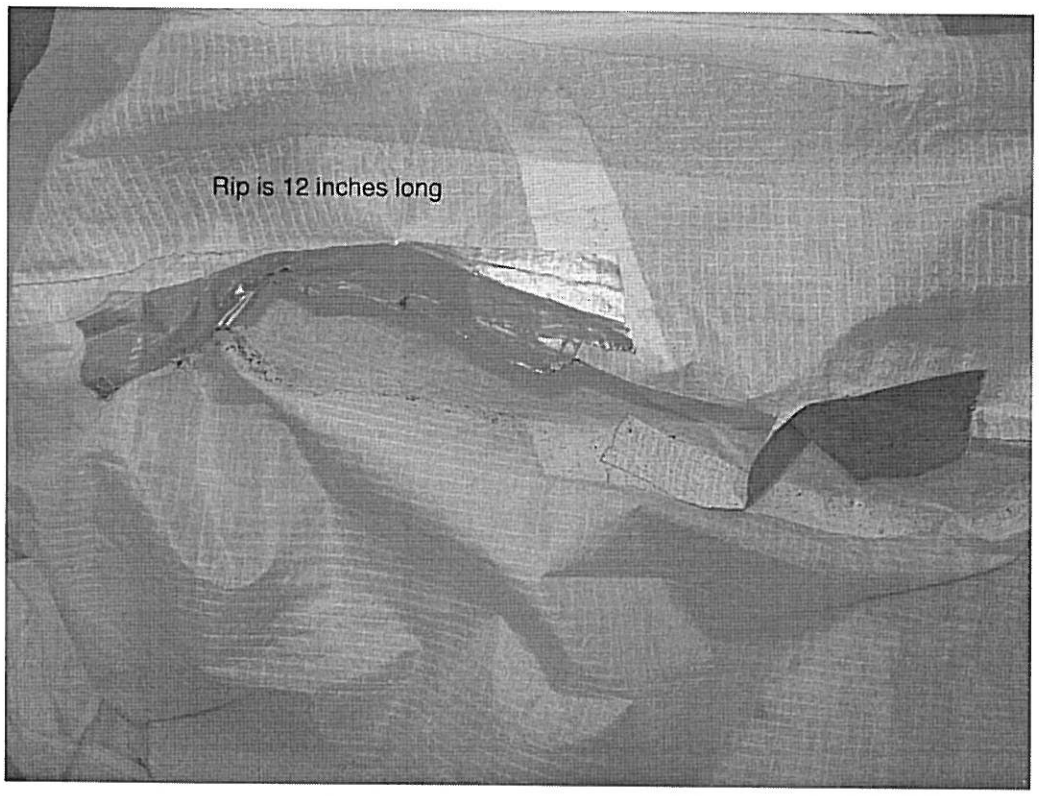
The pilot was an experienced paraglider pilot with several years and many hours of experience. It is reasonable to conclude from review of the pilot's log book that he was experienced in flying different models of wing at different sites and in differing weather conditions. It is almost certain that, given this level of experience, the pilot would have been aware of the causes and effects of deflations to a paraglider.
The Board considered the flight immediately prior to the deflation. A witness to the incident (Witness A) confirms that just prior to the right-hand deflation the paraglider had suffered a much smaller deflation to the left wing-tip. This occurrence would have alerted the pilot to the presence of turbulence and that the turbulence was of a scale that did result in deflations. The pilot, at this stage of the flight, could have chosen to apply slightly more brake input to the glider. This input would have increased the internal air pressure of the glider and would have increased the glider's resistance to deflation. The pilot could also have chosen to fly further away from the hill by initiating a turn to the left (away from the hill). The pilot appeared not to choose either of these options.

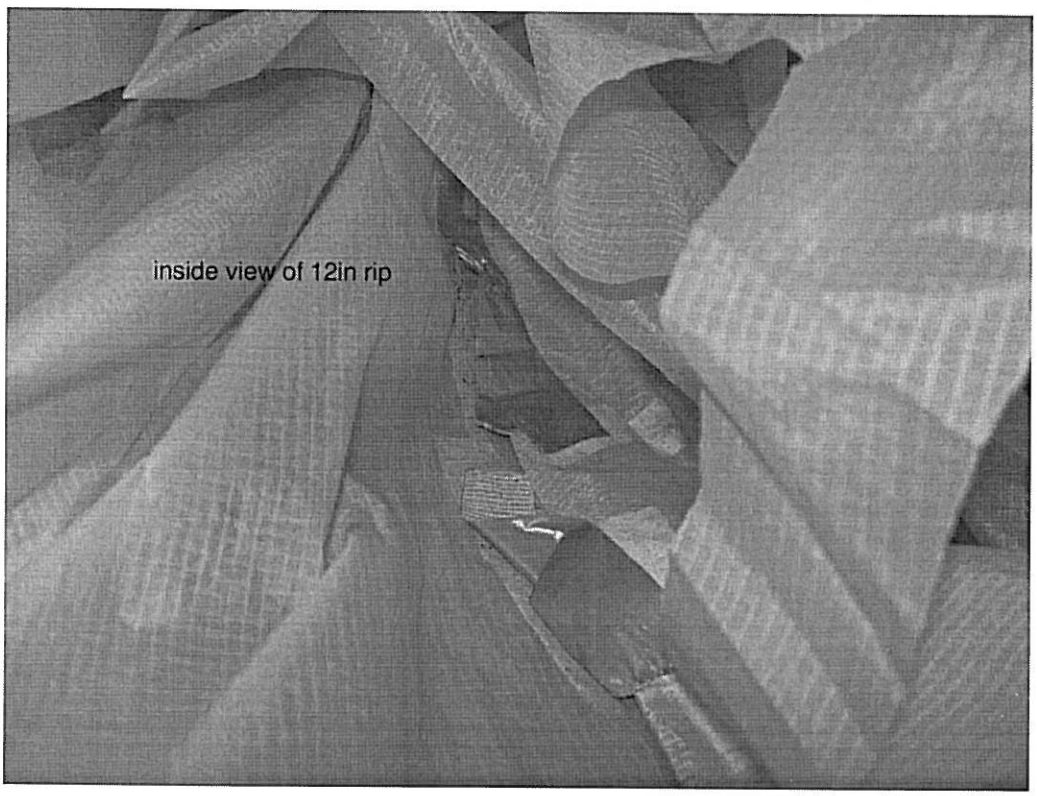
EMERGENCY PARACHUTE:
The pilot was carrying an emergency parachute. The Board considered it extremely unlikely that there would have been time and height to deploy an emergency parachute once control had been lost.

SECTION 3 - CONCLUSIONS
The Board found that the incident was caused by the failure of the pilot to recover from a partial collapse of the paraglider brought about by the turbulent meteorological conditions prevailing at that particular part of the site at the time of the flight – an area known to be dangerously turbulent in breezy conditions due to trees at the foot of the slope. This resulted in an impact with the hill that the Board considered was unavoidable under the circumstances. It was not possible to establish if the poor condition of the glider was a significant contributing factor to the incident, but the equipment was not considered to be airworthy.

SECTION 4 - SAFETY RECOMMENDATIONS
The Board recommends that the Flight Safety Committee continues to remind pilots, via Skywings, of the dangers associated with flying paragliders with little or no inherent stability. The Board would also wish for a reminder to be made that any structural repairs related to flying equipment should only be undertaken by a suitably qualified person.

APPENDIX A
Structural photos.





APPENDIX B
Site diagram.