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INVESTIGATION REPORT

Accident to the PIPER - PA32 - 300 registered F-OKGO

on 16 February 2020
in Fort-de-France bay (Martinique)

Time	Around 09:20[1]
Operator	Air Colibri Parachutisme
Type of flight	Parachute drop
Persons on board	Pilot and four parachutists
Consequences and damage	Aeroplane destroyed

This is a courtesy translation by the BEA of the Final Report on the Safety Investigation published in July 2021. 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. Five hours should be added to obtain the legal time applicable in Metropolitan France.

Reduction in engine power, ditching, during parachute drop flight

1 - HISTORY OF THE FLIGHT

Note: the following information is principally based on statements, radio communication recordings and the data read out from the aircraft's EDM (Engine Data Manager) computer.

The pilot, accompanied by two teams of tandem parachutists, took off at 08:45 from Fort-de-France aerodrome for a parachute drop flight. It was the second flight of the first day of the commercial operation of this aeroplane.

On flying through 2,600 m in climb to 3,000 m, the pilot observed a decrease in the engine speed[2] and engine misfires[3] despite his inputs on the throttle control. As the pilot estimated that 10 US gallons remained in the selected fuel tank based on the fuel gauge indication, he was concerned about the possibility of a technical failure as the aeroplane had just come out of a long maintenance period. On receiving the control's clearance for the drop, he gave the evacuation order to the parachutists at 09:13 overhead the drop point and at the planned altitude.

He then put the plane into descent and selected the appropriate engine speed for this flight phase[4] without changing the fuel tank. It appeared to him that the engine was operating normally again and he thus started returning to the aerodrome.

On final for runway 10 overhead Fort-de-France bay, the pilot was cleared to land at 09:18. On making inputs on the throttle control, he observed that these were to no effect and that the engine was behaving erratically.

At 09:19, he told the controller that nothing was responding to his inputs and then ditched in the bay in the minute that followed.

[2] Normal speed for climb: around 2,500 rpm (source: POH PA32). Data based on recordings: 2,700 rpm.

[3] Cf. § 2.5 – Read-out of recorded data.

[4] Normal speed in this flight phase: around 1,500 rpm (source: POH PA32). Data based on recordings: 1,700 rpm.

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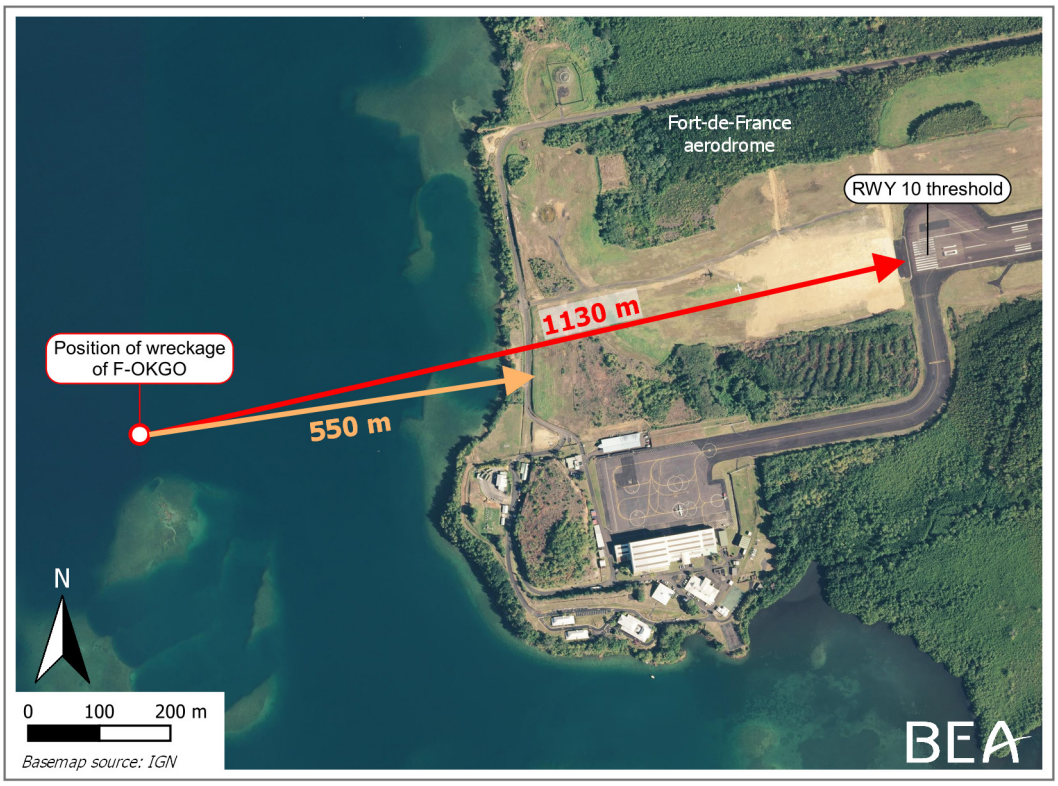

Figure 1: Position of wreckage with respect to coast and runway threshold

The pilot, having donned his life jacket, managed to evacuate the aeroplane before the latter sank at around 550 m from the coast. He was rescued by a boat 25 minutes later.

2 - ADDITIONAL INFORMATION

2.1 Pilot experience and ratings

The 46-year-old pilot held an aeroplane Commercial Pilot Licence (CPL (A)) issued in November 2016 along with valid Instrument (IR), Single-Engine Piston (SEP) and Multi-Engine Piston (MEP) ratings. In addition, he had been qualified to carry out parachute drop flights since July 2018.

His total experience was around 550 flight hours of which 155 hours in parachute drop flights.

To prepare for the parachute drop operations for Air Colibri Parachutisme, the pilot had followed a training course on a Cessna 206 in December 2019 with a pilot from another structure, the F-OKGO not being available at this time. This training consisted of six flights in the right seat. The pilot-in-command of these six flights indicated that in his club it was recommended to fill one of the fuel tanks with a sufficient margin so as to be able to carry out the series of drops in its entirety. During these flights, the fuel tank selection had therefore not been changed.

The Air Colibri Parachutisme Operations Manual requires that new pilots to the company follow a theoretical training course, the programme of which includes flying the aircraft, the circuit to be followed, normal and emergency procedures, fuel management and evacuation. The investigation was not able to determine if all or part of this training had actually been carried out.

It had been planned that on 14 February 2020 (i.e. two days before the accident), the pilot would carry out an information and familiarization session on F-OKGO with an instructor mandated by the operator. However, due to the instructor having a last-minute impediment, the pilot carried out, alone on board the plane, two aerodrome circuits. He indicated that he had not observed anything in particular during this familiarization session. He added that he knew that the plane had just come out of a long maintenance period, however, he did not know the details of this.

Note: familiarization with a new plane generally includes one or more flights along with a study, on the ground, of the performance, systems, particularities and differences with respect to planes on which the pilot is used to flying.

The pilot did not carry out flights other than those mentioned above in the three months preceding the occurrence.

2.2 Aircraft information

F-OKGO, built in 1979, was a single-engine piston aircraft with fixed landing gear. It was acquired in 2018 by Air Colibri specifically for carrying out the parachute drop activity.

Due to difficulties in the process for obtaining a certificate of airworthiness, the aeroplane only entered service in February 2020.

It could carry 98 US gallons of fuel of which 94 gallons were usable. This fuel was divided between two wing tanks. A three-position selector on the instrument panel pedestal was used to select the right wing tank, the left wing tank or to cut off the fuel supply to the engine.

The Flight Manual indicated that the average fuel consumption in cruise was 16.1 US gallons per hour. The Air Colibri Parachutisme Operations Manual adopted this value and added that the consumption per rotation[5] in parachuting operations was 11 US gallons for drops at 3,000 m.

As the aircraft had only been in service for a short time, it was not possible to empirically consolidate this theoretical estimation[6] for parachute drop operations.

The Piper PA32 was not equipped with a low fuel level warning or a low fuel pressure warning.

2.3 Meteorological information

The Fort-de-France aerodrome 13:00 automatic METAR gave the following information:

- Wind from 110°, 17 kt with possibility of gusts of up to 30 kt in downpours.
- Visibility greater than 10 km, descending to 4,000 m in downpours.
- A few clouds at 2,600 ft, broken cloud layer at 19,000 ft and potentially, passing isolated rain clouds at 1,500 ft.
- Temperature 27 °C.
- QNH 1015.

During the period, however, there was no precipitation in the accident zone.

[5] Note indicated in the Operations Manual regarding increased average consumption.

[6] The total measured consumption of the first rotation was around 11 US gallons.

2.4 Wreckage findings

The wreckage, located around 15 meters below the surface of the water, on a muddy bottom, was not examined by the BEA. De-contamination and salvaging operations were, however, carried out at the request of the French authorities several months after the accident. During these operations, the divers observed that the left wing fuel tanks seemed to be empty.

The right wing fuel tanks were completely defuelled; this corresponded to approximately 80 litres (approximately 21 US gallons) of fuel.

Note: the BEA did not participate in these examinations.

It was not possible to examine the fuel gauges, and their operation before the accident could not be assessed due to the damage resulting from them being under the water for a long period and from the wreckage salvaging operations.

2.5 Read-out of recorded data

After the accident, the following items were recovered from the wreckage:

- An Engine Data Management (EDM) computer which displays the main engine data and alerts the pilot if there is a parameter outside the configured limits[7].
- A Primary Flight Display (PFD) which displays the flight data.
- A tablet.

Only the examination of the EDM computer provided usable data of interest to the investigation. An extract of the engine data for the two flights of the day is shown in Figure 2[8].

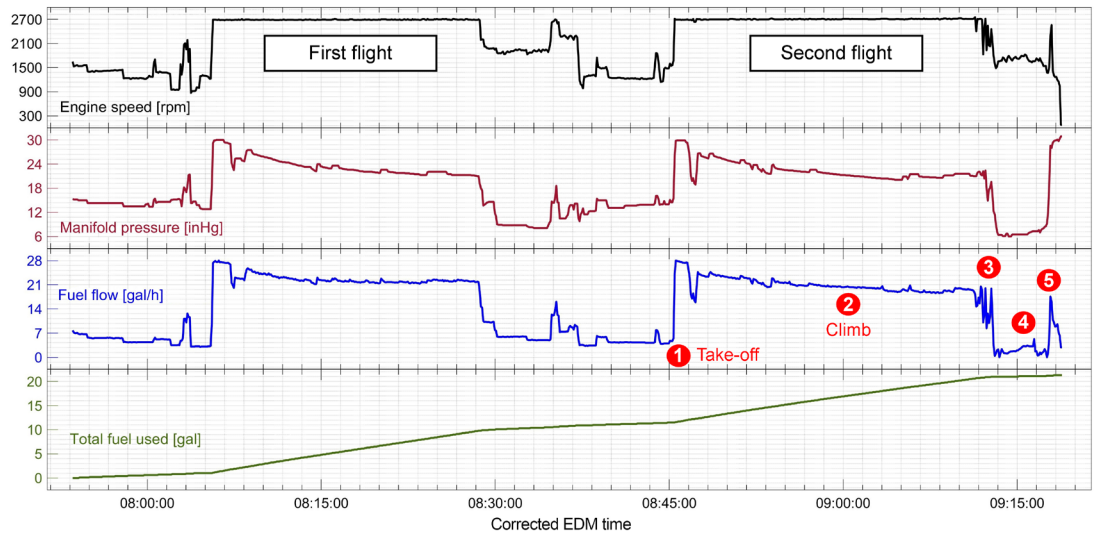

Figure 2: Engine data read out from EDM

[7] These limits are pre-set at the factory but can be entirely reset by the operator. It was not possible to determine the configuration of these settings from the examination of the EDM.

[8] The EDM clock was around 11 minutes behind time, this was corrected.

The analysis of this data revealed nominal engine behaviour during the first flight of the day and at the beginning of the second flight. During this second flight, anomalies in the behaviour of the engine (manifold pressure, engine speed, fuel flow rate) are observed at the end of the climb (point ❸ of figure 2). This malfunction, a series of quick variations in the measured value of the fuel flow rate is consistent with fuel starvation. This signature corresponds to the irregular drying up of the fuel at the engine intake causing the misfires observed.

The aeroplane then lost around 7,000 ft in less than five minutes with characteristics similar to an idle power descent with the propeller windmilling (❹). The pilot may thus have had the sensation that the engine was operating normally although it was not possible to check this in this configuration.

At the very end of the recording, a sudden increase in the engine speed and fuel flow rate can be observed prior to the parameters dropping definitively (❺). This increase is consistent with the inputs on the throttle control and the use of the remaining fuel in the pipes before the complete depletion of the fuel supply.

2.6 Fuel management

The statements indicate that the plane's fuel tanks contained 45 US gallons of fuel before the start of flights[9], equally divided between the two wings.

[9] The fuel tanks were entirely drained the day before the flight and the quantity of fuel added to the tanks measured with precision.

The pilot added that the left wing tank was selected on start-up for the first rotation and that he did not touch this control again.

The pilot estimated the consumption of F-OKGO at 60 litres (around 16 US gallons) per hour and the duration of a rotation at around 30 minutes.

He carried out a first rotation for a duration of 35 minutes with an off-block time at around 8:00. He then boarded the second team of parachutists with the engine running and left the general aviation parking area for the second rotation at about 08:40.

The data read out from the EDM shows a total consumption over the day of 21 US gallons.

Furthermore, the pilot declared that at the time of the failure, he estimated that he had a little less than a quarter of a tank. He had visually confirmed this estimation using the left fuel tank gauge which indicated around 10 US gallons. He added that there were no specific instructions from the operator concerning fuel management during the series of flights.

The Air Colibri Parachutisme Operations Manual specifies in the descent procedure that the pilot should check that the fuel selector is positioned on the fullest fuel tank.

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

Around 1 hour 20 minutes after the first off-block departure, when only the fuel in the left tank had been used, the pilot was confronted with an engine malfunction. The pilot, who had a very small amount of experience with respect to the plane, was not aware that the fuel consumed corresponded to the quantity of usable fuel in the selected tank. In addition, the aeroplane had just come out of a long maintenance period and the pilot focused on the possibility of a technical failure whereas the engine was probably experiencing fuel starvation.

On starting the descent, the rotation of the propeller being assisted by the relative wind and the power demand on the engine being close to zero, the malfunction symptoms disappeared which gave the pilot the impression that the anomaly had disappeared. In all likelihood, this incited him to return to the aerodrome without taking any particular measures.

When he made an input on the throttle control again to increase power on final, the remaining fuel in the system was very probably completely exhausted which led to the total loss of power and meant that the pilot could not hold the approach slope. As he did not question the fact that there was still some fuel, it is probable that he did not envisage changing the tank selection as a possible strategy. In these circumstances, he was obliged to ditch.

In the absence of an examination of the engine, the investigation was not able to eliminate the hypothesis of an engine anomaly, but it is nevertheless very probable that the accident was due to fuel starvation.

Contributing factors

The following factors may have contributed to the pilot's inappropriate fuel management:

- Insufficient training by the operator which did not check that the pilot had good knowledge of its procedures, notably those concerning fuel management.
- The pilot's underestimation of the fuel consumption which was based on cruise consumption which is less than that in parachute drop operations.
- The pilot's conviction that the selected fuel tank contained fuel, reinforced by his reading of the fuel gauge indication. It is possible that the quantity indicated was erroneous, notably on account of the fact that the plane was not in stabilized level flight.