BEA
Bureau d'Enquêtes et d'Analyses
pour la sécurité de l'aviation civile

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SAFETY INVESTIGATION REPORT

Accident to the ZT 610 identified 77AUM on Friday 6 September 2024 at Frestoy-Vaux

Time	Around 18:20[1]
Operator	Private
Type of flight	Practical exam
Persons on board	Pilot in training and instructor
Consequences and damage	Pilot in training and instructor fatally injured, microlight destroyed
This is a courtesy translation by the BEA of the Final Report on the Safety Investigation. As accurate as the translation may be, the original text in French is the work of reference.	

In-flight opening of canopy, collision with ground, fire, check flight

1 HISTORY OF THE FLIGHT

Note: the following information is principally based on statements and the recording from the navigation application used by the instructor.

The pilot in training, accompanied by an instructor, took off from Compiègne Margny aerodrome to carry out a proficiency check flight with a view to obtaining the fixed-wing microlight rating.

They carried out runway circuits at Montdidier aerodrome and then headed south-east (see **Figure 1**).

The recorded flight path showed that at 18:19, when the microlight was in level flight at an altitude of around 1,600 ft, i.e. a height of around 1,300 ft, it suddenly started descending and then collided with the ground.

Eyewitnesses close to the accident site saw the wreckage catch fire and contacted the emergency services. The body of the pilot in training was found around 70 m west of the wreckage. The body of the instructor was found the next day 130 m south-west of the wreckage.

[1] The times given in this report are in local time.

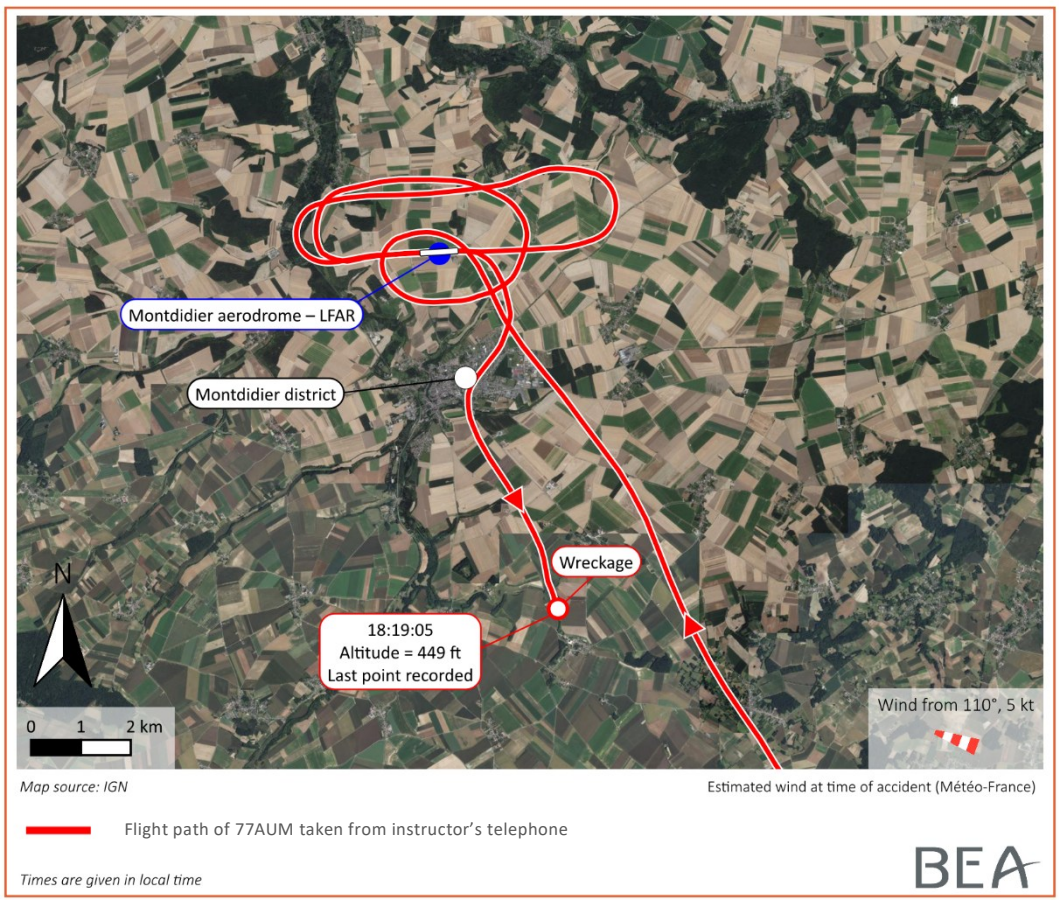

Figure 1: flight path downloaded from instructor's telephone

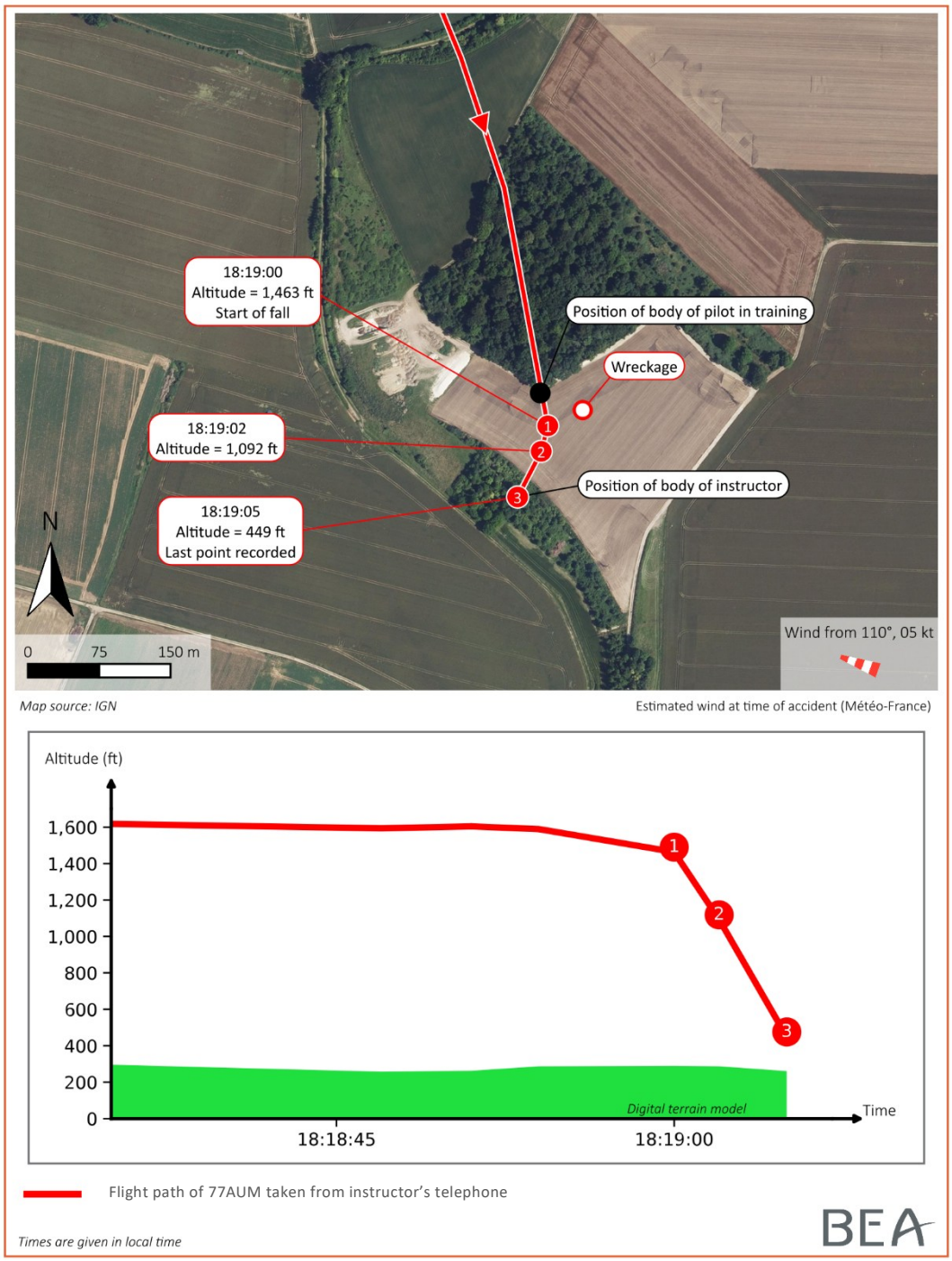

Figure 2: flight path downloaded from instructor's telephone

Points 1, 2 and 3 correspond to the last three positions recorded by the instructor's telephone. This telephone was found near the instructor.

The investigation was not able to determine at what point the instructor was ejected from the microlight and as a consequence, up to what point the path corresponded to that of 77AUM.

2 ADDITIONAL INFORMATION

2.1 Meteorological information

Météo-France estimated that the weather conditions on the accident site were: variable wind, dominantly from 110° of 5 to 10 kt, a few stratocumulus or cumulus based at around 2,500 ft with cloud tops at around 4,500 ft.

The Beauvais - Tillé airport[2] 18:30 automatic METAR indicated wind from 090°, varying between 060° and 120°, 7 kt, CAVOK, temperature 21°C, dewpoint temperature 14°C, QNH 1,010 hPa, no significant change forecast for the following two hours.

2.2 Microlight information

77AUM was an amateur-build fixed-wing microlight known as the ZT610. It was assembled in Poland and was first put into service in September 2003. It was not equipped with an airframe parachute.

The construction drawings and the characteristics of the ZT610 are similar to the Zenair 601 UL.

Figure 3: photo of 77AUM before the accident (source: PA-ULM.com)

The canopy of this microlight is a single piece of Plexiglas fixed onto a metal frame. It opens by tipping forward.

[2] Beauvais - Tillé airport is situated 40 km south-west of the accident site.

Figure 4: photo of open canopy of another ZT610 (source: BEA)

2.3 Occupant information

The 53-year-old pilot in training was the owner of 77AUM since April 2024. He held a microlight pilot licence along with gyroplane, paramotor and flex-wing ratings. It was not possible to determine his total number of flight hours.

He had carried out four instruction flights on 77AUM with the instructor who was on board in the accident, with the aim of obtaining his fixed-wing microlight rating.

The 63-year-old instructor held a microlight pilot licence obtained in 2013 along with a fixed-wing rating and fixed-wing instructor rating. He also held:

- a valid sailplane pilot licence with a sailplane flight instructor rating;
- a valid airline transport pilot licence (ATPL(A)) along with the SEP rating and the instructor rating (FI(A)). In the past, the instructor had held the multi-engine instrument rating (IR/ME) and several airline type ratings. These ratings had expired in 2021.

He had logged more than 14,000 aeroplane flight hours and more than 500 glider flight hours. A relative of the instructor explained that he systematically fastened his seatbelt even when taxiing from the parking to the petrol pump.

The results of the autopsies and toxicological analyses carried out on the instructor and the pilot in training, as well as the discussions the BEA had with the forensic pathologists who performed these analyses, did not reveal any elements that could explain or contribute to the accident.

The pathologist who performed the post-mortem examinations indicated orally to the BEA that there were no signs of seatbelt friction marks and no burn marks on the bodies.

2.4 Examination of wreckage

The global examination of the wreckage determined that it was complete and grouped together. The microlight had collided with the ground with a near-vertical pitch attitude. The flight controls were continuous before the impact.

Figure 5: view of wreckage (source: BEA)

2.4.1 Examination of canopy

The canopy was found broken into numerous fragments, all in the immediate vicinity of the wreckage.

The BEA estimated the total surface area of the canopy pieces that were collected. This surface area was less than the total surface area of the canopy. This may be explained by the many very small pieces measuring < 3 cm that could not be recovered and the fire which melted part of the Plexiglass.

The missing surface area was too small for a body to pass through. Furthermore, an analysis of the canopy pieces using an UV light did not show organic traces on their inner face.

The occupants did not therefore pass through the canopy. As the latter was still integral with the airframe at the time of the impact with the ground, the most probable hypothesis is that the canopy opened in flight.

A visual examination and UV light analysis of the outer faces of the canopy pieces did not show any sign of a bird strike.

2.4.2 Examination of canopy closing system

The canopy closing system was found and examined by the BEA.

Figure 6: canopy frame (source: BEA)

The canopy closing system was composed of two hooks that were integral with the fuselage (one on the right side and one on the left side of the cabin) and connected by a cable so that their movements were symmetrical. The left hook was connected to a handle. When the handle was moved forward towards the nose of the microlight, these hooks positioned themselves over the top of two fittings on the canopy frame, thus preventing it from opening.

The BEA inspected a microlight of the same type and observed a locking system based on the same principles.

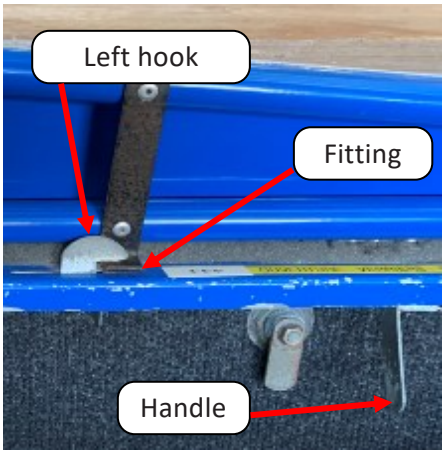

Figure 7: handle to close canopy on an equivalent microlight (source: BEA)

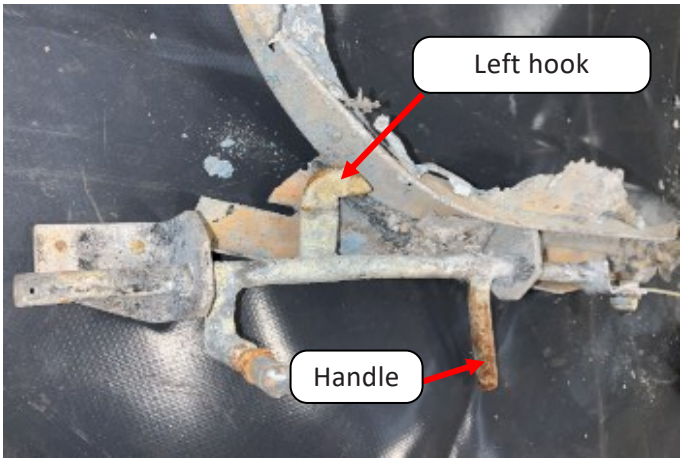

Figure 8: handle to close canopy on 77AUM (source: BEA)

On 77AUM as on the equivalent type microlight, no locking system to prevent untimely opening was observed.

It was observed that the two canopy fittings of 77AUM were deformed in a downwards direction (see **Figure 9** and **Figure 10**).

Figure 9: left-hand canopy fitting
(source: BEA)

Figure 10: right-hand canopy fitting:
(source: BEA)

Furthermore, the left-hand and right-hand hooks were deformed in an upwards direction; this was consistent with the downward deformations seen on the fittings (see **Figure 11** and **Figure 12**).

It was not possible to determine if these deformations were the result of wear prior to the flight or if they were the consequence of the canopy opening during the occurrence flight.

Figure 11: detail of left-hand hook

Figure 12: detail of right-hand hook

2.4.3 Examination of seatbelt system

The seatbelts on 77AUM were “three-point” seatbelts similar to those used in the car industry. They were not equipped with automatic retractors; a metal keeper allowed the occupants to manually adjust the straps. The term "seatbelt buckle" below refers to the seatbelt fastening system, consisting of a male part that inserts into a female part, which is fixed to the airframe and equipped with a red plastic release button.

The straps and the plastic components of the seatbelt buckles were destroyed in the fire. However, it was possible to observe that both seatbelt buckles were fastened.

2.5 Statements

2.5.1 Statement from former owner of 77AUM

The previous owner of 77AUM was contacted during the investigation. He explained that 77AUM had been assembled in Poland and that it was very similar to the Zenair 601UL.

He emphasized that during a flight with 77AUM, the canopy had half-opened in flight; the canopy had been incorrectly closed before take-off and one of the two closing hooks was not in position. The "suction" effect on the canopy was so strong that he was unable to close it during the flight and had had to land.

2.5.2 Statements from witnesses on ground

Three people on the ground separately witnessed the accident to 77AUM. These witnesses explained that they saw the microlight arriving from the north-west at a similar height to that taken by the aeroplanes that they were used to seeing. They indicated that the microlight then suddenly entered a descent while rotating around its axis. However, the type of rotation was described differently according to the witnesses who mentioned respectively a "spin", a "roll" or a "looping". One witness indicated that they had seen something "fall" from the microlight during the descent.

The witnesses indicated that the microlight then collided with the ground and that they heard the noise of an explosion and then saw a fire break out.

2.6 Similar accidents

A search for occurrences linked to a loss of control of a microlight with similar characteristics to 77AUM brought to light the following accidents:

- Accident to the experimental Zenair CH601XL registered N999NA on 29 March 2014 at Collegedale (United States).
  The investigation carried out by the NTSB determined that during the owner's first instruction flight with an instructor and after a flight time of nine minutes, the canopy first partly and then completely opened. The microlight suddenly entered a negative G dive. The pilot, whose seatbelt was not correctly fastened, was ejected. The instructor, whose seatbelt was still fastened, managed to land. The investigation did not reveal any technical failure with respect to the seatbelts and the canopy. It was therefore likely that the canopy was not correctly latched before take-off and that the pilot had not properly fastened his seatbelt which led to his ejection from the aircraft due to the high G forces after the canopy accidentally opened in flight.

- Accident to the Aerospool Dynamic WT9 identified 68-US on 17 May 2017 at Battenheim.
  Shortly after taking off, the pilot lost control of the microlight which struck trees before colliding with the ground.
  The investigation carried out by the BEA concluded that the canopy had opened in flight. It is likely that the canopy was not correctly closed before taking off which led to its untimely opening in flight. A degradation in the aerodynamic performance and controllability of the microlight were among the factors that may have contributed to the loss of control, once the canopy was open.

- Accident to the Aerospool Dynamic WT9 registered PH-4E7 on 17 May 2017 near Kornhorn (Netherlands)
  Shortly after take-off, the pilot lost control of the microlight. The microlight collided with the ground causing fatal injuries to the pilot.
  The investigation carried out by the DSB revealed that the canopy had opened during the flight followed by a pitch-down movement of the microlight.
  Research during the investigation found that there were at least 12 cases of the canopy having already opened on this type of microlight. In 2008, the manufacturer, Aerospool published on its website, a Mandatory Service Bulletin to update the flight manual to specify the procedure in the event of the canopy opening in flight.
  In 2012, Aerospool recommended the installation of a new canopy lock with safety latch and sensor to indicate incomplete locking of the canopy.

- Accident to the Evektor Aerotechnik EV97 identified 73-OH on 24 September 2015 at Fréjus.
  The investigation carried out by the BEA concluded that the canopy was not locked at the time of the collision with the ground. The pilot had most probably closed the canopy before take-off without locking it correctly. As it was not locked, the canopy was able to open slightly during the initial climb. The pilot then lost control of the microlight.

- Accident to the Evektor Aerotechnik EV97 identified 59CVF on 31 July 2015 at Berck-sur-Mer.
  The investigation carried out by the BEA concluded that the canopy had opened during the take-off. The investigation determined that the canopy was not locked before take-off. Once the canopy had opened, the pilot was unable to keep control of the aircraft. It is possible that the microlight's degraded aerodynamic performance and controllability contributed to the loss of control.

Several pilot reports were also found on federal platforms.

- Opening of WT9 canopy in flight on 13 August 2022 – FFVP;
- Untimely opening of canopy in cruise on 25 October 2018 – FFPLUM;
- Opening of Dynamic WT9 canopy on 20 February 2020 – FFVP.

The analysis of these occurrences revealed a significant number of cases of canopies accidentally opening on various types of microlight with similar characteristics to 77AUM. In most cases, these openings were linked to improper closing or locking before take-off. They often resulted in a loss of control of the microlight.

3 CONCLUSIONS

The conclusions are solely based on the information which came to the knowledge of the BEA during the investigation.

Scenario

The pilot in training and the instructor were carrying out a check flight with a view to the pilot in training obtaining the fixed wing rating. While the microlight was flying in level flight, the canopy very probably opened, degrading the controllability and aerodynamic behaviour of the aircraft. The microlight's pitch attitude and flight path were probably abruptly impacted, leading to a high pitch down attitude associated with a significant decrease in the load factor. The instructor and the pilot in training were ejected from the microlight before it collided with the ground.

The investigation was not able to determine what caused the canopy to open in flight.

The seatbelt buckles were found fastened and locked, and no seatbelt marks were found on the occupants' bodies. Based on the statements gathered, it is unlikely that the two occupants were not wearing their seatbelts. It is probable that the occupants were ejected while wearing their seatbelts.

Safety messages

Information about accidental opening of canopy

A high number of cases of the canopy accidentally opening on different types of microlight with similar characteristics to the 77AUM were identified by the BEA (see paragraph 2.6). In most cases, these openings were linked to improper closing or locking before take-off. They often resulted in a loss of control of the microlight.

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