ACCIDENT

Aircraft Type and Registration:	LBL 360A balloon, G-LLGE
No & Type of Engines:	None
Year of Manufacture:	2013 (Serial no: 1401)
Date & Time (UTC):	30 April 2019 at 1905 hrs
Location:	Near Little Sampton, Essex
Type of Flight:	Commercial Air Transport (Passenger)
Persons on Board:	Crew - 1 Passengers - 14
Injuries:	Crew - None Passengers - None
Nature of Damage:	Minor damage to a house
Commander's Licence:	Commercial Pilot's Licence
Commander's Age:	61 years
Commander's Flying Experience:	3,203 hours (of which 176 were on type) Last 90 days - 26 hours Last 28 days - 9 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot and additional enquiries by AAIB

Synopsis

A hot air balloon landed in a field and dragged an unexpectedly long distance before stopping close to a house. The envelope deflated over the house and caused minor damage to it. Insufficient slack in one of the control lines may have inhibited the full operation of the rapid deflation system and contributed to the long drag of the balloon. The balloon had recently undergone maintenance work where the parachute line was requested to be lengthened. This work may not have been satisfactorily completed and in the absence of a specific check where the rapid deflation system was operated to its full extent, there was no way for this to be detected.

History of the flight

The balloon took off at 1825 hrs British Summer Time (BST) with 14 passengers. The forecast wind was from 130 at 7 kt gusting 15 kt. After 30 minutes, the pilot performed two low passes over fields and found the ground speed to be 7 to 8 kt. Between 200 and 600 ft agl it was 10 kt on average.

The pilot started to look for a suitable landing field 35 minutes into the flight (1900 hrs BST). Most of the fields in the area contained crops or livestock so were unsuitable. Two approaches made at 1940 hrs and 1942 hrs BST were aborted due to low level changes in wind direction taking the balloon away from the intended landing fields. Another approach at 2000 hrs BST was aborted due to power lines in the field. Ground speed during these approaches was 5 kt.

The pilot was concerned about the fuel situation. All the front tanks were empty and of the two 80 litres rear tanks, one was indicating 20% and the other was not yet indicating its contents but had been used extensively. The pilot was also concerned about losing light; sunset was at 2021 hrs BST.

The pilot sighted a suitable grass landing field beyond a set of high-voltage pylons. Just under 500 m from the intended landing field, the balloon was over the pylons at a height of 166 ft agl with a ground speed of 10 kt. At the field boundary, at 5 ft agl and 8.5 kt ground speed, the pilot deployed the rapid deflation system. The landing was at 2005 hrs BST and the pilot estimated there was 60 m landing distance available. The basket did not stop as quickly as expected and dragged across the field. It stopped on its side just before a tree and the deflating envelope draped over the roof of a house and garage (Figure 1). No one was injured and the basket and envelope were not damaged. There was some minor damage to the property.

Accident site

Figure 1
G-LLGE incident site

Aircraft information

G-LLGE is a 360,000 cubic feet hot air balloon equipped with a Q-vent rapid deflation system.

The Q-vent system enables rapid deflation of the balloon by pulling a 'parachute' in the top of the balloon fully and quickly down into the envelope using a red line operated by the pilot. It should only be operated close to the ground. When the red line is pulled, the red and white 'candy stripe' parachute line, which is used in flight to descend, is pulled up into the

envelope. Therefore, operation of the Q-vent system requires there to be sufficient slack in the candy stripe line.

At the end of the 2018 flying season, the pilot reported that the Q-vent system was not able to fully operate because there was not enough slack in the candy stripe line (Figure 2). The red and candy stripe deflation lines are made of poly sheathed Kevlar which shrinks with time due to the heat of the burner and the operating temperature within the envelope.

Figure 2

G-LLGE maximum operation of the rapid deflation system showing the candy stripe line at full stretch taken by the pilot in October 2018. The green line is the turning vent line and is not relevant to the accident.

The operator asked for their maintenance organisation to rectify this alongside the certificate of airworthiness renewal performed in December 2018. The Certificate of Release to Service form stated 'Allow spare out of candy stripe end termination' suggesting that an adjustment had been made as requested.

The pilot reported that he checked the operation of the red line pre-flight by pulling until he could see daylight all around the edge of the parachute. He stated that he did not perform a check of the full operation of the rapid deflation system and considered this to be impractical because it could result in deflation of the balloon. For a pre-flight check of the Q-vent system the flight manual specifies:

> *'Pulling the red line until the parachute is clear of the rim of the aperture. Release the line, then pull on the red and white line until the parachute is taut, and then release. Ensure that there is sufficient slack in the parachute line to allow it to feed into the envelope as the red rapid deflation line is pulled.'*

The pilot had flown G-LLGE three times during the 2019 season after the work was completed but had not needed to fully deploy the rapid deflation system because these flights were made in light winds.

Pilot and chief pilot's comments

The pilot acknowledged that there was pressure to land due to the fuel and light situation, but he was confident of stopping in the distance available. He stated that the fuel and light situation was not yet critical and did not lead him to accept a smaller field.

The chief pilot was experienced at flying an identical balloon and stated that it would have stopped within that distance in similar conditions. After the accident, the pilot and chief pilot inspected the balloon. They both believed that the work to lengthen the candy stripe line had not been successfully completed and that this contributed to the long drag. The chief pilot stated he and the pilot both trusted that the requested work to lengthen the line had been completed because an entry about it had been made in the aircraft logbook.

The pilot also noted that the steep approach made due to the power lines meant that more speed was carried into the landing and the balloon did not slow to 5 kt as it had on the previous approaches.

Analysis

The pilot completed a landing under pressure of reducing light and low fuel and the balloon stopped too close to obstructions that were draped by the deflating envelope. The balloon may have taken a longer distance to stop than the pilot expected because the rapid deflation system did not operate fully due to insufficient slack in one of the control lines. The operator and pilot interpreted an entry in the maintenance paperwork as indicating work had been done as requested to lengthen the line. The pilot performed a pre-flight check of the rapid deflation system but a full check of the operation of the rapid deflation system was not performed. The second part of the pre-flight check is to '*Ensure that there is sufficient slack in the parachute line to allow it to feed into the envelope as the red rapid deflation line is pulled.'* In practice, this is difficult to judge visually because the parachute (candy stripe) line has a large amount of slack in it. The pilot had flown the balloon since the maintainer's work on it but had not needed to use full rapid deflation. This system is rarely used to its full extent because it is only required in stronger wind conditions. It is inconvenient to check pre-flight because of the risk of deflating the balloon when doing so. There was no way to determine whether the control line lengthening work had been satisfactorily completed without fully operating the rapid deflation system.

Conclusion

The balloon dragged for a longer distance than the pilot expected after landing and stopped too close to a house because it was travelling too fast to stop in the space available and the rapid deflation system may not have operated to its full extent.