



AIRCRAFT ACCIDENT REPORT

OCCURRENCE NUMBER 00/1160

CESSNA U206F

ZK-JBJ

LINDIS PASS

24 APRIL 2000

Glossary of abbreviations used in this report

CAA	Civil Aviation Authority
E	east
NZST	New Zealand Standard Time
S	south
UTC	Coordinated Universal Time
VFR	visual flight rules
VHF	very high frequency

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Aircraft type, serial number and registration:	Cessna U206F, U20603393, ZK-JBJ
Number and type of engines:	1 Continental IO-520-F9B
Year of manufacture:	1976
Date and time:	24 April 2000, 1145 hours* (approx)
Location:	Lindis Pass Latitude: S 44° 34.5 Longitude: E 169° 38.0'
Type of flight:	Private
Persons on board:	Crew: 1 Passengers: 5
Injuries:	Crew: 1 fatal Passengers: 5 fatal
Nature of damage:	Aircraft destroyed
Pilot-in-command's licence	Private Pilot Licence (Aeroplane)
Pilot-in-command's age	55 years
Pilot-in-command's total flying experience:	332.8 hours, 62.9 on type
Information sources:	Civil Aviation Authority field investigation
Investigator in Charge:	Mr J A Daley

* Times are NZST (UTC + 12 hours)

Synopsis

The National Rescue Coordination Centre was notified of the accident at approximately 1200 hours on Monday 24 April 2000. The Transport Accident Investigation Commission was in turn notified shortly thereafter, but declined to investigate. A CAA investigation was commenced the next day.

The aeroplane had taken off at 1058 hours from Queenstown for Paraparaumu. At approximately 1145 hours the aircraft was observed executing a turn near the summit of the Lindis Pass. During the turn the aircraft impacted with terrain. The occupants did not survive.

1. Factual information

1.1 History of the flight

- 1.1.1 On Monday 24 April 2000 the pilot intended to fly from Queenstown to Paraparaumu with five passengers on board, having attended the “Warbirds over Wanaka” airshow over the preceding weekend. ZK-JBJ was one of six aircraft from a Paraparaumu-based flying school, and the pilots had originally planned to depart early that morning.
- 1.1.2 En-route weather reports were obtained and an aircraft operator on the west coast of the South Island was contacted regarding local weather conditions. The weather at Queenstown was not suitable initially for VFR cross-country flight, so the group decided to wait until conditions improved. At about 0900 hours, one of their number called an operator at Tekapo in an effort to update the available weather information. The operator advised that conditions to the west did not look good but were better to the east, and that there was cloud towards the Lindis area.
- 1.1.3 Weather conditions improved during the morning and the pilots made the decision to depart. There was some concern regarding weather conditions between Cromwell and Tekapo and a decision was to be made by each pilot at Cromwell whether to continue with the Lindis Pass route.
- 1.1.4 The Chief Flying Instructor from the flying school authorised the flight after reviewing the pilot’s documentation. The pilot of ZK-JBJ had planned on a fuel endurance of three hours. He had refuelled the aircraft to 200 litres capacity and checked the engine oil the previous day.
- 1.1.5 ZK-JBJ was the lead aircraft in the group, and took off from Queenstown at 1058 hours. The pilot reported his position as he vacated the Queenstown Control Zone. The aeroplane subsequently passed overhead Cromwell and continued towards the Lindis Pass area, generally following State Highway (SH) 8. The second aircraft in the sequence of six was flown by the Chief Flying Instructor, and took off about 10 minutes after ZK-JBJ.

- 1.1.6 Subsequent events were witnessed by a number of people in motor vehicles on SH 8. Many of these were also returning from the airshow, and included pilots and aircraft engineers familiar with the aircraft type. Some people in a vehicle coming from the Omarama side of the Lindis Pass also witnessed the accident.
- 1.1.7 The aeroplane was observed in the Lindis Valley as being in the “bad weather/poor visibility configuration”. This requires the selection of partial flap and a reduced power setting. The aeroplane was observed following the road at heights estimated between 50 and 300 feet. An aircraft engineer stated that “ the engine sounded crisp and to be operating normally” as it flew over his car.
- 1.1.8 As the aeroplane approached the Lindis Pass it commenced a medium turn to the left as though the pilot intended to make a reversal turn and fly back down the valley again. A witness at this point estimated the height of the aeroplane above the ground between 50 and 100 feet. During the turn the angle of bank was seen to increase. One witness stated that the “aircraft slid on its left wing into the ground”.
- 1.1.9 Witnesses ran to the wreckage, and despite a high risk of fire from leaking fuel, rendered assistance to the occupants. Among the witnesses were two doctors and a nurse, and they tended the occupants until the arrival of emergency services. All occupants, except for a teenage boy who was in the rear left seat, died at the scene. The medical personnel assisted the severely injured boy for one and a half hours until the arrival of a rescue helicopter; however, he died en route to hospital.
- 1.1.10 The accident occurred in daylight at approximately 1145 hours NZST, at Lindis Pass, at an elevation of approximately 2900 feet. Grid reference 260-G39/G40-435196, latitude S44° 34.5', longitude E169° 38.0'.

1.2 Injuries to persons

<i>Injuries</i>	<i>Crew</i>	<i>Passengers</i>	<i>Other</i>
Fatal	1	5	0
Serious	0	0	0
Minor/None	0	0	

1.3 Damage to aircraft

- 1.3.1 The aircraft was destroyed.

1.4 Other damage

- 1.4.1 Nil.

1.5 Personnel information

- 1.5.1 The pilot held a Private Pilot Licence (Aeroplane) and a current Class 2 medical certificate with no endorsements.
- 1.5.2 He had a total flight time of 332.80 hours, including 62.90 hours on type. He had flown approximately 6.4 hours in the 90 days preceding the accident.
- 1.5.3 His last biennial flight review was carried out on 9 March 2000 in ZK-JBJ.

1.6 Aircraft information

- 1.6.1 Cessna U206F ZK-JBJ, serial number U20603393, had accrued a total of 2448.90 hours in service up to the last recorded entry in the logbook on 10 November 1999. The last 100-hour inspection and Annual Review of Airworthiness was carried out on 21 September 1999, at 2446.9 airframe hours.
- 1.6.2 ZK-JBJ had a valid non-terminating Airworthiness Certificate, which was issued on 12 June 1986.
- 1.6.3 The Continental IO-520-F9B engine had run 721.0 hours up to the last entry in the engine logbook on 12 October 1999.
- 1.6.4 The McCauley D3A34C401-C/C90DFA-10 constant-speed propeller had completed 428.20 hours up to the last propeller logbook entry on 12 October 1999.
- 1.6.5 The aeroplane's all-up weight and centre of gravity at the time of the accident were calculated, and found to be within the specified limits.
- 1.6.6 The fuel aboard the aeroplane on departure from Queenstown was 200 litres, of which 4 litres is unusable. This equates to an approximate flight time of 3¼ hours.

1.7 Meteorological information

- 1.7.1 On 24 April 2000 a weak trough of low pressure lay over the South Island. A southerly flow was expected to increase in the south from the afternoon.
- 1.7.2 The MetService forecast for Otago, Southland, and Southern Fiordland was for areas of broken cumulus and stratocumulus at 2500 feet with tops at 8000 feet, with the cloud base lowering to 1200 feet in showers. A few areas of broken altostratus and altocumulus would become scattered through the course of the morning. Visibility was forecast to be 30 kilometres reducing to between 4000 metres and 6000 metres in showers and rain.
- 1.7.3 The aerodrome forecast for Queenstown was for a wind velocity of 170° (true) at 12 knots, 30 kilometres visibility and a broken cloud base of 3500 feet. Between 0800 hours and midday the cloud base was forecast to lower to 1400 feet.
- 1.7.4 A trained meteorological observer was in traffic negotiating the Lindis pass when ZK-JBJ flew over him, and he stated that "low cloud was covering the top of the

Lindis Pass and there was intermittent light drizzle”. Other witnesses described the weather in the Lindis Pass area, as being overcast with the surrounding hills in cloud but the valley was clear.

- 1.7.5 A video recording from Queenstown to Lindis Pass made by one of the passengers in a following aircraft (approximately ten minutes behind ZK-JBJ) confirmed the meteorological conditions described in 1.7.4.

1.8 Aids to navigation

- 1.8.1 Not applicable.

1.9 Communications

- 1.9.1 ZK-JBJ was equipped with dual aeronautical VHF transceivers, but no communications relevant to the accident were heard by pilots of other aircraft in the area.

1.10 Aerodrome information

- 1.10.1 Not applicable.

1.11 Flight recorders

- 1.11.1 Not applicable.

1.12 Wreckage and impact information

- 1.12.1 The aeroplane was observed to strike the valley floor in a steep, descending, left turn. The left wing struck the ground first, cartwheeling the aeroplane on to its nose, then the outboard leading edge of the right wing. The aeroplane had rotated to the left through approximately 110° from the first point of impact.
- 1.12.2 The impact was taken sequentially by the left wing, nose, and right wing. Severe longitudinal compression of the fuselage occurred and the engine and propeller assembly were detached by impact forces. The engine and propeller suffered severe damage.
- 1.12.3 All of the aircraft was accounted for at the site, and pre impact control integrity and normal operation were established during the initial examination and subsequent salvage.
- 1.12.4 Some fuel had leaked from the fuel tanks through ruptured fuel lines however a significant quantity remained in the fuel tanks.
- 1.12.5 The attitude indicator was jammed at approximately 60° angle of bank and was a probable indication of the steepness of the turn prior to impact with the terrain.
- 1.12.6 Engine control positions were not considered to be significant because of the displacement of the engine at impact. The master and magneto switches were found in the “off” position during the site investigation; it was established that a member of the public had turned off the master switch, but it was not known who

turned the magneto switch to “off”. It was considered highly unlikely that this had been done by the pilot.

1.13 Medical and pathological information

- 1.13.1 Post-mortem examination of the pilot revealed that he had died of traumatic injuries sustained at the time of impact. No evidence was found of any pre-existing condition, which may have led to in-flight incapacitation of the pilot.
- 1.13.2 Toxicological tests on the pilot revealed no trace of alcohol, or medical or recreational drugs.

1.14 Fire

- 1.14.1 Fire did not occur.

1.15 Survival aspects

- 1.15.1 Although the pilot and front passenger were restrained by a lap belt and shoulder harness, impact forces and the loss of occupiable space combined to render the accident unsurvivable.
- 1.15.2 The passengers in each of the second and third seat rows were restrained by only a lap belt and the impact forces that each sustained rendered the accident unsurvivable.

1.16 Tests and research

- 1.16.1 Following on-site examination, the wreckage was transported to an aircraft engineering facility for further examination. The engine was bulk stripped, and apart from obvious impact damage, no abnormalities were found. The magnetos were bench-tested and found to be satisfactory; the magneto timing was also checked and found to be correct.
- 1.16.2 The complete engine fuel-injection system was removed and sent to a specialised testing facility. Some damaged components were replaced to enable fuel flows to be measured. Taking the overall combination of unit test findings it was considered that the engine was capable of operating normally.
- 1.16.3 Flap extension measurements taken at the accident site were compared with another Cessna 206. The measurements equated to a flap extension of approximately 10° being set on ZK-JBJ.
- 1.16.4 An investigation of fuel supplier records confirmed that two uplifts were made by ZK-JBJ at Queenstown on 23 April 2000.

1.17 Organisational and management information

- 1.17.1 Not applicable.

1.18 Additional information

- 1.18.1 Nil.

1.19 Useful or effective investigation techniques

1.19.1 Nil.

2. Analysis

- 2.1 From the witness evidence and the technical investigation, the aeroplane was determined to have been operating normally up to the point of impact.
- 2.2 At some stage the pilot had configured the aeroplane in the bad-weather configuration, and witness observations confirm that the aeroplane was following the road at low level.
- 2.3 At the last bend in the road before the summit, the pilot was confronted with rising terrain extending into cloud ahead and to either side. He attempted to turn back in the direction from which he had approached.
- 2.4 The turn was commenced at a height that left no margin for error. Surrounded by high terrain, it is possible that the pilot experienced a “false horizon” effect, leading him to misjudge the angle of bank and/or the nose attitude of the aircraft.
- 2.5 In any case, a rate of sink appears to have developed as the angle of bank increased, and the left wing contacted the valley floor.
- 2.6 The following aircraft all traversed the pass without difficulty, their pilots estimating their height as between 600 and 800 feet above the valley floor. This raises the obvious question as to whether the pilot of JBJ needed to be operating at such a low level.
- 2.7 There is no clear-cut answer to this, but it is likely that he was concentrating on trying to avoid flying into cloud as well as maintaining visual reference to the ground, and in this respect, erring on the side of caution. However, this would have placed him in a situation that limited his manoeuvring options, as, generally speaking, the lower one operates in a valley system, the less horizontal space there is available for executing a reversal turn.
- 2.8 There was no discernible technical reason for the aircraft to have collided with the terrain. There was clear witness evidence of the prevailing weather conditions and of the event itself. It appears that the accident occurred as the result of a misjudgement on the part of the pilot, in attempting a reversal turn for which there was simply not the space available to ensure successful completion. Additionally, the surrounding terrain was conducive to the perception of a “false horizon” by the pilot, and this effect may have been a contributing factor.

3. Conclusions

- 3.1 The pilot was appropriately qualified and experienced for the proposed flight.
- 3.2 The pilot held a valid medical certificate, and was fit for flight.

- 3.3 The aircraft had a valid Airworthiness Certificate and had been maintained in accordance with relevant requirements.
- 3.4 The possibility of a pre existing defect with the aircraft or engine that could have contributed to the accident was eliminated as far as practicable by investigation.
- 3.5 The pilot commenced a reversal turn with insufficient altitude to assure safe completion of the manoeuvre.
- 3.6 During the turn the pilot may have experienced a degree of spatial disorientation causing him to perceive a false horizon.
- 3.7 The angle of bank was increased during the turn and the aircraft sank prior to ground impact.
- 3.8 The post-crash action of witnesses and medical personnel was commendable.

4. Safety recommendations

- 4.1 Nil.

5. Observations

- 5.1 The subject of mountain flying and loss of perception of a natural horizon is discussed in this report. The CAA makes ongoing efforts to inform industry regarding operations in this environment, via *Vector* magazine, which is sent free of charge to all flight crew licence holders. The CAA Good Aviation Practice booklet entitled *Mountain Flying* was published in 1999 and is also available free to industry.
- 5.2 Additionally, the CAA has mountain flying instructional videos available for borrowing or purchase; and periodically, CAA holds instructional seminars at various centres, at which specialised topics such as mountain flying are discussed.

Richard White
Manager Safety Investigation
12 July 2001