

ACCIDENT

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| Aircraft Type and Registration: | Cameron Z-315 Balloon, G-KNIX | |
| No & type of Engines: | 3 Thunder and Colt Triple Stratus burners | |
| Year of Manufacture: | 2005 | |
| Date & Time (UTC): | 10 September 2006 at 0640 hrs | |
| Location: | 1 mile south of Ashton Keynes, Wiltshire | |
| Type of Flight: | Public Transport | |
| Persons on Board: | Crew - 1 | Passengers - 16 |
| Injuries: | Crew - None | Passengers - None |
| Nature of Damage: | Torn fabric in the lower half of the envelope | |
| Commander's Licence: | Commercial Pilot's Licence | |
| Commander's Age: | 42 years | |
| Commander's Flying Experience: | 1,491 hours (of which 1,250 were on type) Last 90 days - 59 hours Last 28 days - 16 hours | |
| Information Source: | AAIB Field Investigation with assistance from the British Balloon and Airship Club | |

Synopsis

The balloon ascended into widespread fog and flew in the clear air above. The pilot made three deliberate descents into the fog in an attempt to land, during the second descent the balloon avoided power lines before striking and becoming lodged in a tree. Having broken clear of the tree, the balloon flew on above the fog until the pilot entered the third descent, which culminated in a safe landing. The investigation determined that the accident would have been avoided had the pilot waited for the visibility to improve before launching. The minimum visibility for the launch to occur under Visual Flight Rules was 5 km, whereas the visibility at the time of the launch was of the order of a few hundred metres.

History of the flight

The balloon operator had planned a public transport (passenger) balloon flight from a launch site on land adjacent to Lydiard Hall, Swindon. The evening before the flight, the pilot discussed the forecast weather conditions with a colleague at the operator's offices. He was assured that advice had been sought from a forecaster (through a commercial 'talk to a forecaster' service provided by the Met Office) and that conditions were forecast to be suitable for flying. In particular, it was forecast that the visibility would be clear by 0600 hrs, although there was a minimal chance of very poor visibility and haze may be prevalent. Before leaving home on the day of the accident, the pilot made a final check

of the weather information on Ceefax¹.

The balloon pilot, the ground crew and 16 passengers arrived at the launch site for the planned departure at 0600 hrs and the balloon was prepared for flight. It was foggy but this was forecast to clear during the morning.

At the launch site there was some debate between the pilot and ground crew about the poor visibility and they discussed whether they should fly. The pilot telephoned a colleague who was planning to launch from a site some distance south-east of Lydiard Park where he understood that fog was making flight unlikely.

The pilot of G-KNIX stated that although the visibility posed a problem, he was also concerned that increasing thermal activity might compromise the flight if he delayed the launch. He telephoned ATC at Lyneham (seven miles south-west of Lydiard Park) to inform them of the position of the launch site and the intended flight. He then arranged for the launch and made radio contact with Lyneham ATC. The pilot reported that the visibility appeared to improve and that he had every reason to assume that the fog was clearing; he believed that the minimum required visibility was eventually achieved. He briefed the passengers that the mist and fog would clear once the balloon was airborne.

The balloon launched at 0600 hrs and ascended from Lydiard Park towards the north-west. Statements from a number of passengers, together with video and photographic evidence, showed that the surface visibility at the launch site was a few hundred metres. The passengers described losing

sight of the ground shortly after launch, as the balloon rose into the fog.

The balloon emerged from the fog into clear skies. There was hardly any sight of the ground; the blanket of fog covered the ground in all directions. The pilot stated that he found there was sufficient steerage², with the surface wind easterly at about 5 kt and the 1,000 ft wind southerly and slightly stronger.

Although not required, the pilot carried a hand-held GPS receiver with him. Shortly before 0620 hrs, he established that the balloon was drifting over an area clear of obstructions as depicted on his customised 1:50,000 Landranger map. (This map showed significant ground detail, but did not feature small power lines, hedges, trees, or some buildings.) He then made an exploratory descent into the fog but, when he gained sight of the ground, he saw that the area was not suitable for a landing, and so climbed back into clear air.

The pilot then chose another area on the map which appeared to be free of buildings and obstructions, and prepared for landing. As the balloon descended some power lines '*loomed out of the fog*' about 200 m ahead, causing the pilot to activate the burners to climb the balloon safely above them. Subsequent investigation found that these were not high voltage power lines on large pylons, but a less substantial variety, standing less than ten metres above ground, and supported by thick wooden posts. Once past the power lines, the pilot saw a grass field, which he assessed as suitable for a landing. However, he could not see the far side of the field; he assessed the prevailing

Footnote

¹ A teletext service provided by the BBC.

Footnote

² Steerage is the degree to which a balloon pilot may steer the balloon by using variations in the wind velocity at different heights.

visibility to be about 50 m. He dumped air to initiate a descent to land but, as the balloon touched the ground it bounced. Almost simultaneously, the pilot saw a line of trees directly ahead and the balloon was carried into a substantial oak tree. One limb of the tree punctured the balloon envelope and the balloon became lodged within the tree.

The pilot judged that the basket was suspended too high above the ground to allow safe deflation and disembarkation, and so he activated the burners for one or two minutes. This eventually caused the balloon to break free and it climbed rapidly to between 1,000 and 1,500 ft. The pilot had been using a hand-held VHF radio, to communicate with ATC and his ground crew, and this fell from the basket during the encounter with the tree; the pilot subsequently used a mobile telephone for the necessary communications. Damage to the balloon was limited to four or five panels, all in the lower half of the envelope, and the pilot decided that the balloon was still capable of safe flight.

The balloon continued north-west, over the Cotswold Water Park (an area of large lakes adjacent to the River Thames west of Ashton Keynes) and, utilising information from his map, the pilot saw that the area just beyond the lakes appeared suitable for a landing. He made a descent towards this area, and with the visibility now slightly improved, made a safe landing at 0700 hrs with the branch from the oak tree still lodged in the envelope. The balloon was then deflated and the passengers disembarked without incident.

When interviewed, the pilot reported that he had not received any training relevant to flight above fog; the investigation identified no such training nor any published procedures to deal with flight above fog in a balloon.

Duty hours and flight time limitations

The pilot reported for duty at 1500 hrs on 9 September and completed his duty period 6 hours 30 minutes later at 2130 hrs. He commenced his next duty period at 0400 hrs on 10 September after 6 hours 30 minutes rest. He then rested between 1000 hrs and 1600 hrs and completed his duty at 2030 hrs. He had therefore completed 16 hours 30 minutes of duty, which included a rest period of 6 hours. The operator's flight time limitations required that after a flight duty period, the minimum rest period to be taken before another flight duty period must be at least as long as the preceding duty period and not less than 11 hours.

To provide for balloon operations for short periods in the morning and evening, provision was made in the operations manual for a reduction in the post-flight rest period to a minimum of eight hours subject to the following requirements:

- (a) the duty period before and the planned duty period after the rest period do not exceed three hours each
- (b) the crew member has a total of 16 hours rest in any 24 hour period (midnight to midnight)
- (c) the crew member does not go for a period of more than three days with less than 12 hours continuous rest.

The operator's flight time limitations stipulated that the maximum flight duty period was to be 10 hours, extended by half of any rest period taken within that period. On the day of the accident, the maximum duty period available (taking into account a six hour rest period) was 13 hours. There was no provision for this period to be extended by use of 'discretion' or any

other means; however, the pilot reported that he was not fatigued. The operator later reported that the pilot had not filled out his duty time report accurately.

Operations manual

The operator's operations manual stipulated that all flights were to be conducted under VFR. Since the launch site was within the Class D airspace of the Lyneham Control Zone the minimum flight visibility required for a flight under VFR was 5 km, (outside controlled airspace it would have been 3 km).

The operator's operations manual stated that the maximum number of occupants permitted to be on board G-KNIX was 16, including the pilot. On the accident flight, there was a total of 17 persons on board, including the pilot. The operator reported that this was a result of an oversight in the compilation of their operations manual.

Motivation to fly

The operator provided balloon flights on an ad hoc basis, selling tickets and then arranging flights from a variety of launch sites subject to weather conditions. The summer of 2006 had been a very difficult one for ballooning, with suitable weather conditions occurring less frequently than in recent years.

The pilot was a freelance professional balloon pilot (who had been working exclusively for this operator for a considerable time). He had a secondary source of income in the winter months, when less balloon flying occurs, but during the summer it was his only occupation. He depended on flying to sustain his income and was not paid for duties carried out when flights were cancelled on account of poor weather. However, an arrangement existed under which pilots were paid a minimum amount each month to ensure some income in the event of

continuous poor weather. The pilot had been working exclusively for this operator for a considerable time.

Analysis

The pilot did not take the required rest period prior to reporting for the flight duty, and did not qualify for the reduction in rest applicable to morning and evening flights. Despite this, he reported that he was not fatigued. However, fatigue has an insidious quality, and a person may be fatigued and his performance impaired without realising it. The pilot continued on duty on the day of the accident after a rest period, and it appears that he was either not aware of the provisions of the operator's flight time limitations scheme or elected not to adhere to them. The operator reported that the pilot had not reported his duty times correctly, but it is notable that the pilot had been employed by the operator for a considerable period, and it would be reasonable to expect that the pilot's reporting should have been audited and appropriate training and advice given, to enable accurate completion of these records.

It was clear, from the passenger recollections, photographs, and video recording that the balloon lifted off when the visibility was very poor, and was less than the required minimum for VFR flight. The ensuing flight, above a layer of fog, placed the balloon in a potentially hazardous position: without clear sight of the ground, the pilot was unable to locate a suitable landing area and plan an approach. Instead, he found himself making two descents into the fog, in the hope of finding a suitable area. Although he used his map to ascertain that the area he approached on each occasion appeared to be clear of obstructions, his map did not show all obstructions. It was fortunate that the pilot saw the power lines, which the balloon encountered on its second descent, in time to climb the balloon over them. He was, however, unable to avoid the large oak tree.

The maximum number of occupants of the balloon, as stated in the operations manual, was exceeded. The operator reported that this was a result of an oversight in the compilation of their operations manual.

Although there were the normal pressures on the pilot to fly, both to complete the flight for the passengers and to derive income, these did not account readily for the decision to fly in the prevailing conditions. It is more probable that the pilot believed that the fog would lift during the flight, and this is reflected in his reassurances to the passengers before the launch. Alternatively, a degree of fatigue may have affected his judgement.

The loss of the VHF radio, whilst the balloon was lodged against the oak tree, was unfortunate. The pilot was also using a GPS receiver, which he had mounted on a rack together with the altimeter, although there was no requirement for such navigation devices to be securely attached. The investigation considered the possibility of the GPS being lost overboard; the situation would then have been more grave since the pilot would have been left without any means of determining the balloon's position with the ground obscured. It would therefore appear sensible that hand-held equipment, used for the navigation of a balloon, should be secured to the balloon to prevent such loss, and this was discussed with the CAA.

The lack of training or procedures relevant to a balloon pilot who finds himself flying above fog was discussed with the operator and the BBAC's Flight Safety Officer, and it was felt that by laying down such procedures or

providing such training, balloon pilots might be more willing to risk finding themselves above fog, in the belief that they would be able to use the procedures and training to carry out a normal and safe landing. Therefore, it was not considered appropriate to make a Safety Recommendation on this topic.

Conclusions

This accident would have been avoided, and the passengers' safety assured, had the pilot delayed the launch until the visibility had improved to 5 km.

Safety actions

The CAA met with the operator's accountable managers some weeks after the accident and discussed the manner in which the company ensured compliance with the terms of its Air Operator's Certificate. The CAA was satisfied that the company would introduce procedures to ensure that weather and terrain considerations were fully considered in future operations.

Following discussions with AAIB, the CAA has undertaken to consider requiring commercial balloon operators to attach hand-held navigation equipment, such as VHF radios and GPS receivers, to the balloon, by suitable means. The British Balloon and Airship Club (which oversees sport ballooning in the UK) has undertaken to consider making a similar suggestion to its members.