



Accident to the ROBINSON R44 Raven II
registered **F-HATU**
on Saturday 9 September 2023
on Issoire - Le Broc aerodrome

Time	Around 12:35 ¹
Operator	Copt'Air Héliclub
Type of flight	Local
Persons on board	Pilot
Consequences and damage	Helicopter substantially damaged
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 yaw control during landing, rollover

1 HISTORY OF THE FLIGHT

Note: the following information is principally based on statements and security videos.

The pilot took off from Lyon - Bron aerodrome at around 10:15 for a flight bound for Issoire – Le Broc aerodrome. After landing, he boarded two passengers and carried out a local flight of roughly 20 min. He landed on runway 18 and then hover taxied and parked the helicopter in a refuelling area to top up with the fuel required for the return flight. He shut down the engine and stopped the rotor and the passengers then disembarked. On realising that it was a private fuel pump, the pilot started up the engine, entered hover and then hover taxied to another pump.

The helicopter was in stable hover facing the pump. The pilot lowered the collective lever to descend vertically. The two skids touched the ground, the helicopter then entered a left-hand yaw rotation of more than one complete turn, rolled over onto the right-hand side and came to a stop.

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

2 ADDITIONAL INFORMATION

2.1 Site and wreckage information

The accident occurred close to a refuelling station, on paved ground (see **Figure 1**).



Figure 1: accident site on Issoire - Le Broc aerodrome

Marks could be observed on the ground, corresponding to the rubbing of the skids and the contact of the main rotor blades when the helicopter rolled over. The wreckage was lying on its right-hand side (see **Figure 2**).



Figure 2: wreckage on accident site (source: BEA)

The examination of the wreckage did not reveal any mechanical failure which could explain the accident. It was observed, in particular, that:

- the deformations of the drive shaft connecting the main gearbox to the tail gearbox indicated the presence of engine drive torque at the time of the accident;
- all the components of the tail rotor drive were functioning normally;
- the connection between the main rotor and the tail rotor drive shaft was nominal;
- the tail rotor blades did not show any significant damage. Each blade freely moved around its pitch change axis with no friction points;
- the mechanical controls of the propulsion system were functional. After energizing the power system, the clutch and the associated light on the instrument panel were functional.

2.2 Helicopter information

The R44 RAVEN II is a four-seat single-engine helicopter equipped with a skid landing gear. It has a Lycoming IO-540-AE1A5 engine providing 249 hp. The main rotor and the tail rotor are both equipped with two metal blades. The main rotor rotates in an anti-clockwise direction.

2.3 Pilot information

2.3.1 Experience and licences

The 43-year-old pilot held a PPL (H) licence obtained in August 2023 and a class 2 medical fitness certificate. At the time of the incident, he had logged approximately 72 flight hours, including approximately 8 hours 30 minutes on the R44. He also held the R22 rating. In the three months preceding the accident, he had flown approximately 6 hours and 30 minutes.

2.3.2 Statement

The pilot indicated that all the lights were extinguished. According to him, there was no object on the seats or on the floor near the pedals. In hover, facing the refuelling station, he lowered the collective pitch lever. He indicated that he then suddenly perceived vibrations. The helicopter started jumping from one skid to the other. He could not remember his inputs on the controls from when the helicopter started yawing to the left. He indicated that he cut off the battery, removed the key and released his seatbelt to exit the helicopter as rapidly as possible after the accident.

2.4 Video analysis

The recordings from the aerodrome security cameras were used to analyse the pitch attitude of the helicopter from the start of hover to when it came to a stop on the ground.

In particular, it was observed that:

- the helicopter was stable in hover and then during the descent;
- the engine was providing power;
- seven seconds elapsed between the skids first touching the ground and the helicopter rolling over onto its right-hand side;
- the helicopter started yawing to the left after contact with the ground, it rose with nose down and nose up movements and then carried out more than one complete turn;
- during the first rotation, the tail rotor skid and the tail rotor guard struck the ground;
- the main rotor struck the ground and broke up with a great deal of energy.

2.5 Meteorological information

Météo-France estimated the meteorological conditions at the time of the accident as being:

- wind from east-south sector of 5 kt;
- visibility greater than 10 km;
- clear sky;
- temperature of 29 to 31°C.

3 CONCLUSIONS

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

Scenario

The pilot, unaccompanied, was hover taxiing in the ground effect to reach the refuelling station. While in hover, he started descending by lowering the collective pitch lever and holding the yaw with the foot pedals. After coming into contact with the paved ground, the helicopter entered a left-hand rotation around its yaw axis. The pilot was unable to counter this movement and the helicopter carried out more than one complete turn. The tail rotor guard and skid and then the main rotor came into contact with the ground. The helicopter rolled over onto its right-hand side.

The investigation was not able to determine what caused the helicopter to start rotating around its yaw axis; the start of rotation was not controlled by the pilot. An inadequate coordination by the pilot, between the lowering of the collective pitch lever during the descent and the inputs on the pedals might have contributed to it.

When a helicopter starts yawing, the pilot must immediately react with large amplitude inputs, possibly up to full travel and this, until the rotation stops.

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