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INVESTIGATION REPORT

Accident to the MUDRY - CAP10B registered F-GPVI

on 28 March 2021
at Villeneuve-sur-Lot (Lot-et-Garonne)

Time	Around 16:30[1]
Operator	Private
Type of flight	Local
Persons on board	Pilot
Consequences and damage	Pilot fatally injured, aeroplane destroyed

This is a courtesy translation by the BEA of the Final Report on the Safety Investigation published in March 2022. As accurate as the translation may be, the original text in French is the work of reference.

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

Collision with the ground during improvised aerobatic manoeuvres initiated at low height

1 - HISTORY OF THE FLIGHT

Note: the following information is principally based on statements, a video recording, and data from the aeroplane's accelerometer recorder.

The pilot arrived at Villeneuve-sur-Lot aerodrome where he joined a few friends and members of his family for lunch. He took off at around 16:00 from runway 10 for a local flight lasting approximately 30 minutes, during which he performed several aerobatic manoeuvres. Upon his return, he made a fast flyby at very low height parallel to the runway, between the runway and the club's facilities. He then made a pull-up manoeuvre, followed by a half loop then a left-hand half roll in descent. No variation in engine speed was perceived by the witnesses on the ground after the half roll. He then performed a left-hand "wing over" (almost vertical climb followed by a vertical U-turn and very steep-angle descent) parallel to the centreline of runway 10. He initiated a pull-up manoeuvre and was unable to avoid collision with the ground.

The aeroplane struck the ground in the vicinity of the runway, with a slight left bank angle and high vertical speed.

2 - ADDITIONAL INFORMATION

2.1 Site and wreckage information

The wreckage was laying in a grassy area in the vicinity of the runway. Debris was found within a radius of 15 to 20 m before the wreckage. No parts were missing.

The aeroplane collided with the ground, with an almost level attitude.

All of the damage and failures observed were caused when the aeroplane collided with the ground at high horizontal speed.

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The flight controls were in place and attached. The flight control linkages were continuous. It was not possible to determine the position of the flaps.

The examination of the power unit at the site did not reveal any mechanical failure or lack of lubrication. This examination was unable to define the power output of the engine at the time of impact with the ground.

2.2 Aeroplane information

The CAP 10B (commercial designation CAP 10C) is a two-seater, low-wing aeroplane with conventional landing gear that has a carbon-reinforced spar. It is equipped with a 180 hp LYCOMING AEIO 360 B2 F engine and an EVRA 3.180-170H5F type wooden propeller.

2.3 Pilot information

The 52-year-old pilot held a Private Pilot Licence - Aeroplanes (PPL(A)) issued in 2009, as well as a SEP land rating and an additional Part-FCL aerobatic rating. He had logged 1,370 flight hours, 8 hours of which in the last three months.

The pilot was the owner of F-GPVI, which was based at Villeneuve-sur-Lot aerodrome.

2.4 Read-out of recordings

2.4.1 Digital accelerometer

F-GPVI was equipped with a digital accelerometer (PGM1212) developed for recreational aviation, in particular aerobatics.

The recording of vertical accelerations starts when the engine is started up. At the end of each flight, a flight report is saved, which contains the following data:

- date and start time of the flight (UTC);
- lengths of time in flight and aerobatic manoeuvres;
- maximum positive and negative accelerations encountered during the flight;
- number of exceedances of limit values fixed by the operator (e.g. club limits).

The examination of this equipment showed that the accident flight had lasted 24 minutes, without exceeding the limit values recommended by the manufacturer and the regulations[(2)].

[(2)] With the exception of the maximum value of +11.6 G, which probably corresponds to the acceleration measured when the aeroplane collided with the ground.

2.4.2 Video recordings

The video recording, taken by a person located at the aerodrome's refuelling station, started when F-GPVI was flying by at very low height and high speed. The recording lasted 24 seconds and showed several aerobatic manoeuvres before the aeroplane disappeared from the camera's field of vision then crashed.

Its read-out was used to determine the following information:

- The spectral analysis of the video recording's soundtrack showed no discontinuity in the change of engine rotation speeds. It was also used to rule out an engine anomaly or erratic engine operation.
- The estimated speed, based on the video, at the lowest point of the path (low flyby, height of 8 m) was around 120 kt. Before initiating the last vertical descent, the height reached was estimated to be around 600 ft.

- There was no additional output between the low flyby and the last manoeuvre. A slight increase in speed could be observed during the last descent. This last figure (left-hand wing over) was initiated at a height (220 ft) that was too low to avoid collision with the ground. The aeroplane disappeared behind a hangar until it collided with the ground.

2.5 Statements

People on the ground, who knew the pilot, stated that he had not been in the habit of performing show-stopping manoeuvres and, to their knowledge, this was the first time that he had put on such a show. Not perceiving any increase in output during the second climb, they thought that the engine had failed. They did not explain this lack of increase in output during the second vertical climb.

2.6 Study of similar occurrences

The BEA contributed to the Aviation Safety Report 2018[3] published by the DGAC along with a study on risk-taking in light aviation during the execution of dangerous manoeuvres not necessary for normal flight.

[3] https://www.ecologie.gouv.fr/sites/default/files/rapport_securite_aerienne_2018.pdf

The findings of the study covering the period from 2004 to 2018 established that, in France, all categories of aircraft included, the BEA had listed at least 120 accidents occurring during manoeuvres not necessary for normal flight, denoting a clear taking of risk by the pilots. At least 70 of these accidents caused the death of 120 people, i.e. 13.5% of light aircraft fatalities over the period.

The study identified a number of factors contributing to the taking of risk, including:

- level of risk awareness for a pilot;
- level of knowledge and the capacity to understand and anticipate a risk situation;
- alteration of the risk awareness due to deterioration in health, fatigue or the effects of psychoactive substances;
- the desire to 'put on a show' for people on the ground or for the passenger;
- thrill seeking.

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

On returning from an aerobatic flight, the pilot decided to perform a flyby at low height and high speed, followed by several aerobatic manoeuvres overhead Villeneuve-sur-Lot aerodrome. He was very familiar with this aerodrome, where his aeroplane was based. He flew very close to the club-house where his friends and members of his family were gathered. After this flyby, he regained height without increasing the engine power and positioned himself for another manoeuvre in the vertical plane. During the descent, he was unable to avoid collision with the ground on coming out of a manoeuvre initiated at insufficient height.

Contributing factors

The following factors may have contributed to the collision with the ground:

- the desire to 'put on a show' for friends and family on the ground, in the immediate vicinity of their position at the aerodrome;
- not adapting the engine output as a function of the figures performed, given the height at which the pilot initiated them.

Safety lessons

Aerobatic flying in an aeroplane is subject to clearly defined rules, based on training, use of adapted aeroplanes and minimum manoeuvre heights. These rules guarantee a maximum level of safety by maintaining margins.

Improvising aerobatic manoeuvres initiated at very low height is extremely risky as it results in the pilot being in an unknown envelope.

The presence of observers on the ground can reduce a pilot's risk awareness and alter their ability to make sound judgements.