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INVESTIGATION REPORT

Accident to the PIPER – PA-28-181 Archer II registered N5352F

on 4 July 2020
off the coast of the isle of Guadeloupe (Guadeloupe)

Time	Around 14:20[1]
Operator	Private
Type of flight	Ferry flight
Persons on board	Pilot and one passenger
Consequences and damage	Aeroplane destroyed

This is a courtesy translation by the BEA of the Final Report on the Safety Investigation published in June 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. The islands of Saint-Barthélemy and Guadeloupe are in the same time zone.

Decrease in engine power en route, ditching, ferry flight

1 - HISTORY OF THE FLIGHT

Note: The following information is principally based on statements, radio communication recordings and radar data.

The pilot, accompanied by a passenger, wanted to ferry the plane which he had just bought, between Saint-Barthélemy airport (isle of Saint-Barthélemy) and Pointe-à-Pitre - Le Raizet airport (isle of Guadeloupe).

He took off at around 13:10. After level flight at 3,500 ft, he climbed to 5,500 ft where he stayed for about 15 minutes before re-descending to 3,500 ft because of the cloud layer. The displayed engine speed was around 2,400 rpm and the indicated airspeed around 100 kt.

At about 14:15, at approximately 30 NM from Pointe-à-Pitre - Le Raizet airport, the pilot and his passenger observed, without there being any particular noise, a reduction in engine speed (see illustration Point 1) which prevented them from holding the flight level. The pilot adopted a speed of around 75 kt, corresponding to the plane's best glide speed. The passenger, who also held a pilot licence, carried out the actions of the inflight power loss procedure (changing fuel tank, switching on electric pump, switching off and on the magnetos) without any notable effect on the power.

The pilot then reported an engine problem to the controller and informed him that he was going to try and get to Point-à-Pitre - Le Raizet airport. The controller gave him the heading and then asked the flight information service to initiate a distress phase.

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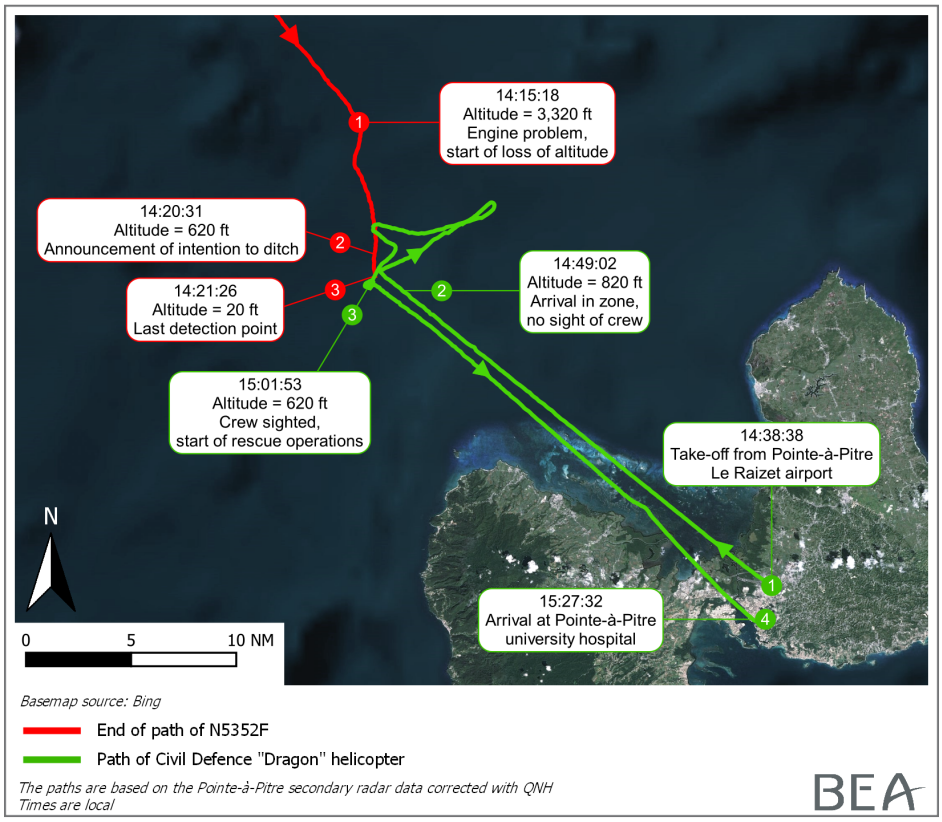
[2] According to regulation (EU) No 965/2012 "Air Ops", Annex VII Part NCO.IDE.A.175, an aeroplane shall be equipped with a life-jacket for each person on board when flight over water will require the plane to ditch in an emergency.

At a height of around 1,000 ft, the passenger opened the lifejackets, donned one of them and equipped the pilot with the second one. He then prepared the liferaft[2]. At around 600 ft, the pilot informed the controller that he was going to ditch (see illustration Point 2). It was 14:20. The latter immediately contacted the rescue services to launch the search and rescue operations. At around 200 ft, the pilot and his passenger shut down the engine and powered off the electricity, and the passenger unlocked the door.

The plane descended and ditched without changing the heading, parallel to the swell. The passenger opened the door immediately after ditching and extracted himself from the plane. Standing on the wing, he got out the liferaft which immediately inflated. The pilot then extracted himself from the plane. The aircraft sank in around ten minutes.

The two occupants of the plane waited for the rescue services in the liferaft. They were located and winched up into a helicopter at around 15:00.



End of accident flight and flight of search and rescue helicopter

2 - ADDITIONAL INFORMATION

2.1 Pilot and passenger information

The pilot held a PPL(A) issued in 2002 and an American Foreign Based Private Pilot Certificate issued in 2014. At the time of the accident, he had logged around 2,250 flight hours as pilot-in-command of which 1,800 hours on the PA-28. Furthermore, he was president of a flying club in Guadeloupe. He had carried out four flights on the PA-28 for a total flight time of 2 h 15 min in the three months preceding the accident. In 2007, he had followed a six-hour seaplane training course in Canada.

The pilot stated that he had flown as a passenger on N5352F for a test flight of around ten minutes on 25 June. The accident flight was his first flight as pilot-in-command on this plane.

The following information is based on his statement and is intended to supplement the history of the flight.

He explained that in the morning of 4 July, he had flown another PA-28 accompanied by a passenger, to the airport on Saint-Eustache (island in the Netherlands Antilles) to join the owner of N5352F at the aircraft maintenance facility in order to purchase it. He left the other PA-28 there.

After the aircraft mechanic had visually inspected N5352F (see paragraph 2.2.1), the owner-vendor of N5352F flew the plane, accompanied by the accident pilot and his passenger, back to Saint-Barthélemy where the plane was based.

At Saint-Barthélemy, the pilot, new owner, carried out the administrative formalities in connection with the purchase of the plane and then performed a pre-flight check before taking off for Guadeloupe with his passenger. They had not observed any singularities apart from a problem with the pilot's headset during the take-off.

The pilot considered that the effective collaboration between himself and the passenger contributed to the successful ditching of the plane.

The passenger held an ATPL(A) issued in 2008. He was also an airline flight instructor. He had logged approximately 11,000 flight hours of which 5,000 hours on light aircraft.

He explained that they did not change the position of the flaps during the preparation for ditching. The aeroplane therefore remained in the clean configuration. The pitch trim was set to slightly nose up and the engine shut down in order to have a minimum speed on impact with the surface of the water. The plane's path, already parallel with the swell, facilitated the ditching operation. He believed that they would not have survived without the presence and use of the liferaft.

2.2 Aircraft information

The Piper PA-28-181 Archer II registered N5352F sank after ditching. The wreckage was not raised and no examination could be carried out by the BEA.

The aeroplane flight manual does not include a specific procedure for ditching.

The aeroplane was equipped with a flat, four-cylinder Lycoming O-360-A4M engine providing 180 hp at a rating of 2,700 rpm.

At the time of the accident, the aeroplane had logged 7,222 operating hours, and its engine 2,423 hours since its last overhaul.

The plane was based at Saint-Barthélemy and maintained by a FAA[3]-approved mechanic at Saint-Eustache. This FAA approval was necessary because the plane was registered in the United States.

[3] Federal Aviation Administration

The previous owner of N5352F indicated that the plane had flown around 15 h in 2020. It had not flown between 13 March and 18 June due to the COVID 19 health situation. Between 18 June and the accident flight, the previous owner carried out four flights with the plane for a total time of around 1 h 30 min.

All of the documents relating to the aeroplane and its maintenance were in the aircraft's aft hold at the time of the accident and could not be retrieved. Only a few copies concerning the maintenance history were transmitted to the BEA by the mechanic.

2.2.1 Maintenance operations

According to the information that the aeroplane mechanic gave to the BEA, the last maintenance operations carried out on the aeroplane before the accident were the following:

- The day of the accident and at the request of the new owner: inspection, without removing any specific component, consisting of a visual check of the engine and plane, draining the two fuel tanks, draining the oil and water trap filter and checking the main flight controls.
- 100 hour/yearly inspection on 6 June 2020: this inspection was carried out in accordance with the aeroplane (Piper) manufacturer's manual, the engine (Lycoming) manufacturer's manual and FAR Part 43[4]. The work order for this inspection indicated that the plane had logged 7,220 operating hours and the engine 2,421 operating hours since the last overhaul. This document species that the engine could be returned to service.
- 100 hour/yearly inspection on 22 April 2019.

[4] Maintenance, Preventive Maintenance, Rebuilding and Alterations.

The mechanic added that after 2,000 operating hours, he carried out the following additional maintenance operations on the engine:

- a leak rate measurement of each cylinder at each 50-hour inspection;
- a visual inspection of the interior of the oil filter at each 50-hour inspection;
- an oil analysis on the owner's request.

He indicated that he had not identified any particularity on the aeroplane's engine.

The results of an oil analysis carried out on 18 September 2012 by an American laboratory, i.e. eight years before the accident, were transmitted to the BEA. In this analysis report, the aluminium and iron content were below the limits specified by Lycoming. The BEA was not informed of more recent analysis results. Consequently, the engine's "internal" health could not be determined.

2.2.2 Extension of TBO[5]

[5] Time Between Overhaul.

For each piston engine series, the engine manufacturer, Lycoming, specifies the recommended TBO. This information is given in Service Letter No 1009BE[6]. For the engine on N5352F, the recommended TBO is 2,000 h.

[6] Latest version published on 24 April 2020.

TBO extensions are, however, indicated by the manufacturer in certain operating and maintenance conditions and can be added together:

- If an engine is being used in "frequent" type service, by accumulating 40 h or more per month, and has been so operated consistently since being placed in service, 200 h may be added to the TBO time.

- A 200 h extension can be applied when the repairs or overhauls are performed:
  - Using only Lycoming genuine parts or FAA-PMA parts approved by Lycoming.
  - Using only Lycoming approved procedures.
  - The FAA form corresponding to the plane's return to service indicates the operations were performed using only Lycoming approved procedures and Lycoming genuine parts or FAA-PMA parts approved by Lycoming.

When the use of the engine does not comply with the monthly use condition indicated above, only a TBO extension of 200 h may be considered, which in this case brings the maximum TBO recommended by Lycoming to 2,200 h.

The day of the accident, the engine of N5352F had logged 2,423 operating hours since the last overhaul.

The FAA in charge of the airworthiness of aircraft registered in the United States told the BEA that as the aeroplane was operated in non-commercial aviation, the TBOs defined by the manufacturer were only recommendations.

In the absence of an examination of the engine after the accident, it was not possible to determine if this exceedance of the recommended TBO may have contributed to the inflight engine failure.

2.2.3 Fuel management information

The PA-28-181 Archer II is equipped with two wing tanks which can each hold 25 US gallons[7]. The total amount of usable fuel is 40 US gal.

[7] Anglo-Saxon volume unit, the symbol being US gal. A US gallon corresponds to around 3.78 litres.

In the operations manual, the engine manufacturer, Lycoming, indicates the following fuel consumptions:

- 10.5 US gal/h at 75 %, i.e. 2,450 rpm (Performance Cruise);
- 9.5 US gal/h at 65 % i.e. 2,350 rpm (Economy Cruise).

On taking a fuel consumption of 10.5 US gal/h, the plane's endurance is thus around 4 h 30 min.

The previous owner of the plane indicated that the last refuelling operation (a full fuel load) was carried out on 18 June at the airport on Saint-Martin. Subsequently, three flights were carried out (the flight from Saint-Martin to Saint-Barthélemy on 18 June, a local flight on 25 June and then the round trip to Saint-Eustache the day of the accident) for a total flight time of around 1 h 30 min. On taking a fuel consumption of 10.5 US gal/h, the estimated quantity on leaving Saint-Barthélemy was around 33 US gal, i.e. an endurance of around 3 h and sufficient for the ferry flight.

2.3 Meteorological information

The information provided by Météo-France indicated that on the flight path there was cloud cover, chiefly composed of low clouds with slight convective activity. The cloud cover was denser on approaching Pointe-à-Pitre with convective clouds (TCU) that could generate showers and reduced visibility. There was a moderate easterly trade wind (20 to 25 km/h) gusting to 40 to 50 km/h over the terrain and the sea.

[8] 10:00 UTC.

The 14:00[8] automatic METAR from Pointe-à-Pitre - Le Raizet airport gave the following information:

- wind 130°, 14 kt, variable between 100° and 160°;
- visibility greater than 10 km;
- few clouds at 4,000 ft;
- periods of showers with broken clouds at 1,500 ft and presence of towering cumulus;
- temperature 31 °C;
- QNH 1014.

The satellite images from the local radars do not show heavy precipitation near Guadeloupe at the time of the accident.

The pilot and passenger indicated that there was a large swell at the time of the ditching.

2.4 Search organization

At 14:15, on being informed by the pilot of the engine problem, the Pointe-à-Pitre - le Raizet approach air traffic controller asked the flight information service to initiate a distress phase (DETRESFA).

At 14:20, the controller contacted the pilot who informed him that they were going to have to ditch. The controller immediately contacted the Civil Defence to ask for the intervention of a rescue helicopter, and the French West Indies-Guiana Regional Operational Centre for Monitoring and Rescue, to give them the aeroplane's estimated distance from Point-à-Pitre - Le Raizet airport.

At 14:38, the pilot of the Civil Defence Dragon took off (see illustration Point 1). The controller was in radio contact with the crew during all of the search phase and was able to give information about the plane (colour, ELT, etc.) and its geographical position. The Civil Defence crew reached the search zone around ten minutes later (see illustration Point 2). They were only able to spot the occupants of the aeroplane, aboard their liferaft, when they flew over the zone a second time at 15:02 (see illustration Point 3). The pilot of N5352F and his passenger were then winched up into the helicopter and directly transported to the Pointe-à-Pitre university hospital.

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 pilot had just bought the plane and was piloting it for the first time to ferry it from Saint-Barthélemy to Pointe-à-Pitre. En route, over the sea, he was confronted with a reduction in engine speed. Unable to increase the engine speed or hold level flight, he was obliged to ditch with the help of his passenger, an experienced pilot.

Due, notably, to the wreckage not being recovered and examined, the investigation was not able to determine the cause of the engine failure during the flight. In particular, it was not possible to assess if the compliance with the manufacturer's recommended TBO for the engine could have prevented this failure.

The following elements minimized the consequences of this accident:

- both pilots had good knowledge of the ditching technique;
- the two pilots spontaneously implemented multi crew cooperation;
- the crew donned their lifejackets before ditching;
- the presence of an onboard liferaft and its use;
- the effective coordination between the controller and the rescue services during the search and rescue operations.