BEA
Bureau d'Enquêtes et d'Analyses
pour la sécurité de l'aviation civile

www.bea.aero
@BEA_Aero

SAFETY INVESTIGATION REPORT

Accident to the helicopter AIRBUS Dauphin EC155B1 registered F-HEGT and the plane NORD N1203 registered F-AYVV on Thursday 8 February 2024 at Cozy

Time	Around 11:45[1]
Operator	F-HEGT: Héli Sécurité F-AYVV: "Les Ailes Anciennes de Savoie" association
Type of flight	F-HEGT: Passenger commercial air transport F-AYVV: Check flight
Persons on board	F-HEGT: Two pilots and six passengers F-AYVV: Pilot and mechanic
Consequences and damage	F-HEGT: Helicopter damaged F-AYVV: Aeroplane substantially damaged

Mid-air collision

1 HISTORY OF THE FLIGHT

Note: the following information is principally based on the helicopter's on-board CVFDR and statements.

At 11:34, the pilot of the helicopter registered F-HEGT contacted the Chambéry airport controller to start up the engines. He was assisted by a safety pilot and accompanied by six passengers, for a flight bound for Courchevel mountain airfield. Five minutes later, the pilot took off, started climbing to an altitude of 3,000 ft[2][3] and headed towards "Sierra Bravo" reporting point (see **Figure 1**). At 11:42, after reaching the reporting point, the pilot left the Chambéry frequency and selected the A/A frequency used by pilots flying in mountainous regions, called the "Mountain" frequency (130.000 MHz). He climbed to an altitude of 4,000 ft, engaged the autopilot and took a route towards Albertville close to the entrance to the Tarentaise valley. The helicopter's speed was 150 kt (280 km/h).

At around 11:40, the pilot of the aeroplane registered F-AYVV, accompanied by a mechanic, took off from Albertville aerodrome for a local post-maintenance check flight. During the climb to the west, the mechanic recorded the flight parameters in the scope of the check flight.

[1] Except where otherwise indicated, the times in this report are in local time.
[2] QNH 1 010 hPa.
[3] The glossary of abbreviations and acronyms frequently used by the BEA can be found on its web site.

The pilot left the Albertville aerodrome frequency and selected the mountain frequency. At an altitude of 4,000 ft, the pilot put the aeroplane into level flight at a speed of 235 km/h (130 kt) to record the last parameters before heading back to the aerodrome.

At 11:45:53, the two pilots on board the helicopter perceived F-AYVV coming towards them, at the same altitude. The pilot flying sharply turned right while pitching down while the aeroplane continued in a straight line. The aeroplane pilot who saw the helicopter at the last moment, did not have the time to carry out an evasive action.

At 11:45:55, the tips of the helicopter's main rotor blades came into contact with the aeroplane's left fairing and made a cut in the root of the left wing, between the leading edge and the main spar (see **Figure 1**, point 1).

The helicopter pilot started an emergency descent, reducing the speed to 80 kt. While searching for an obstacle-free area for landing, he transmitted a distress message by radio and activated the emergency locator transmitter. He landed in a field less than three minutes later (point 2).

At the same time, the aeroplane pilot also reported that they were in distress. After checking the controllability of the aeroplane, he started the descent and returned to Albertville aerodrome. He directly joined the long final and landed five minutes later.

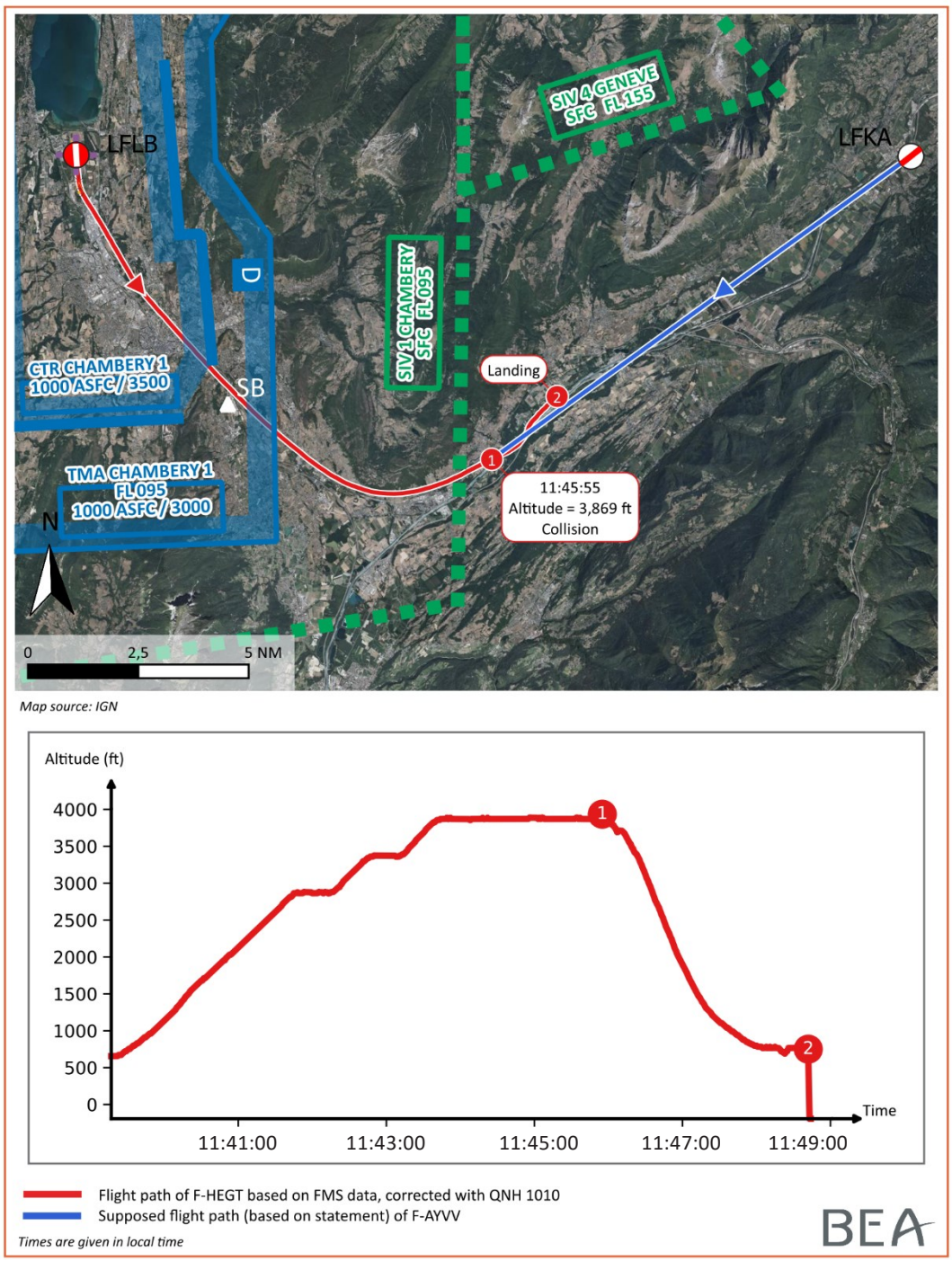

Figure 1: flight paths taken by both aircraft

2 ADDITIONAL INFORMATION

2.1 Aircraft information

2.1.1 Dauphin EC155B1 registered F-HEGT

F-HEGT, owned by Héli Sécurité, is a twin-engine helicopter with retractable landing gear, a tail fenestron and a five-blade main rotor. The rotor disk has a diameter of approximately 12 m, the maximum take-off and landing weight is 4,920 kg.

The navy-blue helicopter was configured as a VIP version, to carry eight passengers and a crew of two pilots. It is certified for single-pilot operations, and is equipped with an autopilot, two VHF radios, a transponder and a collision-avoidance system (TCAS).

2.1.2 North N-1203 registered F-AYVV

F-AYVV, built in 1957, is a vintage Nord N-1203. It was purchased by the association in 1984. The restoration work on this aeroplane started in 2008 and lasted for ten years.

F-AYVV is a single engine piston aeroplane with low wings and a retractable landing gear. It has white paintwork with the two wing tips and propeller cone painted red.

The aeroplane had not been flown since its last 100-hour/annual maintenance inspection on 12 October 2023, and an engine oil and filter change on 7 December 2023. It was not equipped with a transponder; the transponder was to be installed in the days following the check flight. The aeroplane had logged 1,107 flight hours at the time of the accident.

2.2 Damage

2.2.1 Dauphin EC155B1 registered F-HEGT

The helicopter pilot landed in a field close to where the mid-air collision had occurred. The helicopter was resting on its landing gear. During the landing, the landing gear sunk into the soft ground by roughly ten centimetres. The keel under the fenestron had also slightly penetrated the ground.

The damage observed was limited to:

- the tip of two of the five blades, due to contact with the aircraft wing during the evasive manoeuvre, and a notch on the trailing edge of one of the blades;
- the fenestron fairing, which showed blade rubbing marks that probably occurred during landing and the keel coming into contact with the ground.

Figure 2: damage to helicopter (source: BEA)

2.2.2 Nord N1203 registered F-AYVV

The damage observed on the aeroplane was located on the left-hand side, close to the wing root. There was a cut on the left-hand side of the engine cowling. The left-hand wing was also cut from the leading edge to the spar, which was not damaged.

The left-hand wing fuel tank situated forward of the spar was torn. The left-hand aileron control rod was severed. This rupture did not cause the aileron control system to jam. The aeroplane's pilot was still able to turn.

Figure 3: photo of aeroplane and location of damage (Source: BEA)

2.3 Pilot information

2.3.1 Crew of Dauphin EC155B1 registered F-HEGT

The 35-year-old pilot held a helicopter commercial pilot license (CPL(H)) obtained in 2013, as well as a helicopter instructor rating (FI(H)) and a multi-engine (ME) instrument rating (IR). He held type ratings for the R44, AS350, EC130, S365 and EC155. He had a class 1 medical fitness certificate. He had logged approximately 3,000 flight hours. He was an employee of Héli Sécurité since 2018.

The 49-year-old safety pilot held a commercial helicopter pilot license (CPL(H)) obtained in 2014, along with a helicopter instructor rating (FI(H)) and R44 type rating. He had logged around 400 flight hours.

2.3.2 Pilot of Nord N1203 registered F-AYVV

The 65-year-old pilot held an aeroplane private pilot licence (PPL(A)), along with a microlight instructor rating and a valid class 2 medical fitness certificate.

A former military pilot until 1991 and then an airline pilot until 2018, he had logged around 23,000 flight hours.

Owner of a Jodel D113 and a TETRA microlight, he carried out around 200 flight hours a year.

He had been flying the Nord N1203 registered F-AYVV since 2018 on which he had totalled around 50 flight hours.

2.4 Helicopter operator information

Héli Sécurité, based in Grimaud, holds an Air Operator Certificate (AOC) allowing it to transport passengers for commercial purposes. It operates a fleet of helicopters, including the EC155 registered F-HEGT.

Although the EC155 is certified for single-pilot operations, the company's Operations Manual provides for the possibility of a second pilot (safety pilot) in the left-hand seat.

The Operations Manual defines the prerequisites and functions of the safety pilot, namely that this specialized crew member shall hold a class 1 CPL(H) and shall take part in maintaining separation and collision avoidance during the flight, but under no circumstances have the controls. The safety pilot is at the captain's disposal to help with boarding and disembarkation with the rotor turning, and is in charge of the catering and logistics associated with the flight. The hours flown cannot be entered in the pilot logbook.

2.5 Statements

2.5.1 Pilot of Dauphin EC155B1 registered F-HEGT

The pilot indicated that the cloud cover was quite thick with a cloud base that he estimated as being between 5,000 and 6,000 ft. He added that visibility was good. In flight, his visual scan included monitoring the flight parameters and the outside environment. He specified that both he and the safety pilot saw the aeroplane at the last moment. He added that as a reflex action, he made a sharp right turn and took a nose-down pitch attitude. He heard the impact with the aeroplane and added that the helicopter started to vibrate strongly. He continued the descent and reduced speed to 80 kt. He indicated that he asked the safety pilot to extend the landing gear.

He added that although the helicopter was equipped with a TCAS, there had been no warning to indicate the presence of the aeroplane before colliding with it. He estimated that the aeroplane was visually detected no more than one to two seconds before the collision. Although he had heard a few radio messages on the mountain frequency, none of these messages had been associated with the presence of an aircraft at the same altitude and on an opposing route.

2.5.2 Safety pilot of Dauphin EC155B1 registered F-HEGT

The safety pilot indicated that during the flight, he chiefly looked outside. He added that like the pilot, he only detected the aeroplane in front of them one or two seconds before the collision. He specified that the white aeroplane was merged into the cloud cover. He added that after the collision, he assisted the pilot during the emergency descent up to the landing.

2.5.3 Pilot of Nord N1203 registered F-AYVV

The aeroplane pilot specified that the mechanic who accompanied him, was responsible for recording the engine parameters during the flight. He added that while climbing to 4,000 ft, he transmitted a message on the mountain frequency to indicate his presence. He specified that he detected the helicopter when the latter was already carrying out an evasive manoeuvre (banked to the right-hand side and in descent) and that the impact occurred immediately afterwards. He indicated that after the collision, he checked that the aeroplane was still controllable and then reported over the radio on the mountain, Chambéry information (123.700 MHz) and then Albertville frequencies that there had been a mid-air collision. He added that he then headed to

Albertville aerodrome. He specified that despite the reduced effectiveness in roll control, he was able to align on long final for runway 05, extend the flaps, lower the landing gear and land normally before taxiing to the apron.

2.6 Environment and airspace

The collision took place in class G uncontrolled airspace, not covered by a FIS (Flight Information Sector), in a mountainous area. In this class of airspace, an on-board transponder is not required by regulations, and radio contact is not mandatory. Avoidance, or maintaining separation, between aircraft in mountainous regions is therefore based primarily on the “see and avoid” principle.

This principle relies on the pilot monitoring the external environment and visually detecting, in flight, nearby aircraft whose flight path could lead to a conflict situation. However, it has certain limitations in the event of:

- low contrast between the aircraft's colour and the surrounding environment, be it the sky, depending on cloud cover, the position of the sun, or the terrain;
- the aircraft closing in on a constant bearing that the human eye will have great difficulty detecting;
- the aircraft being masked by the layout of the cockpit (canopy post, instrument panel), the aeroplane (high or low wing), the size of the engine cowling, the size of the pilot and his position in the cockpit.

In general, in uncontrolled airspace, pilots can monitor or use the A/A frequency 123.500 MHz, or contact the FIS in the area, although radio contact or monitoring a frequency is not mandatory.

In mountainous areas, pilots generally use the mountain frequency 130.000 MHz instead of the A/A frequency 123.500 MHz.

As the two aircraft were closing in head-on, the visible profile of the helicopter and aeroplane was minimal, and visual detection was made all the more difficult by the fact that the two aircraft were approaching each other on a constant bearing.

3 CONCLUSIONS

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

Scenario

The pilots of both aircraft were on a head-on flight path, with a high relative speed of around 280 kt (520 km/h or 145 m/s) at the same flight altitude, flying through Albertville valley in uncontrolled airspace.

Although they were monitoring the same radio frequency, the pilots were not aware of the other aircraft on the opposing route.

The helicopter pilot visually detected the aeroplane just before the collision and initiated an emergency evasive manoeuvre, by turning right and descending. The pilot of the aeroplane only saw the helicopter during the evasive manoeuvre, and did not have time to react to modify his flight path.

The helicopter pilot's evasive manoeuvre prevented a head-on collision, but the separation between the two aircraft as they passed was not sufficient to prevent contact between the helicopter's main rotor blades and the aeroplane.

Both aircraft were damaged, but remained controllable, and the pilots managed to land, in a field for the helicopter and at Albertville aerodrome for the plane.

Contributing factor

The following factor may have contributed to the pilots' late detection of a conflictual situation:

- the limits of the "see-and-avoid" principle, accentuated by the two aircraft being on a head-on path with a high relative speed.

Safety lessons

Several mid-air collisions or near-collisions have occurred in recent years. In October 2020, a mid-air collision between the DR400 registered F-BXEU and the Alpi Aviation Pioneer 300 identified 37AHH was investigated by the BEA, leading to the publication of a report. The investigation showed that the current safety principles on which collision avoidance is based, namely the "see-and-avoid" rule, do not prevent mid-air collisions. The development and generalisation of electronic conspicuity systems could meet the collision avoidance objectives, provided that these systems are fully interoperable. The BEA recommended that EASA promote "out signal" interoperability of electronic conspicuity systems, for example through the development of an exchange-format standard and the allocation of a dedicated aeronautical frequency in order to promote safety [Recommendation FRAN-2023-006].

EASA responded favourably to the BEA's recommendation in June 2023, and the subject was included in EASA's 2024 annual safety review.

The actions identified included:

- regulatory changes in order to have on-board alert systems on aircraft weighing less than 5,700 kg or with fewer than 19 passengers;
- demonstration and feasibility of the interoperability of alert and information systems;
- promoting the installation and use of these systems on all EASA-certified aircraft.

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