

## ACCIDENT

<b>Aircraft Type and Registration:</b>	UP Makalu wing and Sup'air X-Alps harness	
<b>No &amp; Type of Engines:</b>	None	
<b>Year of Manufacture:</b>	2003	
<b>Date &amp; Time (UTC):</b>	26 May 2007 at 1402 hrs	
<b>Location:</b>	Wether Fell, Hawes, North Yorkshire	
<b>Type of Flight:</b>	Private	
<b>Persons on Board:</b>	Crew - 1	Passengers - None
<b>Injuries:</b>	Crew - 1 (Fatal)	Passengers - N/A
<b>Nature of Damage:</b>	None	
<b>Commander's Licence:</b>	Pilot (Hill)	
<b>Commander's Age:</b>	45 years	
<b>Commander's Flying Experience:</b>	Regular flying since 2002, actual hours unknown	
<b>Information Source:</b>	AAIB Field Investigation	

## Synopsis

At a height of less than 100 ft above a steeply sloping hill the wing of the paraglider suffered an asymmetric collapse over approximately 60% of its area. The wing had partially re-inflated when the pilot impacted a rock imbedded in the hillside. The wing was found to be serviceable and the collapse was probably caused by air turbulence.

## History of the flight

On the day of the accident there had been a hang glider competition at the hill site, alongside which several paragliders were also flying. Earlier in the afternoon a hang glider had suffered an unrelated accident, as a result of which emergency services were already in attendance. At the time of the subsequent accident to the paraglider, most of the competition pilots had landed and conditions were described as turbulent, with "lively

thermal conditions". The accident pilot was seen by other paraglider pilots to be flying at a height of between 50 and 100 ft above the local terrain and was presumed to have become airborne shortly beforehand.

As the paraglider proceeded in a south-westerly direction along the ridge, it sustained an asymmetric collapse over approximately 60% of its area, originating from the left (ridge side) wing tip, causing it to drop and turn towards the slope. The canopy began to re-inflate almost immediately, swinging the pilot towards the slope. With approximately 50% of the canopy remaining collapsed, he impacted the hill laterally, hitting a rock at a point where the terrain sloped at an angle of approximately 70° to the horizontal. Other pilots who ran to assist him found him conscious and conversant. After receiving first aid from the emergency services, the pilot was

placed on a stretcher and raised up the steep slope using ropes to an area of flatter ground. Approximately 30 minutes after the accident he was taken to hospital by an air ambulance.

### Medical and pathological information

Though serious, the pilot's injuries were not thought by those who first attended him to be life threatening. However, the complicated injuries to his pelvis caused severe bleeding to which he later succumbed.

### Aircraft information

The paraglider comprised a wing and harness, manufactured separately.

#### *Wing*

The UP Makalu Extra Large wing used by the pilot had a DHV<sup>1</sup> 1-2 classification, indicating that it had 'good-natured flying characteristics' and was considered likely to recover positively from a partial collapse with little or no control input from the pilot. The Extra Large wing is typically used for dual flying, with an ideal suspended weight range of 110 – 150 kg. The pilot's weight fell within this range however and the wing was therefore suitable for him to operate solo.

#### *Harness*

The harness was a Sup'air X-Alps Large which incorporated under the seat protection against vertical impact but no protection from side impacts. When worn on the ground and not under flight loads the harness of a paraglider is suspended from the pilots shoulders by padded straps. In the air the pilot is also secured within the harness by leg straps and a chest strap.

#### Footnote

<sup>1</sup> Deutscher Hangeleiterverband, the German Hang Gliding and Paragliding Federation, the technical department of which conducts type tests on flying equipment and accessories to assess their safety characteristics and airworthiness.



**Figure 1**

Typical harness layout

The chest belt performs the further function of adjusting the distance between the two risers. Correct setting of this strap is important in determining the flight characteristics of the wing. Fully tightened, it gives the sensation of more security but can make the paraglider easier to spin. Too 'open' a setting (whereby the risers are held relatively far apart) makes the wing less stable, less likely to recover automatically from a partial collapse and makes recovery from spiral dives and partial collapse less certain – no longer within the parameters of a certified glider.

## Examination of wreckage

The wing and harness were found to be serviceable, unmodified and in a condition commensurate with their age. It was not possible to determine the harness chest strap setting used during the accident flight, because it had probably been loosened during efforts to assist the pilot.

## Location

Wether Fell rises in the Pennine Uplands south of the town of Hawes. On the day of the accident flying was conducted on the steep west-facing slope which ascends from a narrow valley at 290 ft amsl, to a summit, Drumaldrace, at 614 ft amsl. The surface is mostly well drained rough grass with several areas of exposed earth where the terrain is particularly steep. The few rocky outcrops are small and well dispersed. A series of parallel dry stone dykes, spaced at intervals of approximately 200 m, form the only man-made obstacles in the area over which the pilot was flying. On the day of the accident the ground was described as slippery and spongy but “not particularly wet”.

Mixed hang gliding and paragliding activities are commonplace at this site, with clearly defined landing and takeoff zones for each discipline.

## Meteorological information

Pilots reported a wind of 6 to 15 kt with gusts up to 21 kt in the ‘compression zone’<sup>2</sup>. Winds of this magnitude are considered likely to cause turbulence sufficient to induce asymmetric collapse of a paraglider wing.

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### Footnote

<sup>2</sup> The ‘compression zone’ is that part of the airflow closest to a hillside where acceleration of the airflow is greatest and wind speed will be greater than the free stream value measured some distance from the hill. The BHPA refers to this as ‘the zone of accelerated airflow’.

## Pilot information

The pilot gained his Club Pilot (Hill) qualification on 12 September 2002 and his Pilot (Hill) rating on 6 February 2004. He was also a club coach. Possession of these qualifications indicates that a pilot has passed theoretical examinations in air law, meteorology, airmanship and navigation. Pilots are examined on their understanding of an asymmetric collapse and how to effect a recovery.

## Wing categorisation

The DHV certification scheme is divided into different categories, indicating the passive safety characteristics of a paraglider. The DHV recommends that pilots use a paraglider from a particular category, according to their experience level. According to the DHV website the lowest categories for paragliders, class DHV 1 and DHV 1-2 are deemed to be suitable for pilots with very little experience and:

*‘should have a good chance of avoiding a crash, should the paraglider suffer a collapse close to the ground.’*

The BHPA commented that these characteristics can only be guaranteed if the pilot flies with the harness chest strap set correctly.

## Asymmetric collapse

### Causes

Asymmetric collapse can be caused by turbulence associated with thermal activity or by the effects of strong wind passing over local terrain. It can also be initiated by any pilot input that reduces significantly the angle of attack of one side of the wing compared to the other, such as pulling down on a front riser.

### *Control*

A paraglider is fitted with two control or brake lines which pull down on the trailing edge of each side of the wing. To initiate a turn, the pilot pulls down on the brake line on the side he wishes to turn towards. The pilot can assist the turn by shifting his weight to the same side.

Avoiding turbulence is considered the best way to prevent collapse because any wing confronted with a sufficiently strong vertical gust will collapse. A wing loaded towards the top of its certified weight range will be the most resistant. The pilot can assist recovery by applying a smooth 'pump' (a long pull and release of the brake) on the affected side, whilst maintaining direction by shifting weight away from the collapse and applying brake opposite to the collapse. Weight shifting has the advantage of controlling the tendency of the wing to turn towards the collapse whilst minimising height loss. Height loss of at least 50 ft is typical.

Many participants and manufacturers advocate 'active flying' whereby the pilot maintains light brake application, making constant adjustments through each brake line in response to relative slackness on that side

to restore tension. Active flying is taught as part of the BHPA Club Pilot course.

### **Conclusion**

It is likely that the pilot had sufficient experience and training to fly the equipment, which was found to be serviceable and appropriate for his weight. The strong wind and thermal activity produced turbulence sufficient to induce an asymmetric collapse, which occurred at a height from which the pilot was unable to effect a recovery. As the left side of the wing began to recover the pilot swung towards the slope, which he impacted sideways on an isolated rock. It is unlikely that the provision of additional side impact protection would have altered the outcome.

The BHPA advises paraglider pilots to cease flying activities when thermal activity and wind speed is sufficient to cause turbulence leading to a collapse.

### **Safety action**

The BHPA, through its own publications and registered paragliding schools, intends to raise awareness of the risks of flight in turbulent conditions.