Air Accident Investigation Unit Ireland

Executive Summary for Formal Report 2020-003

ACCIDENT
Cessna 208B, G-KNYS
Near Clonbullogue, Co. Offaly

13 May 2018

An Roinn Iompair
Turasóireachta agus Spóirt
Department of Transport,
Tourism and Sport

Foreword

This Executive Summary has been issued due to the detailed nature and length of the Final Report and contains extracts from the Final Report (2020-003).

This safety investigation is exclusively of a technical nature and the Final Report and Executive Summary reflects the determination of the AAIU regarding the circumstances of this occurrence and its probable and contributory causes.

In accordance with the provisions of Annex 13[1] to the Convention on International Civil Aviation, Regulation (EU) No 996/2010[2] and Statutory Instrument No. 460 of 2009[3], safety investigations are in no case concerned with apportioning blame or liability. They are independent of, separate from and without prejudice to any judicial or administrative proceedings to apportion blame or liability. The sole objective of this safety investigation and Final Report is the prevention of accidents and incidents.

Accordingly, it is inappropriate that AAIU Reports should be used to assign fault or blame or determine liability, since neither the safety investigation nor the reporting process has been undertaken for that purpose.

Extracts from the Final Report and Executive Summary may be published providing that the source is acknowledged, the material is accurately reproduced and that it is not used in a derogatory or misleading context.

[1] **Annex 13**: International Civil Aviation Organization (ICAO), Annex 13, Aircraft Accident and Incident Investigation.
[2] **Regulation (EU) No 996/2010** of the European Parliament and of the Council of 20 October 2010 on the investigation and prevention of accidents and incidents in civil aviation.
[3] **Statutory Instrument (SI) No. 460 of 2009**: Air Navigation (Notification and Investigation of Accidents, Serious Incidents and Incidents) Regulations 2009.

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In accordance with Annex 13 to the Convention on International Civil Aviation, Regulation (EU) No 996/2010 and the provisions of SI No. 460 of 2009, the Chief Inspector of Air Accidents, on 13 May 2018, appointed John Owens as the Investigator-in-Charge to carry out an Investigation into this Accident and prepare a Report.

Aircraft Type and Registration:	Cessna 208B Grand Caravan, G-KNYS
No. and Type of Engines:	1 x Pratt and Whitney Canada (PWC) PT6A-114A
Aircraft Serial Number:	208B1146
Year of Manufacture:	2005
Date and Time (UTC)[4]:	13 May 2018 @ 13.38 hrs approximately
Location:	3.5 nautical miles (NM) west of Clonbullogue Village, Co. Offaly
Type of Operation:	Specialised Operations – Parachuting
Persons on Board:	Crew – 1 Passengers – 1
Injuries:	Crew – 1 (Fatal) Passengers – 1 (Fatal)
Nature of Damage:	Aircraft destroyed
Commander's Licence:	Commercial Pilot Licence (CPL) Aeroplane (A), issued by the Civil Aviation Authority (CAA) of the United Kingdom (UK)
Commander's Age:	47 years
Commander's Flying Experience:	2,157 hours (estimated) Total on type undetermined
Notification Source:	Dublin Air Traffic Control (ATC)
Information Source:	AAIU Field Investigation

[4] **UTC**: Co-ordinated Universal Time. Unless otherwise stated, all timings in this report are quoted in UTC; to obtain local time add one hour.

SYNOPSIS

The Cessna 208B aircraft took off from Runway 27 at Clonbullogue Airfield (EICL), Co. Offaly at approximately 13.14 hrs. On board were the Pilot and a Passenger (a child), who were seated in the cockpit, and 16 skydivers, who occupied the main cabin. The skydivers jumped from the aircraft, as planned, when the aircraft was overhead EICL at an altitude of approximately 13,000 feet. When the aircraft was returning to the airfield, the Pilot advised by radio that he was on '*left base*' (the flight leg which precedes the approach leg and which is normally approximately perpendicular to the extended centreline of the runway). No further radio transmissions were received. A short while later, it was established that the aircraft had impacted nose-down into a forested peat bog at Ballaghassan, Co. Offaly, approximately 2.5 nautical miles (4.6 kilometres) to the north-west of EICL. The aircraft was destroyed. There was no fire. The Pilot and Passenger were fatally injured.

The Investigation determined that the probable cause of the accident was a loss of control in a steeply banked left-hand turn, leading to a rapid loss of altitude. Four Safety Recommendations are made as a result of this Investigation.

NOTIFICATION AND RESPONSE

The AAIU on-call duty Inspector was notified of the accident by Dublin ATC at approximately 14.15 hrs. Three Inspectors of Air Accidents deployed to the accident site to commence an Investigation. Following an extensive excavation operation by the emergency services and local personnel to recover the two fatally injured occupants, and an initial examination of the aircraft wreckage by the AAIU, the site was secured overnight by An Garda Síochána. Three Inspectors of Air Accidents returned early the following morning to further examine the wreckage and the site, before the wreckage was recovered and transported under escort to the AAIU's facility at Gormanston, Co. Meath.

1. FACTUAL INFORMATION

1.1 History of the Flight

The Cessna 208B aircraft (**Photo No. 1**) took off from Runway (RWY) 27 at EICL at approximately 13.14 hrs. The occupants on board were the Pilot, who was seated in the left-hand cockpit seat, a Passenger (a child), who was seated in the right-hand cockpit seat, and 16 skydivers, who occupied two bench seats in the main cabin.

The aircraft was owned by a UK-based parachute-aircraft leasing company and flown by a UK-based Pilot. At the time of the accident, it was operating the locally based Club's (hereafter referred to as the Club) fifth parachuting flight that day. It had been operating each weekend at the airfield since 21 April 2018 (a total of four weekends). Shortly after take-off, at 13.15:44 hrs, the Pilot advised Dublin ATC that the aircraft was passing 1,500 feet (ft) and requested climb clearance to FL130[5]. According to one of the Club members who was operating the radio at the airfield, when the aircraft was overhead the drop zone[6], the Pilot advised that the drop would occur in two minutes. The radio operator said that following a check to ensure that the drop zone was clear, permission for the drop was given and the 16 skydivers exited the aircraft.

[5] **FL130:** Flight Level 130, a three-digit representation of aircraft altitude (13,000 ft in this case) referenced to standard pressure (1013.25 hPa).
[6] **Drop zone:** The area above and around a location where a skydiver freefalls and expects to land.

At 13.34:26 hrs, the Pilot reported to Dublin ATC that the drop was complete and the aircraft was in the descent. The aircraft was at an altitude of approximately 10,700 ft at that time. The radio operator at EICL said that the Pilot subsequently transmitted to advise that the aircraft was on '*left base*'. The aircraft's earlier flights that day had landed on RWY 09 – the reciprocal of the take-off runway. Therefore, left base would have been to the north-west of the airfield. No further transmissions were received from the aircraft, and when it did not arrive as expected, the radio operator attempted to establish radio contact, but was unsuccessful.

At approximately 13.54 hrs, the Marine Rescue Co-ordination Centre (MRCC) in Dublin contacted EICL to advise that an alert signal was being received from an aircraft's Emergency Locator Transmitter (ELT) close to the airfield. Another aircraft, which was based at the airfield, was used to conduct a search for the missing aircraft. A land-based search was also initiated and Dublin ATC was informed of the situation. A short time later, the accident site was located approximately 2.5 NM (4.6 km) to the north-west of the airfield and approximately 1 NM (1.85 km) from the south-eastern perimeter of a wind farm. The aircraft was found to have been destroyed. The Pilot and Passenger were fatally injured. There was no fire.

Photo No. 1: G-KNYS - Cessna 208B Grand Caravan (*David Reeves*)

1.2 Damage to Aircraft

The aircraft was destroyed.

1.3 Other Damage

The aircraft impacted into a forested peat bog. The impact was such that the front section of the aircraft, forward of the main wheels, was submerged below the surface of the bog. There was significant fuel contamination in evidence at the site. The accident site was compact and only trees immediately adjacent to the aircraft wreckage were damaged.

1.4 Personnel Information

1.4.1 Pilot

The Pilot, a male aged 47 years, was seated in the left-hand cockpit seat at the time of the accident. He held a CPL (A), which was initially issued by the UK CAA on 1 April 2010. The licence contained four ratings: Instrument, Cessna SET (Single-Engine Turbine), MEP (Multi-Engine Piston) (land), and SEP (Single-Engine Piston) (land). The Pilot's Cessna SET rating was revalidated on 4 February 2017, following the completion of a rating test conducted by a CAA-approved Flight Examiner on that day. The rating was valid until 28 February 2019.

The Pilot's Class 1 Medical Certificate was issued by a UK-based Aeromedical Examiner (AME) on 11 May 2018. The Pilot's previous Class 1 Medical Certificate had an expiry date of 20 March 2018. The Pilot's Class 2 Medical Certificate had an expiry date of 20 March 2019.

1.4.2 Passenger

The Passenger, a child aged seven years, was seated in the right-hand cockpit seat at the time of the accident. The Passenger was travelling on the aircraft with his parents' permission. His parents, one of whom was a skydiver at the Club, were not on board the aircraft on the accident flight. The Passenger had been on board the aircraft on previous flights. A video recorded by one of the skydivers on the day prior to the accident shows the Passenger briefly holding the control column yoke under the supervision of the Pilot.

1.5 Aircraft Information

The aircraft, a Cessna 208B (Grand Caravan), high-wing, 12.7 metres (m) long, all-metal aircraft, was manufactured in 2005. The aircraft had a United States (US) registration prior to 6 December 2017. Two cockpit seats were fitted and the aircraft could be operated from either side of the cockpit.

The aircraft's Certificate of Airworthiness was issued by the UK CAA on 12 December 2017. The Airworthiness Review Certificate was also issued by the CAA on the same date and was valid until 11 December 2018.

1.6 Communications

Shortly after take-off, at 13.15:44 hrs, the Pilot advised Dublin ATC that the aircraft was passing 1,500 ft and requested climb clearance to FL130, which was approved. At 13.34:26 hrs, the Pilot reported to Dublin ATC that the drop was complete and the aircraft was in the descent. The last radio transmission received from the Pilot was to advise the radio operator at EICL that the aircraft was on '*left base*'. No '*MAYDAY*' call was heard.

1.7 Flight Data

1.7.1 Aircraft Data Acquisition System

The aircraft was fitted with an Aircraft Data Acquisition System '*ADAS+*', which was manufactured by the Engine Manufacturer's parent company. According to the Engine Manufacturer, the ADAS unit provides '*an integrated aircraft data source and analysis tool for operators, maintenance personnel and fleet owners*'. The unit also contains a '*built in flight data recorder to assist in accident/incident investigations*', although it is not certified as crash-survivable. The ADAS system includes the unit itself and several transducers[7], some of which utilise sensors from other systems on the aircraft, including the aircraft's pitot-static sensors and engine parameter sensors. The data was recorded every 0.489 seconds (2.045 Hz).

The ADAS unit from the accident aircraft was found at the site when the front section of the aircraft was lifted from the bog. It was damaged, but intact, and was shipped to the Engine Manufacturer's Norwood facility in the USA on 15 May 2018 with the assistance of the National Transportation Safety Board (NTSB). It was examined in the presence of a Federal Aviation Administration (FAA) representative, acting on behalf of the NTSB.

Following extensive preparatory work by the Engine Manufacturer, the unit was successfully downloaded on 23 May 2018. Overview of Information Obtained. The ADAS unit contained data recorded over a period of 29 minutes approximately. This included the entire accident flight and approximately the final 28 seconds of the previous flight.

1.7.2 ATC Radar

ATC provided the Investigation with the radar data for the accident flight. Due to the location of the aircraft relative to the radar heads, the aircraft was only detected above a certain altitude. The data obtained included the aircraft's position, heading, ground speed, altitude and vertical speed and was used by the Investigation to plot the path of the accident flight from when the aircraft was first detected by radar until it was last detected.

ATC Radar first detected the aircraft just after 13.15 hrs, as it climbed to the north-west after take-off from EICL. The radar data indicates that the aircraft was at approximately 1,275 ft at this stage. The last valid radar return was received at time 13.37 hrs, when the aircraft was approximately 2.3 NM (4.26 km) to the north-west of the threshold of RWY 09 at EICL.

1.7.3 Skydivers' Cameras

Several of the skydivers were wearing helmet cameras which video-recorded their jumps. One of the videos was recorded by a skydiver who was one of the last to exit the aircraft. The video, which is of approximately five minutes duration, shows the skydiver's entire jump, including the exit from the aircraft, freefall, piloting of the canopy (parachute) and landing. As the skydiver descended from the south, along a line approximately perpendicular to the runway, the skydiver's camera mainly pointed towards the landing zone at EICL. Approximately three minutes and 48 seconds after the skydiver exited the aircraft, which was approximately 30 seconds before the skydiver landed, the camera briefly pointed towards the north-west.

[7] **Transducer:** A device that converts variations in physical quantity, such as pressure, into an electrical signal.

At this time, the video recorded what appeared to be the aircraft for less than one second, as it descended into a line of trees in the distance at a location consistent with the accident location. The skydiver only became aware of this content some days after the accident and immediately contacted the Investigation.

1.7.4 Closed Circuit Television Recordings

1.7.4.1 General

The Investigation obtained CCTV recordings from security systems installed at a wind farm and at a construction training facility, both located to the north-west of the accident site. There was no recording of the accident aircraft in the videos obtained from the construction training facility's CCTV system, which was configured for security monitoring of the facility and its associated buildings.

The CCTV system at the wind farm was similarly configured; however, two of the system's (fixed) cameras, which were pointing approximately to the south-east of the wind farm, showed the aircraft in flight. One of these cameras was located at the maintenance and administration buildings within the wind farm complex, and was pointing towards another building. The video did not contain sufficient detail to permit further analysis.

The other camera which recorded the aircraft was mounted on a security hut located just outside the wind farm complex. This camera was approximately 0.7 NM (1.3 km) to the north-east of the camera located within the complex and approximately 1.2 NM (2.2 km) north-west of the accident site. The aircraft was visible for approximately 11 seconds. During the first 7.5 seconds approximately, the aircraft can be seen flying towards the upper edge of the field of view, following what appears to be a normal trajectory. In the final 3.5 seconds approximately, the aircraft can be seen rapidly losing altitude and travelling towards a line of trees in what appears to be a near-vertical (nose-down) attitude.

1.7.4.2 Video Analysis performed by the National Transportation Safety Board

In an attempt to determine the aircraft's trajectory, altitude, speed and orientation in the moments leading up to the accident, the Investigation requested the NTSB (representing the State of Manufacture of the aircraft) to conduct analysis of the video recording captured by the CCTV camera located at the security hut situated just outside the wind farm complex.

1.8 Wreckage Examination

1.8.1 Aircraft Examination

Following on-site examination and wreckage recovery, detailed wreckage examination was performed at the AAIU's wreckage examination facility with the assistance of the Aircraft Manufacturer and the UK AAIB.

1.8.2 Engine Examination

The engine was disassembled and examined at the AAIU's wreckage examination facility with the assistance of the Engine Manufacturer.

1.8.3 Propeller Examination

The propeller sustained substantial damage during impact. The AAIU shipped it to the Propeller Manufacturer's facility in the USA for disassembly and examination. Representatives from the FAA oversaw the work on behalf of the NTSB and the AAIU.

1.9 Medical and Pathological Information

Post-mortem examination was performed at the Midlands Regional Hospital at Tullamore, Co. Offaly on 14 May 2018. The autopsy report for the Pilot stated that samples of blood and urine were forwarded to the State Laboratory for toxicological examination and that ethanol (alcohol) and drugs were '*Not detected*'. The report noted that there was '*no evidence of acute infarction*[8] *or fibrosis*' of the heart and that '*coronary arteries were normal*'. The pathologist deemed the cause of death to be due to '*massive generalised trauma* […]'.

1.10 Carriage of another Person in the Flight Compartment

Paragraphs 3, 4 and 5 of Article 5 of Commission Regulation (EU) No 965/2012 were added by Commission Regulation (EU) No 800/2013 (amending Commission Regulation (EU) No 965/2012). These paragraphs were replaced by Commission Regulation (EU) No 379/2014 (amending Commission Regulation (EU) No 965/2012). Commission Regulation (EU) No 379/2014 also introduced two new paragraphs (6 and 7) to Article 5 of Commission Regulation (EU) No 965/2012. Commission Regulation (EU) No 2015/140 (amending Commission Regulation (EU) No 965/2012) amended Article 5, Paragraph 7; this paragraph states:

> '*Flights taking place immediately before, during or immediately after specialised operations and directly connected to those operations shall be operated in accordance with paragraphs 3, 4 and 6, as applicable.* ***Except for crew members, persons other than those indispensable to the mission shall not be carried on board***' [Emphasis added].

The Club's Operations Manual extant on the date of the accident contained no guidance regarding the leasing of aircraft, nor did it contain any guidance regarding the carriage of passengers.

2. CONCLUSIONS

2.1 Findings

1. The aircraft, engine, and propeller were operating normally prior to the accident.

2. The aircraft contained a significant quantity of fuel at impact.

3. The aircraft was owned by a UK-based parachute-aircraft leasing company and was being operated by a Club based in Ireland. The aircraft and Pilot first arrived at the Club on 21 April 2018.

[8] **Infarction:** Obstruction of the blood supply to an organ or region of tissue.

4. The Pilot who flew the aircraft to Ireland and when it was based at EICL was recommended by the owner and paid directly by the Club.

5. At the time of the accident, the Pilot was flying the aircraft for a fourth weekend at the Club.

6. The Club's Operations Manual did not contain any procedures regarding the leasing of aircraft or the use of pilots associated with such a lease.

7. There was no formal signed contract outlining the terms and responsibilities for the leasing of the aircraft or the Pilot's employment arrangements.

8. The Pilot's Class 1 Medical Certificate (necessary for a CPL) was renewed on 11 May 2018 and rendered his CPL valid at the time of the accident.

9. The Club based in Ireland submitted a declaration to the IAA on 3 May 2018, which included details of the accident aircraft and indicated it was being operated by the Club under Part-SPO (Specialised Operations). The Club declared on the document that it was the '*operator*' of the aircraft.

10. Article 5 of Commission Regulation (EU) 965/2012, as amended by Regulation (EU) 2015/140, prohibits the carriage of persons other than those indispensable to the mission on board an aircraft being used for specialised operations (whether Part-SPO or Part-NCO).

11. The Operations Manual of the Club based in Ireland did not contain any procedures regarding the carriage of passengers.

12. The aircraft owner did not have a policy regarding the carriage of passengers in aircraft that it leased out.

13. The aircraft descended at an overall rate of over 3,000 ft/min from 12,000 ft to 2,176 ft.

14. The aircraft's rate of descent reduced when the aircraft reached an altitude of approximately 2,176 ft, just after the aircraft had completed a left-hand turn and had taken up a south-easterly track back in the general direction of EICL.

15. When the aircraft was approximately 2.3 NM (4.26 km) from the threshold of RWY 09 at EICL, it commenced what appears to have been another descending left-hand turn.

16. This descending left-hand turn brought the aircraft into the field of view of a CCTV security camera system.

17. It is likely that the descending turn, which was executed at a speed in excess of 140 kts, was a steep turn which resulted in the left-hand wing's angle of attack (AoA) being close to its critical AoA.

18. The ADAS unit recorded a speed of 166 kts at an altitude of approximately 7,900 ft when the aircraft was in the descent. The aircraft's maximum operating speed (V_{MO}) while operating with the cargo doors removed is 155 kts.

19. The aircraft exceeded its maximum manoeuvring speed (V_A) (112-125 kts) in the descending left-hand turn.

20. Control of the aircraft appears to have been lost during the descending left-hand turn.

21. A rapid and large increase in engine torque recorded by the ADAS during the descending left-hand turn may have been part of an attempted recovery; however, due to torque reaction, it was likely a contributing factor in a loss of control.

22. During the final 3.5 seconds of the accident sequence, the aircraft descended in a near-vertical nose-down attitude. The height of the aircraft above ground at this stage was insufficient to effect a recovery.

23. Video evidence indicated that the aircraft was being operated on the day before the accident with the amber *LEFT FUEL LOW* caution light and the red *FUEL SELECT* warning light illuminated.

24. The aircraft was being operated under Part-SPO without a Minimum Equipment list

25. The aircraft was being operated with the Pilot's sun-visor missing.

2.2 Probable Cause

Impact with terrain following a loss of control in a steeply banked left-hand turn.

2.3 Contributory Cause(s)

1. The steeply banked nature of the turn being performed.

2. Propeller torque reaction following a rapid and large increase in engine torque.

3. The aircraft's speed while manoeuvring during the steeply banked turn.

4. Insufficient height above ground to effect a successful recovery.

3. SAFETY RECOMMENDATIONS

No.	It is Recommended that:	Recommendation Ref.
1.	The Irish Parachute Club should revise its Operations Manual to include specific procedures regarding the leasing of aircraft for operations at the Club and the use of pilots associated with such aircraft operations.	IRLD2020001
2.	The Irish Parachute Club should revise its Operations Manual to specifically prohibit the carriage of persons other than those indispensable to the mission on aircraft being used for parachute/skydiving operations as required by Commission Regulation (EU) 965 of 2012, as amended.	IRLD2020002
3.	Parachuting Caravan Leasing Pty Ltd should revise its aircraft leasing arrangements to specifically prohibit the carriage of persons other than those indispensable to the mission on aircraft it owns being used for parachute/skydiving operations, unless such carriage is permitted by the state of operation.	IRLD2020003
4.	The IAA should revise its Operations Advisory Memorandums (OAMs) regarding parachute operations to highlight that the carriage of persons other than those indispensable to the mission on aircraft being used for such operations is prohibited.	IRLD2020004

View Safety Recommendations for Report 2020-003

- END -

In accordance with Annex 13 to the Convention on International Civil Aviation, Regulation (EU) No. 996/2010, and Statutory Instrument No. 460 of 2009, Air Navigation (Notification and Investigation of Accidents, Serious Incidents and Incidents) Regulation, 2009, the sole purpose of this investigation is to prevent aviation accidents and serious incidents. It is not the purpose of any such investigation and the associated investigation report to apportion blame or liability.

A safety recommendation shall in no case create a presumption of blame or liability for an occurrence.

Produced by the Air Accident Investigation Unit

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