

AIRCRAFT ACCIDENT REPORT
OCCURRENCE NUMBER 00/4114
PITTS S2A
ZK-PTO
NEAR WANAKA AIRFIELD
15 DECEMBER 2000



Glossary of abbreviations used in this report:

CAA	Civil Aviation Authority
cm	centimetre(s)
E	east
km	kilometre(s)
NTSB	National Transportation Safety Board (USA)
NZDT	New Zealand Daylight Time
S	south
UTC	Coordinated Universal Time

AIRCRAFT ACCIDENT REPORT

OCCURRENCE No 00/4114

Aircraft type, serial number and registration:	Pitts S2A, 2182, ZK-PTO
Number and type of engines:	One Lycoming AEIO-360-A1A
Year of manufacture:	1978
Date and time:	15 December 2000, 1500 hours* (approx)
Location:	0.83 km south of Wanaka Airport Latitude: S 44° 43.9' Longitude: E 169° 14.4'
Type of flight:	Air Transport, Aerobatic
Persons on board:	Crew: 1 Passengers: 1
Injuries:	Crew: 1 fatal Passengers: 1 fatal
Nature of damage:	Aircraft destroyed
Pilot-in-command's licence	Airline Transport Pilot Licence (Aeroplane)
Pilot-in-command's age	54 years
Pilot-in-command's total flying experience:	12,346.2 hours, 102.9 on type
Information sources:	Civil Aviation Authority field investigation
Investigator in Charge:	Mr Michael A Carrelli

* Times are NZDT (UTC + 13 hours)

Synopsis

The Civil Aviation Authority was notified of the accident at 1530 hours on Friday 15 December 2000. The Transport Accident Investigation Commission was in turn notified shortly thereafter, but declined to investigate. A CAA site investigation was commenced the following day.

The pilot was on his third aerobatic flight for the day during which passengers were carried. The final manoeuvre was observed to be the entry into a stall turn. Towards the apex of the stall turn the aeroplane fell into a spin from which it did not recover before it impacted the ground on a terraced area close to the airfield. A helicopter was immediately despatched to the scene. Both occupants were found to have been killed.

1. Factual information

1.1 History of the flight

1.1.1 The aeroplane had been used for two previous flights from Wanaka airfield during the day of the accident. Each trip was approximately 20 minutes long.

1.1.2 The manoeuvres normally accomplished during an aerobatic flight would be: steep turns, loop, stall, barrel roll, roll off the top, Cuban 8, stall turn, rolls left and right and inverted flight. If the client requested extra manoeuvres then the following would be done: roll from inverted back to the inverted, knife-edge, vertical rolls and 4-point aileron rolls.

1.1.3 Witnesses reported that the usual routine had been performed. However, towards the end of the flight the aeroplane was seen to perform a vertical manoeuvre culminating in a stall turn and “flop” out of the stall turn near its apex. From this the aeroplane was then seen to fall into an inverted spin, then into an erect spin, back to an inverted spin and finally into a vertical dive whilst rotating about the longitudinal axis. The aeroplane did not recover to level flight from this vertical dive before it impacted the ground.

1.1.4 The accident occurred at approximately 1500 hours NZDT, 0.83 km south of Wanaka airfield at an elevation of 1320 feet. Latitude. S 44° 43.9', longitude E 169° 14.4'.

1.2 Injuries to persons

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

1.3 Damage to aircraft

1.3.1 The aeroplane was destroyed by impact and the subsequent fire.

1.4 Other damage

1.4.1 Nil.

1.5 Personnel information

1.5.1 The pilot held a valid Airline Transport Pilot Licence (Aeroplane) first issued 2 October 1990 and a Commercial Pilot Licence (Helicopter) first issued 4 April 1984 with a current class 1 medical, expiry date 20 March 2001. He held in addition to this, the following ratings:

- Instrument rating (Aeroplane);
- Instructor rating (Aeroplane): Category A and D;
- Glider towing rating;
- Flight examiner rating (Aeroplane): Airline and General Aviation;
- Chemical rating.

1.5.2 Up until 15 December 2000 the pilot had flown 12,346.2 hours in total comprising 122.9 hours on helicopters and 12,223.3 hours on aeroplanes. Time on the Pitts S2A was 102.9 hours.

1.5.3 The passenger was on an aerobatic pleasure flight and was not a pilot.

1.6 Aircraft information

1.6.1 Pitts S2A serial number 2182 was manufactured in 1978.

1.6.2 The aeroplane was imported into New Zealand from Australia in 1992. It had been damaged in an accident and was rebuilt. It was issued with a non-terminating Airworthiness Certificate in the standard category on 6 November 1992.

1.6.3 Up to 15 December 2000, ZK-PTO had accrued a total time in service of 1555.1 airframe hours. The most recent maintenance was a 50-hour check performed at 1526.7 airframe hours, on 14 July 2000. An annual review of airworthiness had been carried out on 18 May 2000.

1.6.4 The engine, a Lycoming AEIO-360-A1A serial number L-19399-51A, had run 283.03 hours since overhaul. The most recent maintenance was a 50-hour check carried out on 14 July 2000. Engine time since this inspection was 28.4 hours.

1.6.5 The passenger cockpit was fitted with non-removable dual controls.

1.7 Meteorological information

- 1.7.1 Actual recorded weather from the Wanaka automatic weather station showed that the surface winds gradually turned northwesterly during the morning and reached 13 knots, gusting to 20 at 0400 UTC (5pm local). During the afternoon, surface humidity was around 50%, implying fairly clear skies and no precipitation nearby. It is therefore concluded that the winds during the afternoon were relatively light, with good visibility, and probably only 2-3 oktas¹ of fair-weather cumulus. Weather is considered not to be a factor in this accident.

1.8 Aids to navigation

- 1.8.1 Not applicable.

1.9 Communications

- 1.9.1 Not applicable.

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 had impacted the ground on a southwesterly heading, in an open, level, grassed paddock.
- 1.12.2 The ground impact marks and damage to the aeroplane indicated that the aeroplane had struck in a nose-down and left wing down attitude with little forward speed. The wreckage was localised at the impact site with only minor parts such as fragments of the canopy lying no more than 5 to 10 metres away from the main wreckage. All parts of the aircraft were accounted for.
- 1.12.3 The upper mainplane had moved sufficiently forward during the impact to strike one of the propeller blades. The lower left mainplane had been destroyed on impact. The other mainplanes, both upper and lower, appeared essentially undamaged by the impact.
- 1.12.4 One of the two propeller blades had detached at impact and lay embedded in the ground directly under the propeller hub. The other was bent slightly forward due to being struck by the upper mainplane, which bore a witness mark 3 cm deep. The nature of the propeller blade damage indicated that the engine was probably producing low power at impact.

¹ Eighths of sky cover

1.12.5 Pre-impact integrity of the rudder and aileron control runs was positively established. In the elevator control run, the aft rod end spherical bearing loop was found to have fractured into two pieces at the elevator bell crank attachment. Another rod end spherical bearing on the mid-fuselage elevator control rod was found to have cracked at the idler bell crank with the one further forward found to be bent.

1.12.6 The centre of gravity of the aeroplane was calculated and found to be within the prescribed limits for aerobatic flight.

1.13 Medical and pathological information

1.13.1 Post-mortem examination of the pilot and passenger revealed that they died of traumatic injuries sustained at the time of impact. The post-mortem examination did not reveal any medically incapacitating condition that may have contributed to the accident.

1.14 Fire

1.14.1 The first people to arrive at the scene by helicopter found an intense fire had destroyed the wreckage, except for the tip of the upper right mainplane. Within minutes rescue crew with fire extinguishers quelled the remaining flames. There was no evidence to suggest an in-flight fire.

1.15 Survival aspects

1.15.1 The impact was not survivable.

1.16 Tests and research

1.16.1 The aft elevator control rod spherical bearing, which connected to the elevator bell crank, was recovered and sent for detailed metallurgical examination. It was established that the failure was due to overload at impact, with no sign of fatigue.

1.16.2 The engine was transported to an engine overhaul shop, stripped and inspected. As far as possible, this revealed no pre-impact abnormalities.

1.16.3 Due to fire and impact damage it was not possible to determine the serviceability of the electrical or fuel system components.

1.17 Organisational and management information

1.17.1 Not applicable.

1.18 Additional information

1.18.1 Not applicable.

1.19 Useful or effective investigation techniques

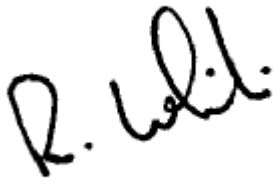
1.19.1 Nil.

2. Analysis

- 2.1 There was no evidence to show that there was any pre-accident failure of the airframe or engine. Indeed it is unlikely that an engine failure or partial power loss would have resulted in this accident. The aircraft was considered to be within gliding distance of the airport, which would have resulted in a normal forced landing at worst possibly off field.
- 2.2 The possibility exists that the passenger in the front cockpit could have manipulated or interfered with the dual controls in flight. Most of the sequence had already been flown and he had requested a “good ride.” Possible reasons for the passenger to take hold of the controls include anxiety, fear of falling and vertigo. As he had requested a good ride (a common enough request) anxiety and fear of falling seem unlikely, but vertigo/vomiting cannot be ruled out at or near the end of a probably more vigorous aerobatic sequence.
- 2.3 Whilst it was company policy for both occupants to wear an overall, with only an airsickness bag in the pocket, it was noted from a videotape of the penultimate and final flight that overalls were not used. No cameras or other loose articles were allowed during the flight and none were seen in the video taken by the passenger’s wife prior to the flight. Furthermore the aeroplane was inspected each day for loose objects and vacuumed if necessary to remove small objects. No foreign objects were found at the accident site.
- 2.4 Experienced Pitts pilots stated that if the stall turn was poorly executed the aeroplane would most probably roll inverted before establishing itself in an erect spin. It was suggested that if the pilot had been presented with an unintentional inverted spin entry it may take some seconds to establish whether the spin was inverted or erect. Research of NTSB accident data has shown numerous accidents involving spinning, some being almost identical to this. However, Pitts are very responsive aircraft and generally behave as expected with the correct inputs from the pilot.
- 2.5 The possibility exists that the pilot experienced an incapacitating or disorientating event. G-induced ‘grey-out’, ‘black-out’ or ‘red-out’ and the levels at which they might be experienced can be affected by a number of factors including age, physical tiredness, tiredness or fatigue, dehydration, food intake, circadian rhythm, anticipation of G on-set and other factors. Whilst it is normally considered to only affect pilots encountering high G loads, some research suggests that this may well happen at lower G loads. Accelerative forces while manoeuvring were normally restricted to approximately 3G.
- 2.6 Whilst all these factors have been considered it is not in any way possible to tell if any of them played a part in this accident.
- 2.7 It was not possible from the evidence available, to determine a definite or likely cause for this accident

3. Conclusions

- 3.1 The pilot was properly licensed, rated and fit for the flight undertaken.
- 3.2 The aircraft had been subject to regular maintenance and appeared to be airworthy prior to the accident.
- 3.3 The aircraft did not recover from a (probably unintended) spin manoeuvre and collided with the ground.
- 3.4 There was no evidence of pilot in-flight incapacitation.
- 3.5 Although the aeroplane was equipped with non-removable flight controls at the passenger seat position, there was nothing to indicate that the passenger interfered with the controls.
- 3.6 The accident was not survivable.
- 3.7 It was not possible to determine a conclusive cause for the accident.

A handwritten signature in black ink, appearing to read 'R. White', is written in a cursive style.

Richard White
Manager Safety Investigation
Date