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SAFETY INVESTIGATION REPORT

Accident to the KUBICEK - BB26 - E registered F-HBBQ on 23 September 2021 at Chambley aerodrome

Time	07:38[1]
Operator	Private
Type of flight	Instruction
Persons on board	Student pilot
Consequences and damage	Instructor seriously injured
This is a courtesy translation by the BEA of the Final Report on the Safety Investigation published in December 2022. As accurate as the translation may be, the original text in French is the work of reference	

Tethered flight take-off, in solo instruction, fall of instructor hanging from the guide rope

1 HISTORY OF THE FLIGHT

Note: the following information is principally based on the instructor's statement and the video recorded by the control tower surveillance system.

The crew, composed of the instructor pilot, two student pilots and a fellow crew member (set-up operator) had programmed a free flight taking off from Chambley Bussières aerodrome. Fog blankets located three kilometres north of the aerodrome led the instructor to choose a tethered flight instead of the initially planned free flight. The two students took off at 07:30 with the instructor and set-up operator on the ground, close to the basket.

The first student pilot carried out an ascent and descent. In order to change the pilot and as requested by the instructor, he then got out of the basket. The consecutive reduction in weight and the second student pilot at the controls heating the envelope resulted in the hot-air balloon quickly rising. The instructor grabbed the guide rope connecting the vehicle to the balloon, to act as a counterweight and thus slow down the balloon's ascent speed.

He found himself hanging from the taut guide rope. At a height of around eight metres, he let go and fell onto paved runway J.

The set-up operator provided him with help while the student pilot landed without difficulty.

[1] Except where otherwise indicated, the times in this report are local.

Figure 1: video recording just before the instructor let go
(source: surveillance video from Chambley aerodrome control tower)

2 ADDITIONAL INFORMATION

2.1 Instructor pilot information

The 49-year-old instructor pilot held a European Balloon Pilot Licence (BPL) obtained in May 2021 by converting his French free balloon pilot licence obtained in 2001. Along with his BPL, he held the group A[2] hot-air balloon class rating and the instructor rating for group A hot-air balloons and tethered flight. He also held a valid class 2 medical certificate. The pilot had had a balloon business activity for five years.

In the previous 90 days, he had flown approximately 14 flight hours including approximately 3 h on F-HBBQ. His total experience was around 800 flight hours including approximately 3 h on F-HBBQ.

2.2 Student pilot information

The 54-year-old student pilot held a valid class 2 medical certificate.

His pilot training record indicated that the accident flight was his third training flight. He had carried out his first two flights on a group A CHAISE DC2200 balloon on 13 and 15 June 2021, for a total time of one hour.

[2] There are four hot-air balloon groups. Group A includes the smallest envelopes, with a maximum capacity of 3,400 m^3.

2.3 Meteorological information

The general situation in Lorraine was characterised by a light wind and clear sky with the temporary formation of local fog banks at the beginning of the morning.

The meteorological conditions estimated by the French met office (Météo-France) at the accident site were the following: clear sky, mist possible, variable ground wind of 2 kt, visibility greater than 8 km, possibly reduced to 4 to 6 km, ground temperature 6°C, QNH 1022 hPa.

2.4 Balloon information

The balloon is composed of an E-TYPE KUBICEK BB26E envelope of a capacity of 2,600 m^3, an ULTRAMAGIC C-4 basket and an ULTRAMAGIC MK10 double burner. The basket which does not have a partition, can hold up to three passengers and a pilot along with the material required for the flight and four CAMERON type fuel tanks. The basket was ballasted with bags of sand totalling 90 kg.

The total weight of the balloon was in the envelope weight limits defined by the manufacturer at the time of the accident.

2.5 Principle of tethered flight

The Pilot Manual[3] indicates that tethered flight consists in restraining the balloon with ropes to keep it on the ground in order to carry out a display, an instruction flight or to take passengers for a few minutes of flight at a height of 10 or 20 m.

In the scope of training, a tethered flight has several educational advantages, such as learning to hold level flight, perceiving and managing inertia and simulating landings.

This manual specifies that managing a tethered flight in calm wind conditions may seem very simple, but this is not at all the case.

A tethered flight requires specific equipment, for example, three mooring lines which can be attached to the basket at three anchor points. The snap hooks used must be made of steel rather than aluminium. A reminder is given to use an onboard radio to make communication with the head of the ground team easier.

[3] *Manuel du pilote de montgolfière, volume 2, 2ème éd., Arnaud Deramecourt.*

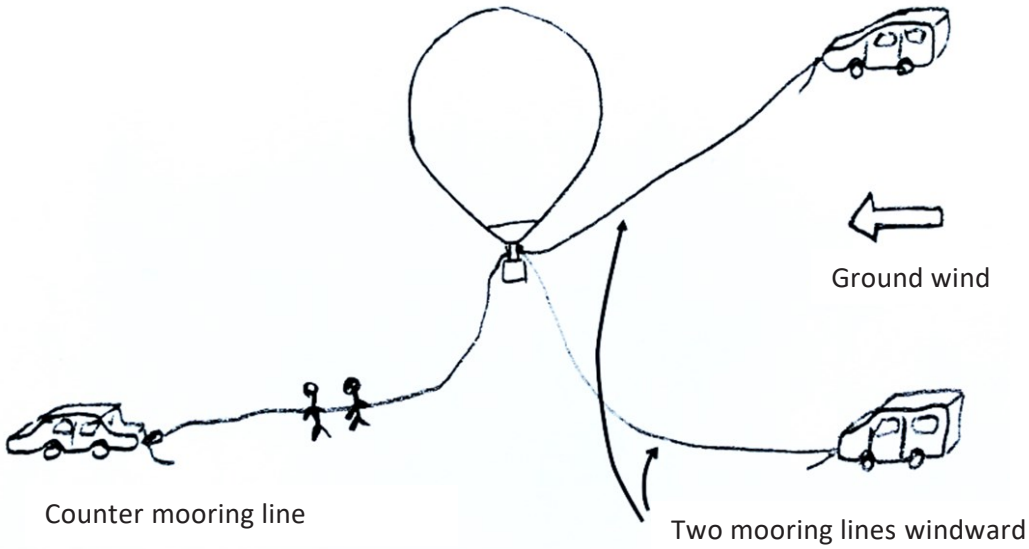

Figure 2: configuration of mooring lines and anchoring points: two mooring lines situated at around 30° or 40° to the wind's path plus a third line.
(source: Manuel du pilote de montgolfière, annotated by the BEA)

The specific check-list for tethered flights described in this manual is the following:

- Tethering rings x 4
- Mooring lines x 3 or 4
- Tethering ropes x 3 or 4
- Pibals, string, cylinder and pressure regulator or windsock
- If the surface is abrasive and might damage the basket (bitumen): a piece of carpet measuring 4 x 4 or 5 x 5 m
- If there is a risk of the surface damaging the envelope: a tarpaulin sheet to be laid out on the ground before inflating the envelope
- Marking out equipment: barrier preventing public access.

In addition, the hot air balloon flight manual[4] mentions a third golden rule, no-one must hang onto a rope or the basket.

2.6 Statements

2.6.1 Instructor pilot statement

The instructor pilot reported that on obtaining the weather forecasts the day before, free flight could be envisaged and it was agreed that the team would meet at 06:30 at Chambley aerodrome. On arriving on site the day of the accident, he mentioned that he had observed dense fog in the northern vicinity of the aerodrome requiring him to cancel the free flight and replace it with a tethered flight. He specified that the weather forecasts had not indicated this fog.

After checking out the conditions by car and a crew planning meeting[5], a joint decision was taken. The instructor specified that tethered flight is ideal for learning and training.

[4] *Manuel de pilotage des montgolfières, 2ème éd., Éditions Cépaduès*.
[5] Commonly known as a briefing.

He indicated that he inflated the balloon, brought it into an upright position and then secured the basket to the support vehicle using a guide rope, in the company of the two student pilots and the set-up operator. He remembered that he did not have tethering ropes and the specific equipment for carrying out this particular type of flight.

The instructor indicated that one of the two student pilots on board carried out a first ascent and descent in the balloon before landing and handing over the controls to the second student pilot. He specified having asked the first student pilot (and owner of the balloon) to get out of the basket on landing.

He emphasized that this decision to reduce the weight and the activation of the burners to heat the envelope initiated by the second student pilot when he took off, resulted in the balloon climbing very quickly. He then grabbed the guide rope to act as a counterweight. He mentioned that it was a reflex action.

He remembered having climbed quickly and that at an estimated height of eight metres, he let go of the guide rope. The instructor pilot mentioned that the student pilot landed normally after the accident.

2.6.2 Second student pilot statement

The student pilot described the same weather conditions and the decision taken to carry out a tethered flight. He remembered that he arrived shortly before the instructor as the latter had left by vehicle to check out the weather conditions in the vicinity.

He indicated that he gave a quick burst of the burner to heat the envelope just after the first student had got out of the basket. The balloon then quickly climbed and he thought that the instructor had been afraid and grabbed the guide rope which very quickly became taut. He mentioned that he barely had time to shout to the instructor to let go, when he was already hanging at about seven to eight metres above the ground. He stated that he landed as soon as possible without further incident after the instructor fell.

3 CONCLUSIONS

The conclusions are solely based on the information which came to the knowledge of the BEA during the investigation. They are not intended to apportion blame or liability.

Scenario

The day of the occurrence, the weather conditions permitted a tethered flight. After the first student pilot had carried out an ascent and descent, the instructor decided to change pilots on the ground. The balloon landed and the first student pilot got out of the basket. At this moment, the second student pilot, who had the controls, heated the envelope.

The combination of the reduction in weight and the heating of the envelope caused the hot-air balloon to quickly climb. The instructor had a reflex action and grabbed the guide rope connecting the vehicle to the balloon to act as a counterweight and to try to slow down the balloon's ascent speed. He then let go.

Safety lessons

Risks linked to a change in action plan

Due to adverse weather conditions, it was not possible to carry out the free flight which was replaced at the last moment with a tethered flight. The instructor did not have the necessary equipment to carry out this type of flight. The student pilot heated the envelope on the previous student pilot leaving the basket at the instructor's request.

Although there had been a briefing, these factors show both that the flight had not been sufficiently prepared and the lack of coordination between the crew members for this flight which was not initially planned.

It is important to bear in mind that last-minute changes of plan, even for a flight that may seem simpler, involve risk factors that need to be taken into account and analysed carefully.

The BEA investigations are conducted with the sole objective of improving aviation safety and are not intended to apportion blame or liabilities.