

Accident to the TECNAM - P92- JS registered F-HBSV

on 10 November 2019

at Chambéry Challes-les-Eaux (Savoie)

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

Time	Around 14:00 ⁽¹⁾
Operator	Aéroclub de Bellegarde-Vouvray
Type of flight	Instruction
Persons on board	Student-pilot and instructor
Consequences and damage	Aeroplane damaged
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.	

Reduction in engine power in initial climb, turn back, runway excursion, failure of the nose gear, in instruction

1 - HISTORY OF THE FLIGHT

Note: the following information is principally based on statements.

The student-pilot, accompanied by the instructor, took off from Bellegarde-Vouvray aerodrome (Ain) for a cross-country flight bound for Chambéry - Challes-les-Eaux aerodrome. After flying over the aerodrome at 3,000 ft, he joined the beginning of the downwind leg at 2,000 ft for a left-hand circuit, for paved runway 32. He pulled the carburettor heat control. In short final, around 50 ft above the ground, just before the runway mid-point, when the aeroplane was too high on the path, the instructor asked him to go around. Around ten seconds after the go around⁽²⁾, approximately 250 ft above the ground, the instructor noted the appearance of severe vibrations and a reduction in power. She took over the controls, and operated the carburettor heat control for a few seconds. With this action having no effect, she pushed the carburettor heat control back in and adjusted the power⁽³⁾ to stop the vibrations. In the absence of a zone suitable for an emergency landing on the flight path and not able to maintain level flight, she decided to make a left-hand turn back to land at the aerodrome. After turning back, she converged towards paved runway 14. The plane touched down on the runway approximately 100 m from its end, overran the runway and ran over the grass. Passing over a rut, the nose gear failed and the plane came to a stop.

⁽²⁾ The flaps are
in the take-off
position and the
carburettor heating
is deactivated.

⁽³⁾ The engine speed
is then slightly
higher than idle.

2 - ADDITIONAL INFORMATION

2.1 Meteorological information

The meteorological conditions estimated by Météo-France at Chambéry Challes-les-Eaux aerodrome were as follows:

- ☐ north to north-westerly wind of 5 to 8 kt;
- ☐ visibility greater than 10 km;
- ☐ overcast sky with layer of cloud between 2,000 and 3,000 ft;
- ☐ temperature 8 °C, dew point 5 °C;
- ☐ QNH 1011 hPa.

2.2 Crew information

The instructor held a Commercial Pilot Licence - Aeroplane (CPL(A)) and a Flight Instructor - Aeroplane rating (FI(A)), had logged 440 flight hours, 101 hours of which as an instructor and 70 hours of which in instruction on F-HBSV.

The student-pilot had logged 67 flight hours, 62 hours of which in dual flight.

2.3 Aeroplane information

The plane, a TECNAM P92-JS, was built in 2010 and had flown 3,446 flight hours.

The ROTAX 912-S2-01 engine was installed on the plane in February 2016. It had logged 1,488.36 operating hours.

The ROTAX engine was equipped with two carburettors of type 64/32 (S/N 18.3647 and S/N 18.5045) installed since 2 May 2019 (on this date, the plane had logged 3,247.38 operating hours and the engine had logged 1,289 operating hours). These carburettors had been installed new and no incident had occurred since their installation.

The next scheduled maintenance inspection (50 engine hours) was planned at 3,462 hours (aeroplane).

2.4 Examination of the aeroplane

The airbox takes in air heated by the exhaust manifold via an air duct when carburettor heat is activated. This air duct positioned between the casing covering the exhaust manifold and the airbox was found broken off. It comprises a rubber casing and a stiff metal spiral that keeps it rigid. The spiral was damaged by corrosion. The broken strand of the spiral had torn the duct casing across the entire circumference. It was not possible to determine when this break occurred.

Based on the hypothesis that this break occurred before the accident, the duct was no longer opposite the exhaust casing. The bleeding of hot air when activating the carburettor heating could have been affected, which certainly limited, or even completely negated, its effectiveness during the descent phase prior to the go around during which the reduction in power occurred.

The examinations of the airframe, the engine and its carburettors did not reveal anything else unusual.

2.5 Statements

The instructor specified that after having adjusted it to eliminate the vibrations, the available power no longer enabled her to maintain level flight. She also stated that carburettor heating had been activated during each descent phase throughout the cross-country flight and during the aerodrome circuit.

She confirmed that no anomaly had been detected during the engine tests carried out prior to taking off from Bellegarde-Vouvray aerodrome.

2.6 Similar cases

Several occurrences, similar to that experienced on F-HBSV on 10 November 2019, were identified at a number of operators and on different aircraft, all equipped with a Rotax type 912 engine.

Similar symptoms had previously been observed on F-HBSV.

The common factors were sudden reductions in power, mostly occurring in initial climb and very often accompanied by vibrations. The technical examinations conducted on these planes were unable to explain these occurrences.

During these occurrences, no singularity on the heating device⁽⁴⁾ was observed or reported to the BEA.

In some of the occurrences, friction marks on the carburettor throttle valves were observed. On F-HBSV, the throttle valve of one of the two carburettors, removed and replaced approximately 200 hours before the occurrence on 10 November 2019, presented this type of damage. The engine manufacturer was informed of these observations and questioned about their origin and consequences. According to the manufacturer, this damage can be caused by abnormal engine vibrations. Further examinations will be conducted by the BEA to better understand this phenomenon of damage on carburettors and the consequences.

Generally, powerplants were supplied either by unleaded auto fuel, or by UL91 fuel. The use of these fuels has not been linked to these occurrences in any way.

During the investigation, the phenomenon of intake system icing as one of the possible causes was considered. Within the context of a wider study launched in 2019, pertaining to the analysis of the icing phenomenon of piston engine intake systems, the BEA analysed the operating conditions of this type of Rotax engine, and in particular the operating conditions of the associated carburettors. The first results suggest that the use of the simple "Icing" diagram proposed by the EASA and the taking into account of meteorological conditions are not sufficient. The taking into account of the characteristics of the powerplant on the aircraft seems essential.

In the case of the accident to F-HBSV, two hypotheses are to be considered based on the effectiveness of the carburettor heating system:

- ☐ With an effective carburettor heating device⁽⁵⁾, the hypothesis of an icing phenomenon seems unlikely, given the results obtained by the BEA on this type of powerplant.
- ☐ With a totally ineffective heating device⁽⁶⁾ the tests conducted by the BEA would make it possible to estimate, based on the ground meteorological conditions, a temperature downstream of the carburettors close to or less than 0 °C and a temperature of the body of the carburettors slightly above 0 °C. In these conditions, the hypothesis of an icing phenomenon of the intake system during the descent phase cannot be ruled out.

⁽⁴⁾ When the aircraft concerned were equipped with it.

⁽⁵⁾ Corresponds to the hypothesis of the failure of the hot air supply duct (paragraph 2.3) as a result of the accident.

⁽⁶⁾ Corresponds to the hypothesis of the failure of the hot air supply duct (paragraph 2.3) prior to the accident.

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 missed approach, in initial climb, the instructor noticed a reduction in engine power and the appearance of vibrations. She took over the control and noticed that the residual power delivered by the engine, after adjustment to eliminate the vibrations, did not enable her to maintain level flight. In the absence of an area suitable for an emergency landing straight ahead she decided to turn back to land at the aerodrome. She converged towards the paved runway and landed approximately 100 m before the end of the runway. When running over the grass beyond the runway, passing over a rut, the nose gear failed and the plane came to a stop.

The origin of the reduction in power of the engine could not be determined with certainty.

Nevertheless, it is likely that the air duct supplying the carburettors with hot air was damaged before the flight and contributed to rendering the carburettor heat device less effective. This loss of effectiveness, taking into account the meteorological conditions at the time of the occurrence, may have favoured the appearance of the carburettor icing phenomenon and caused the reduction in power.