



Accident to the Robin DR400/500
registered **F-HSOO**
on 17 June 2022
at Martillac (Gironde)

Time	09:25 ¹
Operator	Aéroclub de Bordeaux
Type of flight	Cross-country
Persons on board	Pilot and two passengers
Consequences and damage	Pilot and passengers fatally injured, aeroplane destroyed
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.	

Loss of control after take-off, collision with trees, fire

1 HISTORY OF THE FLIGHT

Note: the following information is principally based on statements, security camera recordings and radar data.

A group of club pilots met several times to prepare a long-planned flight from Bordeaux-Léognan-Saucats aerodrome (Gironde) to Calvi-Sainte-Catherine airport (Corse), making stops at Montpellier-Candillargues airport (Hérault) and Marseille-Provence airport (Bouches-du-Rhône).

The DR500 registered F-HSOO, two of the club's DR400-120 and a private Lancair were the four aeroplanes chosen for the flight.

The F-HSOO pilot was accompanied by a second pilot in the front seat and by a passenger, which was the second pilot's wife.

He took off from paved runway 03 at 09:23, after the first DR400. Shortly after take-off, the pilot lost control of the aeroplane, which crashed in a forest.

A pilot, in contact with the Bordeaux FIS controller, reported a fire along the Saucats aerodrome runway centreline. He added that he saw a plane take off, then lost sight of it, and suspected that it was this one.

Security cameras on an industrial building near the accident site captured part of the flight. The video recording clearly showed F-HSOO flying at low speed and with a steep attitude. Oscillations around the roll axis were observed, followed by a more pronounced left bank angle. The plane then descended and disappeared into the forest. This situation corresponded to a change to the backside of the power curve.

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

2 ADDITIONAL INFORMATION

2.1 Pilot information

The 69-year-old pilot held a Private Pilot Licence - Aeroplanes (PPL(A)) along with a single-engine piston (SEP) (T) rating issued in 1983 and a night rating. He had logged approximately 230 flight hours. He had obtained the VP (variable pitch) variant on 05 August 2021 after performing 2 flight hours on DR500. He had then logged 4 hours and 20 minutes on DR500 between 31 October 2021 and 18 May 2022. The pilot was responsible for organising trips for the club since the last general meeting. He had joined the club in 2019 and had logged approximately 28 flight hours with it.

The passenger in the right-hand seat, also a pilot, planned to fly some of the stages of this trip. He was a member of the club since 2010 and logged around 25 flight hours per year with it.

2.2 Meteorological information

The meteorological conditions obtained from the automatic station at Bordeaux-Léognan-Saucats aerodrome were as follows: 050° wind of 5 kt, variable direction from 010 to 090°, visibility greater than 10 km, CAVOK, QNH 1,020, outside temperature 27 °C.

2.3 Aerodrome and surrounding environment information

Bordeaux-Léognan-Saucats is an aerodrome open to public air traffic, with two parallel runways, one paved (800 x 20 m) and the other grass (774 x 80 m), oriented on QFU 033/213°. It is bordered by forests. The A/A frequency (119.000 MHz) is not recorded.

2.4 Site and wreckage information

2.4.1 Site

The accident site was about 700 m north of the end of runway 03, in a forest of oaks and conifers, with dense ferns growing underneath.

A fire broke out after the collision with the ground.

2.4.2 Wreckage

The wreckage, entirely burned, was lying on its back. Examination showed that all the main components were present before the fire. However, the extent of the damage caused by the fire limited the scope for examination.

The continuity of the flight control linkages was established on the roll and yaw channels. A failure in one of the pitch channels was observed, in a bolted connection, without any defect prior to the impact being suspected².

The position of the (electric) flaps could not be determined because the control actuator was not found.

² Analysis of the aeroplane's attitude on the security camera recording did not call into question its control on the pitch axis.

Marks in the vegetation showed that the aeroplane hit a tree with its right wing before turning over and coming to a stop on its back on the ground. Tree trunks and branches about 15 cm in diameter were severed by the propeller. This observation confirmed that the engine was working and transmitting power to the propeller. An in-depth examination of the powerplant was therefore deemed unnecessary.

Examination of the propeller distortions suggested that the blades were in a position close to coarse pitch when they made contact with the vegetation and then the ground. It was not possible to know the pitch position at the time of take-off.

2.4.3 Survival aspects

The security camera images suggested a collision with the obstacles and the ground with low longitudinal and vertical energy. Witnesses nearby explained that they heard calls for help coming from the site and immediately went to the area with hand-held fire extinguishers. However, they were unable to get any closer because of the intensity of the fire and the various explosions.

The speed with which the fire spread left no possibility for the aircraft's occupants to survive the accident.

The rapid reporting of the fire by an aeroplane pilot to the air traffic controller optimised the response of the emergency services.

2.5 Aeroplane information

2.5.1 General

The DR400/500 President is a single-engine aeroplane powered by a 200 hp Lycoming IO-360-A1B6 fuel-injected engine and a Hartzell HC-C2YK-1BF constant speed two-blade metal propeller. It has a fixed tricycle landing gear and is made of wood and canvas. This model has four tanks, only three of which were used for the planned flight (total capacity 185 litres).

The take-off speed is 59 kt and the initial climb speed is 70 kt. The optimum climb speed is 84 kt with the flaps in the take-off position and 92 kt with the flaps retracted. The stall speeds when wings are level are 60, 57 and 55 kt with flaps retracted, at take-off and at landing, respectively.

The take-off distance, taken from the flight manual, in the conditions of the day, was around 530 m and therefore compatible with the length of runway available³. The estimated climb speed in these conditions was 870 ft/min.

The take-off procedure⁴ in the flight manual specifies that during take-off and after obstacle clearance, the engine parameters must be set by means of:

- the manifold pressure control, to display 25 in.Hg;
- the propeller control, to 2,500 rpm;
- the mixture switch, to 12 USG/h.

³ TODA of paved runway 03: 800 m

⁴ The operator instructs that the maximum power available must be maintained up to a height of 300 ft.

The manufacturer explains that the propeller governor, which is designed to govern the propeller rotation speed according to a setpoint, will increase the propeller pitch towards coarse pitch during an acceleration phase of the aeroplane, without however reaching the stop. The manufacturer also specifies that take-off with the propeller set to coarse pitch would be difficult to achieve in the conditions of the day, as the engine would have difficulty picking up speed and the take-off distance would be noticeably increased.

The propeller governor system comprises the following components: a governor control in the cockpit, a hydraulic governor and a return spring at the propeller. When the propeller governor is not delivering oil pressure, the propeller is forced towards fine pitch by a return spring. Ten days before the accident, the aeroplane underwent a 100-hour scheduled maintenance inspection. No anomaly was found.

2.5.2 Weight and balance

The load capacity (occupants + luggage) is 500 kg. The maximum take-off weight is 1,150 kg. The pilot refuelled and filled both wing tanks as well as the front tank, totalling 130 kg. The pilot and passengers carried luggage estimated to weigh 30 kg. The pilot drew up a weight and balance report. The calculation indicated that the aeroplane was within the weight and balance limits recommended by the manufacturer (1,122 kg, lever arm 0.503 m).

2.6 Read-out of radar recordings

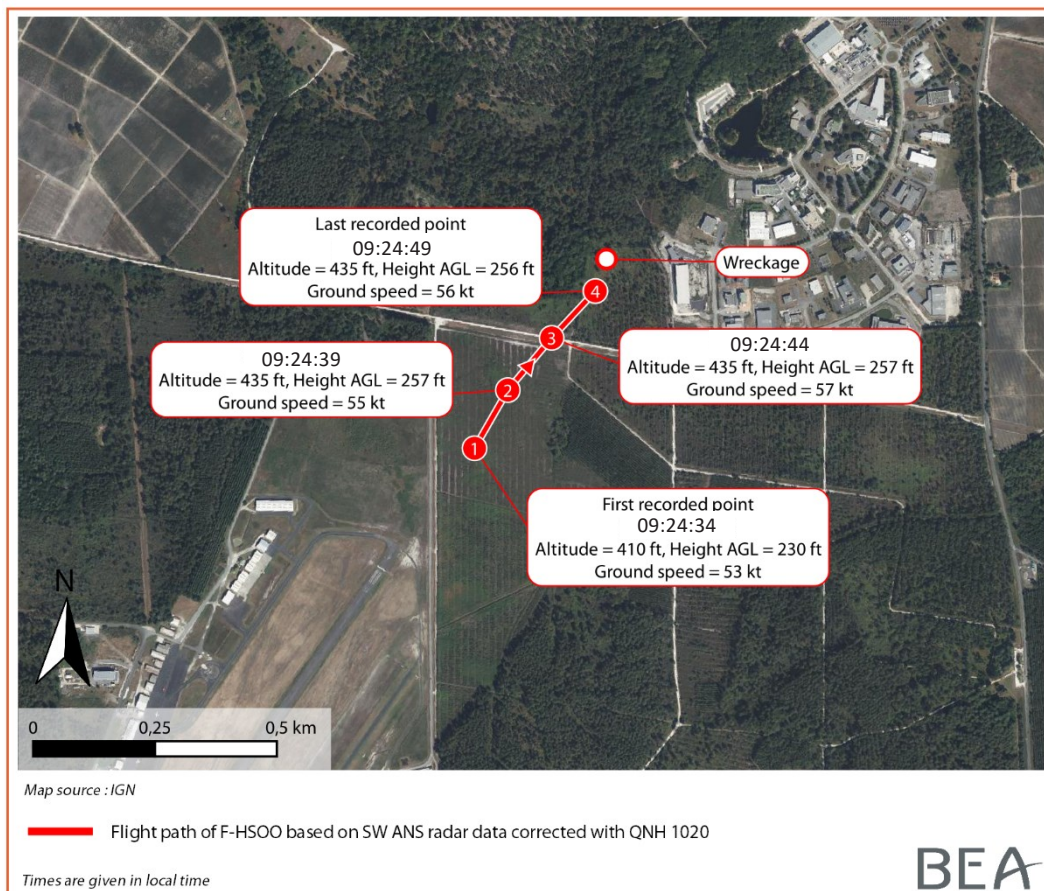


Figure 1: path of F-HSOO based on radar data

The accuracy inherent in radar data limits its analysis. It should be noted, however, that after take-off, the aeroplane's ground speed remained at around 55 kt with no noticeable increase in altitude.

In light winds, the associated airspeed values were lower than those normally observed during the take-off of a DR400/500 Président.

3 CONCLUSIONS

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

Scenario

The pilot of F-HSOO lost control of the aeroplane shortly after take-off. The read-out of a security camera recording showed the aeroplane flying with a steep attitude (high angle of attack), descending at low speed and low height. The examinations of the wreckage determined that the propeller was close to the coarse pitch stop at the time of the collision with the vegetation. It is likely that an input was made on the propeller pitch control after take-off.

Contributing factors

The following factors may have contributed to the loss of control after take-off:

- An early rotation and/or excessive attitude in climb: although the aeroplane was operating within the prescribed weight and balance limits, the conditions of the day (ISA +12 °C) led to a reduction in obstacle clearance margins compared with the situations usually encountered by the pilot. This situation may have led him to adopt an attitude steeper than that required to maintain climb speed and thus to remain on the backside of the power curve. The instability generated by the low flight speed could have led to a stall and loss of control at low height.
- The pilot's lack of experience on type (constant speed propeller) and his lack of recent experience may have contributed to the difficulty in analysing the cause of unexpected climb performance.
- A possible input on the propeller governor control shortly after leaving the ground: the aeroplane would then have been unable to accelerate during the climb, given the high temperature and take-off weight.

It was not possible to determine the flap position at the time of take-off. Flaps in landing position would have degraded take-off performance.

Safety lessons

[Taking off on the backside of the power curve](#) was the subject of a publication by the French national council of aeronautical and sports federations (CNFAS), which explains the risks associated with maintaining this flight condition after take-off.

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