

Sky 220-24, G-SPEL, 19 July 1997

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Aircraft Type and Registration:	Sky 220-24, G-SPEL
No & Type of Engines:	Sky Triple
Year of Manufacture:	1996
Date & Time (UTC):	19 July 1997 at
Location:	Near Longridge, Lancashire
Type of Flight:	Public Transport (Balloon)
Persons on Board:	Crew - 1 - Passengers - 12
Injuries:	Crew - None - Passengers - 1 serious 5 minor
Nature of Damage:	None
Commander's Licence:	CPL Balloons, Groups A & B
Commander's Age:	42 years
Commander's Flying Experience:	474 hours (approximately)
Information Source:	AAIB Field Investigation assisted by officials from the British Balloon and Airship Club

Flight preparation

A one hour balloon flight, departing from a private launch site close to a public house in the village of Ribchester and flying over the Ribble Valley, was planned. The 12 passengers were accompanied by a single pilot. Forecast weather information, received by the pilot from the 'MET FAX' service, indicated that the wind would be light and variable with good visibility and the temperature at 1,000 amsl would be +18°C.

When the balloon envelope was erect, following pre flight preparations, the passengers, who had been standing at the base of the balloon, entered the basket and were briefed by the pilot on the landing procedures. They were instructed to adopt a position with their backs to the direction of landing, to bend their knees and to hold onto the ropes on the inside of the basket and remain within the basket after landing. The pilot reported that the process of boarding and briefing took

approximately 15 minutes. With the pre-flight procedures complete the tether was released and, at 1945 hrs (BST), the balloon lifted into the air.

History of the flight

As the balloon climbed it followed a south-westerly track over the Ribble Valley. One passenger reported that he noted the digital display on the balloon's altimeter during the climb, and that the highest point reached was just over 4,500 feet (the pilot stated that the maximum altitude reached was 3,000 feet). Visibility at this height was restricted due to haze so the pilot decided to descend to a lower altitude for a better view of the surface.

As the balloon descended to 1,800 feet it was heading for the town of Longridge. The pilot continued to fire the burners from time to time to control the balloon's descent. At this stage the recovery vehicle, which had been following the balloon's progress, came into sight. The balloon flew over houses in Longridge at a height, estimated by one of the passengers to be 400 feet. As it passed near a school, on the southern side of the town, the pilot was heard to say that he would have to land soon. The balloon had been airborne for some 50 minutes and was slightly to the west of the town. It then started to drift back towards the town on an easterly track. The pilot spotted the school playing field with two reservoirs close by. He stated that he was going to try and land on the bank of one of the reservoirs but soon changed his mind as the balloon had become becalmed over the town. He then climbed the balloon from 300 feet to 600 feet and in doing so picked up a south-westerly drift and a more positive ground movement. The balloon then passed over more houses and industrial premises before the pilot stated "we'll have to get it down fast - we're running out of gas".

The approach and landing

In the descent the balloon's flight path was aligned with a small area of open land. One passenger, standing in the basket on the pilot's right, noticed power lines running across the planned flight path beyond the open area and brought these to the pilot's attention. The pilot fired the burners and the balloon climbed but this time the flames, as described by one passenger, were 'minute compared to earlier burns'. This description is indicative of a burner that is no longer being supplied with liquid gas (as normal) but instead is being supplied with vapour. Balloon pilots are trained to recognise at an early stage the progressive reduction in intensity and noise of the burner flame. Beyond the powerlines, which ran along the edge of a housing estate was a playing field. A passenger estimated that the balloon cleared the powerlines by approximately 100 feet although the pilot reported that he was at 600 feet as he cleared the wires. He was concerned about drifting back into the wires and went well into the field before initiating the final controlled descent. As he did so the fuel ran out. The balloon developed a high descent rate and so the pilot warned his passengers that, "it's going to be a hard landing - everybody keep your knees bent and hold on."

A few seconds later the basket hit the ground. One passenger estimated the speed of impact as being '20 mph'. After the first touchdown the basket bounced to a height of between 15 to 20 feet before hitting the ground a second time and coming to rest in an upright position. Such a bounce is quite normal in balloon landings. The landing time was estimated by one of the passengers to be 2115 hrs (BST). The pilot shouted to the passengers 'stay where you are - nobody get out or it may take off again'. Several passengers were complaining of injuries and, once the envelope had deflated, the pilot, who was uninjured, got out of the basket to assess the situation. The balloon ground crew arrived moments later to assist and the pilot used his mobile telephone to summon the emergency services. All but two of the passengers disembarked from the basket. A man with a broken leg and a

woman with back injuries remained 'in situ' until they had been attended to by paramedics who arrived on the scene some 10 to 15 minutes later. Ambulances took the injured passengers, including a further four with sprained ankles, to hospital.

Fuel and loading requirements

The operator had been issued with an Air Operators Certificate (AOC) and the Operations Manual (OM) detailed the fuel requirements. These specified that the minimum fuel to be carried was to be sufficient for the intended flight plus 30 minutes. The minimum fuel required at take off (including the 30 minute reserve), in International Standard Atmosphere (ISA) conditions, for a 220-24 balloon with an intended flight time of 1 hour, was 120 kg (240 litres). Changes in temperature, pressure or lapse rate from ISA conditions have to be taken into account as they can affect fuel consumption.

The OM also specified that the maximum take-off weight for the ambient conditions was to be calculated before each flight using the approved method. The maximum take-off weight is the Total Permitted Lift calculated for the ambient conditions. For all flights the load sheet section of the technical log Sector Record Page had to be completed using the actual passenger and crew weights.

The completed load sheet and passenger manifest for the accident flight showed that the total passenger weight (843 kg) plus the weight of the pilot (83 kg), the fuel cylinders (64 kg), the empty balloon weight (500 kg) and the fuel (120 kg), came to 1,610 kg. The permitted lift calculation showed that the pilot had used a datum temperature of +15°C and a pressure altitude of 3,000 feet. This gave a Total Permitted Lift weight of 1,705 kg showing that the loaded balloon was 95 kg below the maximum allowed.

An experienced balloon operator and an executive member of the British Balloon and Airship Club (BBAC) estimated that the pilot would have used approximately 20 kg of fuel to inflate an envelope of this size and a further 10 kg during the 15 minutes it took to load and brief the passengers. Thus it is estimated that the balloon took off with a fuel load of 90 kg; ie some 75% of the OM fuel required.

In planning the flight, the pilot had incorrectly used a surface temperature of +15°C in the calculation of his fuel requirement. The correct procedure is to enter the calculation with the actual surface temperature and then reduce it at the Dry Adiabatic Lapse Rate (DALR) of 3°C per 1000 feet to determine the temperature at the planned maximum flight altitude (in this case 3000 feet). The available lift per unit volume is then calculated from a loading chart. The proper surface temperature should have been at +20°C (another operator launching a balloon for the same area at the same time reported that the surface temperature was probably nearer to +21°C). The difference in temperature and the fact that the balloon climbed to 4,500 feet instead of the planned 3,000 feet would also have resulted in an increase in the fuel requirements or would have required a reduction in passenger payload.

Follow up actions

Because of this accident and a previous accident to the same balloon in March 1997 (see report published in this Bulletin), the CAA decided to conduct an 'accompanied inspection flight' with the pilot. This flight, which was carried out on 28 July 1997, showed that the pilot was operating to a satisfactory standard. Some anomalies within the administration and pre-flight preparation prompted the CAA to impose operating restrictions and conditions on the day-to-day management of the

operating company. The operator has also decided to increase the number of fuel cylinders carried in the basket.