



Accident to the CESSNA 208B “Grand Caravan”
registered **F-GXMP**
on 30 April 2022
at Pamiers (Ariège)

Time	Around 18:20 ¹
Operator	Centre École de Parachutisme Sportif de l’Ariège
Type of flight	Parachute drop
Persons on board	Pilot and one passenger
Consequences and damage	Aeroplane substantially damaged

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.

Fuel exhaustion, forced landing before runway, tipping into a ditch

1 HISTORY OF THE FLIGHT

Note: the following information is principally based on statements and data from the aeroplane’s GNSMAP 196 GNSS computer.

The pilot arrived at the beginning of the afternoon at the Centre École de Parachutisme Sportif de l’Ariège located at Pamiers Les Pujols aerodrome to carry out parachute drop flights. He determined that he had enough fuel to make three rotations with the Cessna “Grand Caravan”. After the first three rotations, the jump coordinator informed the pilot that he needed to carry out one or two extra rotations. The pilot therefore added fuel.

He took off for the fourth rotation, made the drop, landed and shut down the engine. The pilot stated that during start-up for the last rotation for a parachute drop at a height of 4,000 m, the low fuel level indicator lights for each tank illuminated in amber (see *Figure 1*, point ①). The pilot thought he had 85 l in the right tank and 29 l in the left tank. He continued with the start-up with a view to making the flight.

One of the parachutists told the pilot that she wanted to accompany her colleagues on the flight without jumping due to neck problems. Nevertheless, she put on her parachute. She sat in the seat that was back-to-back with the pilot’s seat and fastened her seat belt.

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

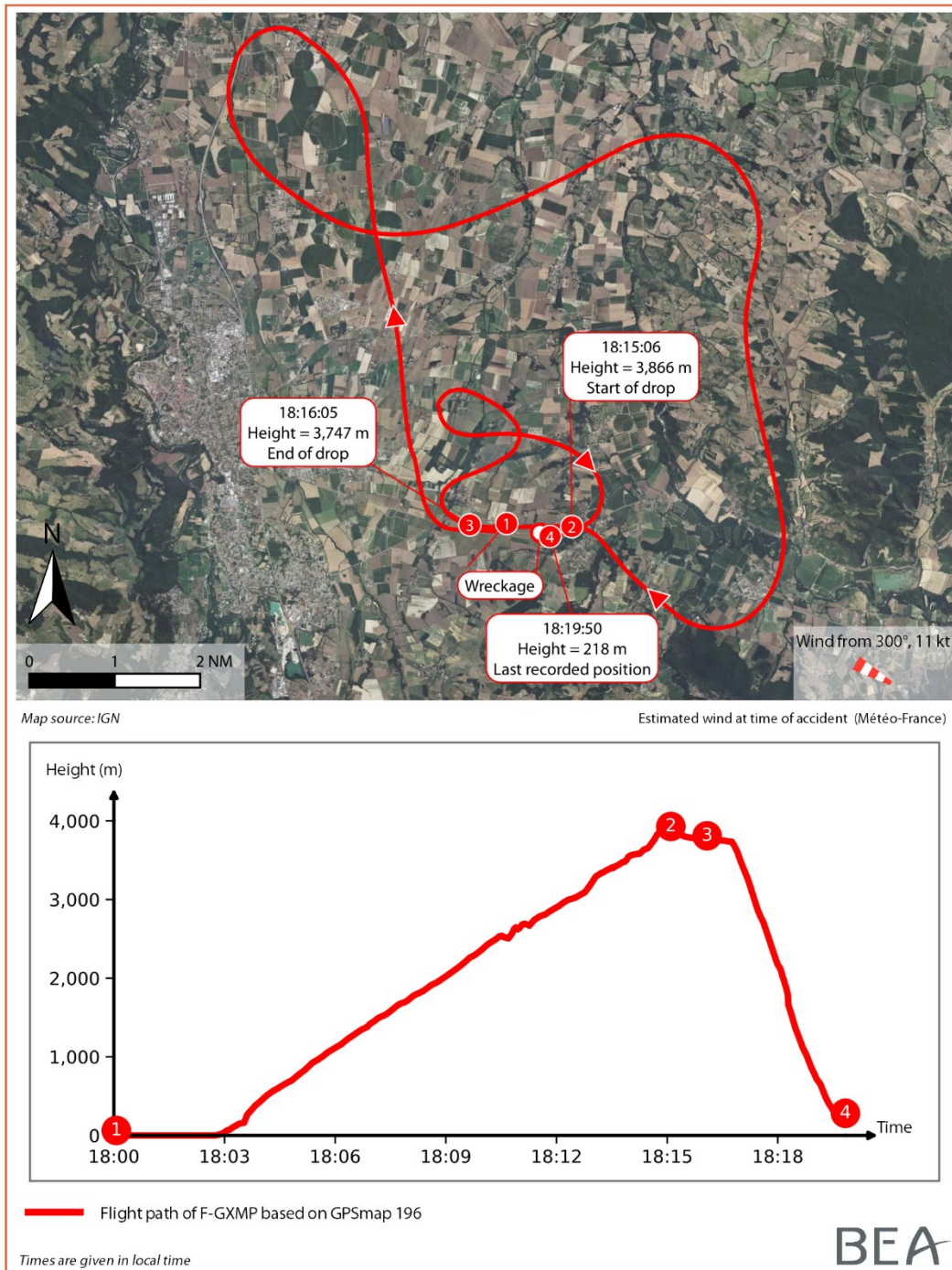


Figure 1: complete path of F-GXMP (Source: BEA)

During the climb, the pilot realised that the fuel gauges were displaying a level close to the minimum. He planned to carry out the drop at a height of 3,000 m, but in the end continued the climb to the drop height. Upon reaching the height of 3,800 m, the low fuel level indicator light for the feeder tank illuminated in red. He asked the 18 parachutists to jump as quickly as possible. The drop lasted around one minute (see *Figure 1* between points 2 and 3).

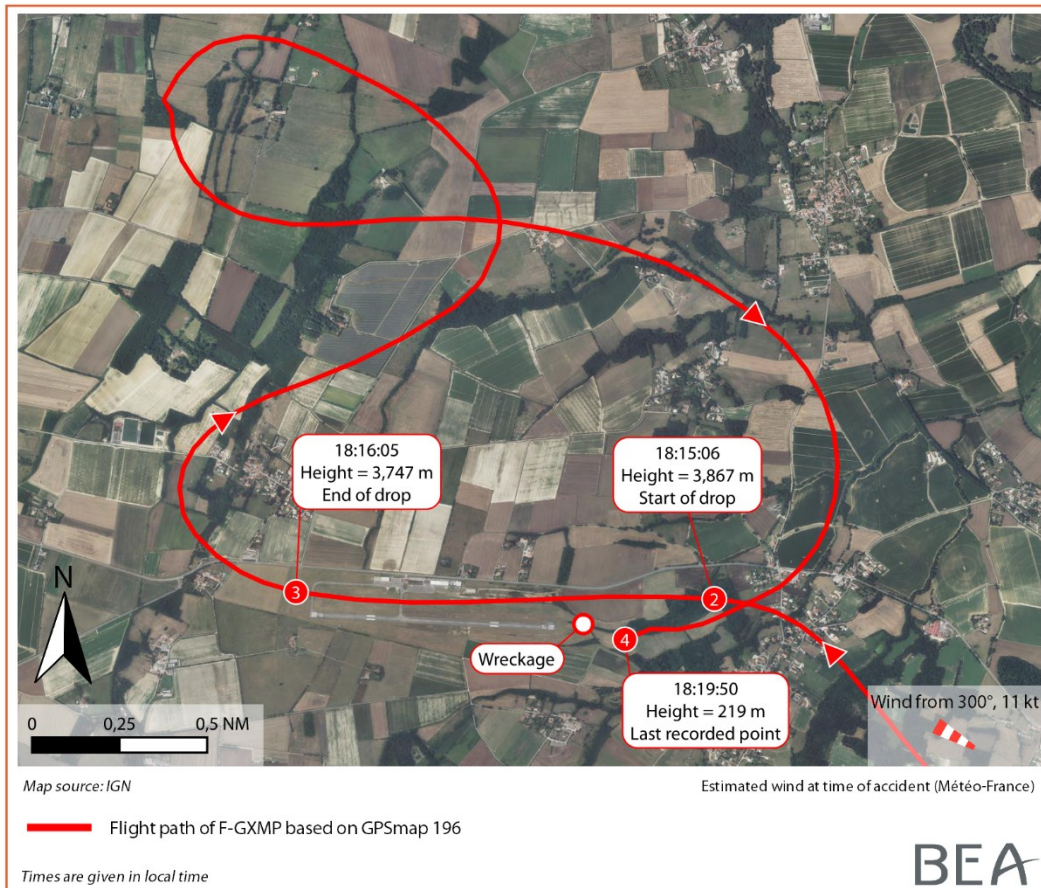


Figure 2: drop and final path of F-GXMP (Source: BEA)

The pilot started the descent with the engine at reduced speed. He distanced himself from the aerodrome, turning northwards to avoid interfering with the parachutists who were landing near the runway. He attempted to increase the power, without success. He understood that he had no fuel remaining, then the engine shut down. At a height of around 500 m, in the base leg, he configured the aeroplane for landing (third flap detent position). The pilot indicated that he decided not to feather the propeller.

On final, he realised that the aeroplane was low on the glide path and fully retracted the flaps in order to reduce the drag. The aeroplane instantly sank whilst the pilot increased the attitude to compensate for this loss of lift. The aeroplane touched down in a grass field located before the threshold of runway 27 and bounced. It ran for several dozen metres before crossing a grove and coming to a stop in a ditch.

2 ADDITIONAL INFORMATION

2.1 Pilot information and statement

The 64-year-old pilot held a Private Pilot Licence - Aeroplanes (PPL(A)) along with Cessna Single-Engine Turbine (SET), Pilatus PC6 SET, Single-Engine Piston (SEP) and Flight Instructor – Aeroplane (FI(A)) ratings. He had logged 5,744 flight hours, 43 hours and 30 minutes of which in the last three months, 10 hours and 40 minutes of which on the Cessna 208B “Grand Caravan”.

The pilot explained that during the partial refuelling, he added 100 litres of fuel, estimating this amount to be sufficient to make the last two rotations. During the start-up for the last parachute

drop, upon reading the fuel gauges, he thought he had at least 85 l in the right tank and 29 l in the left tank, i.e. a total amount of 114 l. For the last drop at 4,000 m, he estimated a consumption of approximately 70 l for the entire flight. The pilot indicated that he made a mistake in terms of the quantity of fuel required at flight departure. The investigation was unable to determine the exact quantity of fuel in the tanks at flight departure.

The pilot indicated that, given the circumstances, he asked the passenger suffering from neck problems to jump. Although she had put on her parachute, she refused.

He specified that he did not feather the propeller during the approach as he knew that the aeroplane glides a lot in this configuration and he did not want to “overshoot the runway” on landing.

2.2 Meteorological information

The meteorological conditions estimated by Météo-France at the time of the accident were as follows:

- surface wind from 300° of 11 kt;
- visibility greater than 10 km;
- scattered cumulus clouds at 4,000 ft, scattered cirrus clouds at 25,000 ft;
- temperature 19°C;
- QNH 1020.

2.3 Aeroplane information

2.3.1 General

F-GXMP was purchased by the Centre École de Parachutisme Sportif de l’Ariège in 2013. It was equipped with two Garmin GPS: one GPSMAP 196 and one Aera 500.

2.3.2 Fuel system

The C208B is equipped with two independent wing tanks with a total capacity of 1,270 l, around 13 l of which is unusable. They supply a feeder tank located under the cabin floor. To supply the engines with fuel, the pilot must select either the right tank or the left tank, or both tanks at the same time. This last position is the normal flight position.

Each tank is equipped with a pointer gauge, graduated in hundreds of pounds (lb) or in tens of gallons (see *Figure 3*). According to the aeroplane flight manual, 100 lb corresponds to approximately 56.5 litres of fuel. A half-graduation therefore corresponds to approximately 28 l, and 1.5 graduations corresponds to approximately 85 l².

² In the report, the quantities of fuel mentioned in the description of the systems are expressed in litres to facilitate understanding. The original flight manual provides these quantities in pounds (lb). In the pilot’s statement, the quantities are also in litres.



Figure 3: tank gauges (Source: pilot)

For each tank, an amber low level indicator light illuminates on the warning panel in the cockpit when the quantity of fuel in the tank is less than or equal to 95 l.

The warning panel also comprises a red indicator light indicating a low fuel level in the feeder tank. This illuminates when only 6.5 litres of fuel remain in the feeder tank, i.e. approximately one minute and 30 seconds of flight at maximum power or nine minutes of flight at “idle” power.

2.4 Operational procedures

2.4.1 Fuel

The Centre École de Parachutisme Sportif de l’Ariège published a document entitled “*Check-list NCO*”, specifying the procedures to follow to operate aeroplanes for parachute drops. This document indicates the calculation method used to determine the minimum quantity of fuel (Q) to conduct a parachute drop flight.

“Q = Taxi + Consumption + Final reserve + Additional fuel”

- Taxi: quantity of fuel required for taxiing.
- Consumption: fuel used for take-off, climb, cruise flight including the drop, descent up to landing in the conditions of the day.
- Final reserve: for a daytime flight, this reserve allows for 30 minutes of flight at “economic cruise speed”³.
- Additional fuel: additional quantity of fuel, at the pilot-in-command’s discretion.

³This term is not precisely defined in the “*Check-list NCO*” manual.

Based on the flight manual, these quantities were estimated for the event flight:

- taxi fuel specified in the flight manual: 35 lb (20 l);
- estimated consumption for the event flight⁴: 200 lb (113 l);
- final reserve (30 minutes at cruise speed at sea level): 168 lb (95 l).

The minimum quantity of fuel to be carried for the last rotation was therefore 403 lb (i.e. 227 l).

Moreover, the operator's document also specifies the following: Operator's instructions: pilots must never take off with less than one hour of fuel on board. According to the flight manual, one hour of flight corresponds to a quantity of 190 litres of fuel when cruising at 2,000 ft.

On the same page, the instructions concerning parachute drop flights stipulate that before each new take-off, after configuring the aeroplane for a new take-off, pilots must check the fuel gauges.

- 1 - If there is enough fuel to allow at least one taxi phase + one parachute drop + 30 minutes of flight, pilots may either take off or add fuel, depending on the flight conditions on the day and how congested the airspace is.

- 2 - If the quantity of fuel is below this minimum, pilots must add fuel.

2.4.2 Engine in-flight shut-down

In the event of a forced landing without engine power, the flight manual specifies that the propeller must be set to the feather position. It also specifies that over 100 kt, the flaps must be in the "retracted" position. From 80 kt, the flaps must be set to the landing position.

3 CONCLUSIONS

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

Scenario

Prior to the penultimate rotation of the day, the pilot added a quantity of fuel that he estimated to be sufficient to make two rotations. Based on the quantities of fuel indicated by the pilot, the amber low fuel level indicator lights for the tanks were most probably illuminated at the end of the penultimate rotation. During start-up for the last rotation, these amber indicator lights most probably illuminated again. During the climb, the pilot realised that the fuel gauges displayed a level close to the minimum. He continued the climb to the drop height of 4,000 m.

At a height of approximately 3,800 m, the low fuel level indicator light for the feeder tank illuminated in red. The pilot asked the 18 parachutists to jump as quickly as possible. The female passenger voluntarily remained on board.

One minute later, upon completion of the drop, the pilot began the descent. During the descent, the engine shut down. The pilot extended his path to avoid interfering with the parachutists. In the base leg, he extended the flaps to the landing configuration, but did not feather the propeller. He specified that this was to avoid overshooting the runway. On final, finding himself low on the glide path, he retracted the flaps to reduce the drag and allow him to reach the runway. The aeroplane lost lift and immediately sank, it touched down in a field before the runway threshold and finally came to a stop in a ditch.

⁴ Consumption corresponding to take-off, a climb to 4,000 m, a levelling off lasting one minute for the drop, descent and landing.

Contributing factors

The following factors may have contributed to the forced landing before the runway:

- The decision to make the parachute drop flight, although the low fuel level indicator lights for the tanks were illuminated from the engine start-up, and although the quantities of fuel read on the gauges were lower than the minimum quantity required to carry out this type of flight as specified by this operator.
- The decision not to feather the propeller following the engine shut-down, which caused additional drag and had a negative impact on the approach slope.
- The retraction of the flaps on final, causing substantial loss of lift to the aeroplane.

Safety lessons

The European regulations state that passengers must not be carried when carrying out specialised operations (SPO), including in particular parachute drop flights made with a complex aeroplane (article 5 paragraph 7 of Regulation No 965/2012 known as “AIR OPS”⁵):

“Flights taking place immediately before, during or immediately after specialised operations and directly connected to those operations shall be operated in accordance with paragraphs 3, 4 and 6, as applicable. Except for crew members, persons other than those indispensable to the mission shall not be carried on board.”

The presence of the passenger on the flight exposed her to unnecessary risks.

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

⁵ Commission Regulation of 5 October 2012 laying down technical requirements and administrative procedures related to air operations ([Version in force on the day of the accident](#)).