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INVESTIGATION REPORT

Accident to the RYAN – PT-22 registered N53018

on 23 February 2020
at Beaulieu (Puy-de-Dôme)

Time	Around 13:30[1]
Operator	Private
Type of flight	Cross-country
Persons on board	Pilot and one passenger
Consequences and damage	Pilot and passenger fatally injured, aeroplane destroyed

This is a courtesy translation by the BEA of the Final Report on the Safety Investigation published in February 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.

Oil leak, in-flight engine shut-down, loss of control, collision with the ground

1 - HISTORY OF THE FLIGHT

Note: the following information is based on statements, observations made at the accident site, the examination of the engine and the analysis of security camera footage.

The pilot sat in the rear seat, accompanied by a passenger sat in the front seat, took off at around 13:00 from Clermont-Ferrand Auvergne airport (Puy-de-Dôme) bound for Brioude Beaumont aerodrome[2] (Haute-Loire). The pilot flew over Issoire Le Broc aerodrome[3] (Puy-de-Dôme) at low height to wave to friends present at the aerodrome, then he regained altitude before heading to his destination. Shortly after, when the aeroplane was in level flight, the engine shut down. The pilot lost control of the aeroplane, which collided with the ground with a steep nose-down attitude.

[2] Located 29 NM within 163° of the departure airport.

[3] Located 17 NM within 165° of the departure airport.

2 - ADDITIONAL INFORMATION

2.1 Examination of site and wreckage

The accident site was located in a field, next to a subsidiary road, in a hilly area 4.6 NM south-east (166°) of Issoire Le Broc aerodrome, between the latter aerodrome and Brioude Beaumont aerodrome.

The wreckage was complete and not dispersed and oriented along a 250° heading. Debris was scattered around the wreckage within a radius of 70 m.

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The engine was separated from the firewall and located four metres from the airframe. It was laying next to the crater made by the aeroplane when it collided with the ground. The damage observed on the propeller blades is consistent with the engine delivering low or zero power at the time it collided with the ground. The many failures were the result of the collision with the ground.

The flight control linkages were continuous. The flaps were retracted.

The oil tank had burst open and its plug was missing. The small chain[4] that connects the plug to the oil tank was found broken. No trace of oil was observed on the interior or exterior skin of the fuselage in line with the oil tank plug[5] or on the windscreen that would indicate loss of the plug during the flight. It is likely that the plug, which was not found, was ejected due to compression of the oil tank when the aeroplane collided with the ground.

Black marks that could have been caused by the spraying of oil or smoke were found under the fuselage at the central fastening of the lower bracing wires towards the right main landing gear.

Figure 1: Marks under the fuselage

2.2 Aeroplane information

The Ryan PT-22 ST-3KR is a single-engine aeroplane with two seats in tandem built in 1941 (serial number 1164). It is equipped with a Kinner R-56 engine and a Fahlin wooden propeller. As the PT-22 is not equipped with a starter, the engine is started by manual propeller start.

This N53018 had logged approximately 2,200 flight hours. The last 100-hour maintenance inspection was carried out on 25 April 2019. The engine had logged 1,200 hours and 650 hours since its last major check.

2.3 Pilot experience

The 51-year-old pilot co-owned the aeroplane and held a Private Pilot Licence - Aeroplanes (PPL(A)). He had logged approximately 600 flight hours.

He also owned a Rallye MS983 aeroplane in which he regularly flew.

The pilot had been trained then authorised by an instructor to fly solo in the PT-22 more than six months ago. He had logged around 35 flight hours in this aeroplane, of which around 25 hours in dual flight.

[4] This small chain prevents the plug from being lost when it is handled.

[5] The plug is flush. It is located on the upper and front left section of the fuselage behind the engine and forwards of the cockpit.

The log book shows that the pilot had made three flights for a total duration of 1 h 40 min in the month preceding the accident, including a 1 h flight the day before the accident.

2.4 Analysis of the video recording

A security camera located a few kilometres from the site captured some of the accident flight. The analysis of this video enabled the last minute of the flight to be seen.

At 13:21:52 (time on the camera), the aeroplane entered the camera's range. It was in level flight on a path roughly north-south. Twenty-one seconds later, black marks appeared behind the aeroplane. The loss of altitude started approximately 10 seconds after this. The aeroplane is seen sideways on in descent for 24 seconds. Following a seven-second break in the recording (no images in the file saved by the camera), the aeroplane reappears with a steep nose-down attitude. At 13:22:59, the aeroplane collided with the ground with this attitude.

2.5 Statements

2.5.1 Accident witnesses

All of the statements reported abnormal engine noise (spluttering) and the emission of smoke. According to witnesses, the aeroplane seemed to fly at low height. However, with the accident area being hilly, the positions of the witnesses standing on the hilltops may have distorted their perception of the height of the aeroplane in relation to the ground.

2.5.2 Other statements

The second co-owner of the aeroplane stated that he knew the pilot well. He specified that the day before the accident, they had each made a local flight lasting around one hour and that refuelling had taken place after the last flight. The total quantity of fuel on board was sufficient to make the flight between Clermont-Ferrand Auvergne airport and Brioude Beaumont aerodrome. He stated that no abnormal oil consumption had been observed prior to the accident flight.

The instructor who had trained and signed off the pilot on the aeroplane stated that this aeroplane had a practical flight speed range of between 80 and 140 MPH[6]. He specified that the flight performance rapidly declined when the engine power was reduced, and that the stall speed of 64 MPH[7] was rapidly reached. Furthermore, he added that the maximum lift-drag speed of the aeroplane with the engine shut down is 85 MPH. He also stated that the difference in stall speed between flaps retracted and flaps fully extended only being 2 MPH, the use of the flaps was not useful.

In the case of an engine in-flight shut-down with the propeller set, in the absence of a starter, it is not possible to restart the engine.

[6] 80 MPH = 70 kt, 140 MPH = 120 kt.

[7] 55 kt.

2.6 Examination of engine

The oil tank was punctured and a small amount of oil was observed at the strainer.

The seal between the accessory section and the engine casing was damaged on its lower part. The failed part of the seal was expelled from the joint face between the accessory section and the engine casing. A strong smell of burned oil was detected during removal of the accessory section.

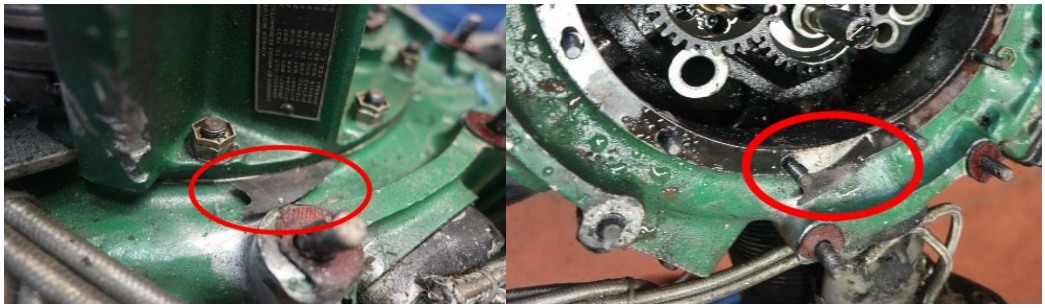

Figure 2: Seal broken and expelled from its housing

During removal of the cylinder located high up on the engine, significant erosion of the piston was observed. The control rod was blocked and scratches were visible inside the cylinder.

No significant anomalies were found on the other four cylinders.

The engine contained practically no oil.

The blockage of the control rod on the highest cylinder piston due to lack of lubrication resulted in engine shut-down.

Examination of the engine log book, the first entry of which dates back to 1977, indicates on this date that the engine had logged 110 operating hours since the last major engine check[8]. No major operation on the engine requiring removal of the accessory section had been carried out since 1977. The seal between the accessory section and the engine casing had therefore been installed since at least 1977. It is probable that the seal wore over time until it failed and became displaced during the accident flight.

[8] The investigation was unable to determine the exact date.

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

During the flight, the seal failure between the accessory section and the engine casing caused a gradual oil leak that could not be detected by the pilot, along with the emission of black smoke. The lack of engine lubrication caused the engine to seize and shut down.

The pilot started to descend to perform a forced landing.

During this descent, the pilot lost control of the aeroplane. The low height at which this loss of control occurred did not enable the pilot to regain control of the aeroplane.