ACCIDENT

Aircraft Type and Registration:	ITV Agena 30 paraglider	
No & Type of Engines:	None	
Year of Manufacture:	1995	
Date & Time (UTC):	12 May 2008 at 1847 hrs	
Location:	3 nm south of Luss, Loch Lomond, Scotland	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - None
Injuries:	Crew - None	Ground assistant -1 (Fatal)
Nature of Damage:	Not applicable	
Pilot's Licence:	Not required	
Pilot's Age:	19 years	
Information Source:	AAIB Field Investigation	

Synopsis

A paraglider became airborne with a second person holding the harness straps in a deliberate attempt to increase the paraglider's weight. The paraglider unexpectedly gained height and the second person fell, suffering fatal injuries. The investigation concluded that unsuitable equipment, unsuitable wind conditions and a lack of formal training were contributory factors.

Background to the accident

On the evening of the accident, a group of four friends travelled with two paragliders to the hill site where the accident later occurred. One of the four had no experience of paragliding and was not directly involved in the flying activities. The other three had limited paragliding experience, although the eldest (35 years) was a commercial fixed-wing pilot with considerable skydiving experience. The accident victim was the elder of two brothers, aged 19 and 21 years.

The eldest of the group had acquired a used paraglider the previous summer and the group had taught themselves the basics of paragliding flight, using books, videos and the internet. That summer (2007) the group confined their activities to ground handling of the equipment and short downhill 'hops' in light wind conditions on gentle slopes. None of the group received any formal instruction in paragliding techniques. A second paraglider was acquired during the winter months of 2007/2008. This was bought by the man who was later to lose his life in the accident. He and his younger brother had subsequently made a number of short 'training' flights similar to those of the previous season. The second paraglider was of a similar category to the first.

Two weeks before the accident, the group had gone to the hill site for the first time, for their first experience of ridge soaring. The site they chose had been used in

the past for paragliding but was not a regular venue. It was situated on the east facing slope of Shantron Hill (elevation 1,243 feet amsl), which commanded views to the east over Loch Lomond. Two of the group flew without incident in fine weather conditions and relatively light winds, using a launch position part way up the hill at about 850 feet amsl. The accident victim chose not to fly on that occasion.

The accident

With fine weather conditions, the group decided to fly again at the same location, arriving there with their equipment in the early evening. The same two fliers made short flights and found that the wind conditions were not as favourable as before. The wind was stronger and gustier and seemed to increase during their time on the hillside. This meant that the paragliders could not penetrate the wind sufficiently to soar the ridge, but instead were forced steadily backwards up the hill before landing on a flatter area above the launch site. The eldest of the group had completed two flights before deciding that he was not comfortable with the wind conditions and would not fly again. At this point, the other pilot had flown once and was further down the slope with his elder brother (who had again decided not to fly), preparing for a further launch.

As the eldest of the group approached the other two down the slope, he saw the second pilot launch his paraglider, with the pilot's brother holding on to the harness straps at his rear. Both the first pilot and the non-flying member of the group were alarmed and shouted to the 'passenger' to hold on. They described the paraglider rising about 10 feet in the air before descending briefly to the surface. It then rose very quickly "straight upwards", still with the pilot's brother holding on.

The paraglider rose to an estimated 150 to 200 feet and the pilot appeared to be having difficulty controlling the paraglider, being tilted backwards in his harness by the weight of the second man. After what the witnesses estimated as two or three minutes, the second man fell from the paraglider, while it was still at a considerable height. The two men on the ground ran to the casualty, who was unconscious and seriously injured, and were later joined by the casualty's brother who landed his paraglider further up the hill. Emergency services attended the scene but the casualty succumbed to his injuries before he could be moved from the hillside.

Pilot's account

The pilot of the accident paraglider gave his account of the event. With the paraglider failing to penetrate the wind, it was decided to try to increase its weight, which would increase the wing loading and forward speed. While the pilot kept the wing on the ground, his brother found some rocks which were put into the harness to increase weight. There were not many rocks nearby, so the pilot decided to launch anyway, accepting that the paraglider would probably still track backwards up the hill. His brother suggested flying the paraglider with their combined weights. Neither knew what effect this would have, or whether it would in fact fly with so much weight. The pilot thought that it probably would, but thought it inadvisable. However, there was a further brief discussion between the men and it was decided that they would attempt to launch with the second man holding onto the rear of the harness. It was agreed that he would let go if the paraglider seemed likely to gain height, but both men thought that it would most probably descend at low height down the hillside.

The pilot recalled that the paraglider seemed to launch rapidly once the wing filled with air, and rose straight

up at an unexpectedly fast rate, describing it as being "wrenched" upwards. The pilot was tipped back in the harness, looking up at the wing, and had difficulty getting his feet behind the speed bar, a control which would allow him to vary the paraglider's airspeed. Eventually he let go of the control lines to free his hands so that he could bring the speed bar into operation. He shouted to his brother to hold on, and thought that he would be able to land the glider lower down the slope; the increased weight did have the effect of allowing the paraglider to make progress down the hillside. He also manoeuvred to his left so that, by flying across the prevailing wind, the glider would descend more quickly. The pilot's brother warned that he may have to let go, and did so soon afterwards.

Post-accident activities

When his friends reached him, the accident victim was lying unconscious at the bottom of a gulley, about 40 feet deep, into which he had fallen after landing on the ground at the gulley's edge. One of the group called the emergency services at 1849 hrs. As well as a ground-based ambulance, the Scottish Ambulance Service's Glasgow-based helicopter was scrambled, taking off at 1859 hrs with a doctor and paramedic on board. The helicopter was able to land on a flatter part of the hill above the accident site, the helicopter's log recording that it arrived on scene at 1916 hrs, 27 minutes after the '999' call.

An ambulance-based paramedic was met at the base of the hill by the fourth group member and guided to the scene, arriving at the casualty just after the helicopter team. At this stage the casualty was breathing with difficulty and was still unconscious. The medical team were in radio contact with a consultant doctor at the Royal Alexandra Hospital in Paisley. It was soon decided that he too should attend the scene, and was ferried there on board a Royal Navy Sea King helicopter from HMS Gannet at Prestwick. Unfortunately, the medical team were unable to save the casualty, who was declared dead at the scene at 2030 hrs. The post-mortem examination revealed that he died as a result of chest injuries sustained in the fall.

Meteorological information

The Met Office provided an assessment of the likely wind conditions. There was little observational data for the accident area, but an isobaric analysis produced a 2,000 feet wind estimate of 30 to 35 kt from the south east. However, there was also a low level inversion at a similar altitude, which may have caused the 2,000 feet wind to have been markedly different from lower levels. With the blocking effect of the mountains and a low inversion layer, the wind at the level of Loch Lomond would probably have been light and variable. Although the wind at the launch site may also have been quite light at times, temporary increases in wind strength to between 20 and 25 kt were probable. Wind direction would have been from between 130º and 160º.

Witnesses described the wind as being reasonably strong at times and quite gusty. There had also been a brief conversation between the older paraglider pilot and a hill walker who passed by before the accident. The walker (who was a Mountain Rescue Team member) had seen that the paragliders were being forced up the hill and commented that he thought the wind would have been too strong for paragliding.

Recorded information

The eldest group member used a helmet-mounted camera which recorded some of the ground training sessions and much of the events of the accident evening. Being helmet-mounted affected the quality of the recording, and the majority of spoken words were

lost against background noise. However, pertinent information was gained, as described below.

Based on the limited information from the recording, the older man was evidently the most experienced of the group and tended to lead the training sessions. The recording of the accident events started on the hillside with both paragliders being readied for flight. There was obviously some early discussion about the wind before launch, as the older pilot commented "it's getting up a little". About seven minutes into the recording the pilot made a failed launch attempt, followed by a successful one. The flight lasted about one minute, and the paraglider's progress back up the hillside could be seen.

The conversation with the passer by was captured in part, when the pilot replied "yeah it's a little bit windy". After this the pilot moved the paraglider back down the slope toward the original launch point. The pilot appeared to be referring to the other paraglider when he shouted "where's (name) going?" then "go back". The pilot was joined by the older brother and there was clearly another conversation about the wind, the pilot saying "the wind is definitely picking up". there was a brief view of the other paraglider, much further up the hill, and the older pilot shouted "speed bar, speed bar", probably meaning that the pilot should increase forward speed against the headwind.

The older pilot launched again for a longer flight of three minutes, before landing considerably further up the hill. He gathered his paraglider then walked to where the other paraglider was being prepared to launch. The camera captured the point at which the paraglider launched with the older brother holding on. For about two seconds the paraglider flew close to the ground, before the ground beneath it fell away and the paraglider rose out of the camera field of view. Both men on the ground shouted "hold on" as it did so. The accident itself was not captured but, assuming it occurred when the men on the ground started running to the scene, the paraglider was airborne for just under one minute before the second man fell.

Paragliding activities

The sport of paragliding is unregulated in the United Kingdom. Consequently, there are no legal requirements for paragliders to be registered or conform to any standards, or for paraglider pilots to undergo training or hold any formal qualifications. Nevertheless, most paraglider types in the UK have been subject to stringent safety tests and classified according to their flying characteristics against standards agreed by the major paragliding federations and associations in Europe.

The majority of paragliding activity in the UK occurs under the auspices of the British Hang Gliding and Paragliding Association (BHPA). Most paragliding clubs and schools are affiliated to the BHPA (though they are not required to be) and training courses at such schools teach a BHPA-approved syllabus which leads to internationally recognised paragliding qualifications. The BHPA also operates a compulsory reporting scheme for paragliding accidents and incidents, and conducts its own investigations, where appropriate, or provides technical assistance to AAIB investigations. Full details of the BHPA's activities, including information on learning to fly, are given on their website at www.bhpa.co.uk.

Paraglider information

The Agena 30 paraglider (the number referring to approximate wing area in square metres) involved in this accident was manufactured by the French company ITV, and was certified for production on 10 October 1993.

According to the ACPUL[1] classification used at the time, the paraglider was suitable for beginners' use, achieving an 'A' rating in each of 10 (later 12) flight manoeuvres. Grades A to C were awarded for each manoeuvre, with 'C' being applicable to the most demanding high performance/low stability wing types and 'A' being suitable for inexperienced pilots and training.

The Agena 30 was the largest of four paragliders in the Agena range and had the largest weight capacity, of between 92 and 110 kg. This was a total weight, to include the paraglider wing and lines, harness, pilot and equipment. Although flight outside the weight range would have been possible, flight tests were only performed at the declared weights. As paragliders are very sensitive to weight variations, the flight characteristics observed in testing could not be relied upon outside the declared weight range. The optimum weight is considered to be at, or slightly above, the middle of the weight range.

The Agena 30 had a quoted maximum speed of 39 km/hr (21.3 kt) and a trim speed of 34 km/hr (18.6 kt). These speeds would be valid for a weight at the top of the allowed range, since this would provide the maximum wing loading and forward speed, albeit at the expense of some gliding efficiency. In the opinion of a BHPA technical officer, the paraglider would be considered to be slow by modern standards, although the handling characteristics would not be dissimilar to a modern design of the same classification.

The paraglider involved in the accident had been purchased by the deceased man via the internet, along with the harness and ancillary equipment. He had established that the equipment was suitable for beginners' use and was satisfied with the vendor's credentials, although the weight capacity of the paraglider and its age had not been major factors in the purchase.

The paraglider was about 12 years old and bore a manufacture date of 8 November 1995. Paraglider wings are relatively delicate and in normal use are subject to deterioration over time through exposure to UV light and general wear, even if regularly serviced. At 12 years of age and with an undocumented past, the paraglider in question should, according to the BHPA technical officer, have been regarded as at, or beyond, the end of its safe life. He advised that it would be unwise to fly such a paraglider without a recent report from the manufacturer (or other suitably able service facility) showing the fabric and suspension lines to be in serviceable condition. The nature of the accident and the paraglider's performance on the day were such that the paraglider and associated equipment were not required to be examined in close detail during the investigation. Based on a visual inspection, the wing and lines appeared to be in reasonable condition.

The pilot of the paraglider on the evening of the accident weighed 75 kg and his brother, who purchased the equipment, weighed 70 to 72 kg. The pilot estimated that the rest of the equipment accounted for 15 to 20 kg. Thus, with either of the brothers as pilot, the paraglider weight would have been at the bottom end of the declared weight range, or slightly below it.

Analysis

Although none of the group had sought or received formal instruction in paragliding, their overall approach to it appears to have been cautious and considered. They had, sensibly, conducted their early activities on gentle slopes and in benign conditions, as witnessed in part by the camera recording.

Footnote

[1] ACPUL was an acronym for a European association of paraglider manufacturers.

The meteorological situation was such that the group would have experienced quite light wind conditions before climbing the hill, but may not have been aware of the potential for relatively strong wind and gusts at the launch point. The fact that the paragliders were unable to make headway and were forced back up the hill indicates a wind strength of 20 kt, or possibly more, was being experienced at times. The wind conditions were unsuitable for the group's experience level, although the older pilot clearly appreciated that the wind was quickly becoming a factor.

The presence in the group of an individual with significant commercial flying and skydiving experience may have been a factor in deciding not to seek formal training, and it is likely that the younger members looked to him for guidance, at least in part. It is also likely that he acted as a positive steadying influence on the younger men, and was more able to recognise higher risk areas and ensure that the group's activities were as safe as they could make them. Although this is supposition, it is supported by the available recorded evidence.

The decision not to seek formal training had a bearing on the accident itself. In the first place, expert advice would have been more readily available concerning the paraglider purchase and one with a more suitable (ie lower) weight range may have been sought. Second, under proper tuition the group would have been more aware of the risks associated with stronger winds and therefore less likely to have been flying on that particular evening. The hazards of what the two young men were attempting to do by increasing the paraglider's weight would also have been better understood, and they would have been trained in a culture in which such experimentation is forbidden.

The decision to experiment with the paraglider's weight came about because the pilot was attempting to fly in relatively strong wind conditions. The group had not encountered the conditions before; the decision taken by the two brothers on the hillside was without input from the oldest and most experienced of the group. The idea was therefore not given sufficient thought and the possible consequences were not foreseen.

Although the theory of increasing weight to increase speed was correct, this was not an accepted practice (with the possible exception of the competition arena, where water ballast is sometimes used). The inclusion of rocks into the harness would have substantially increased the risk of serious injury during landing. The control difficulties experienced by the pilot because of the extra weight and trim change were not considered, nor were the possible adverse effects of an instantaneous reduction in 'all up' weight of nearly a half if the passenger needed to let go. It is also unlikely that the men appreciated the significant risk of structural failure that existed, given the uncertain condition of the ageing paraglider. The brothers' overall lack of paragliding experience meant that they were also unaware of the potential of the wing to lift both men with ease in the wind speeds that existed.

Conclusions

This accident highlights the fact that aviation in any form, regardless of the level of complexity or regulation involved, incurs risks which need to be understood and mitigated. Compared with other sports, aviation is far less forgiving of experimentation and improvisation. The group had acquired considerable knowledge and had taken a cautious approach to flying. Even so, without the benefit of formal training and expert advice, which is readily available within the BHPA system, the two brothers found themselves with equipment unsuited to their weights and in conditions unsuited to their experience level. They embarked on a course of action, the dangers of which they did not fully understand.