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Australian Transport Safety Bureau

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Australian Transport Safety Bureau
PO Box 967, Civic Square ACT 2608
Australia

1800 020 616

+61 2 6257 4150 from overseas

www.atsb.gov.au

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ATSB TRANSPORT SAFETY REPORT
Aviation Occurrence Investigation AO-2009-051
Final

Collision with terrain, VH-KVT 81 km NE of Winton, Queensland 17 August 2009

Abstract

At about 1730 Eastern Standard Time on 17 August 2009, a Cessna Company U206G aircraft, registered VH-KVT, was being operated on a local flight on a property 81 km north-east of Winton, Queensland. The pilot was the only person on board. The only witness reported seeing the aircraft in a steep dive before losing sight of it behind slightly rising ground. The aircraft was later found to have collided with flat, open terrain in a steep nose-low attitude, resulting in serious damage. The pilot received fatal injuries.

Due to the limited evidence available, the investigation was unable to establish the reason(s) why the aircraft departed controlled flight and impacted the ground.

FACTUAL INFORMATION

At about 1730 Eastern Standard Time[1] on 17 August 2009, a Cessna Company U206G aircraft, registered VH-KVT, was being operated on a local flight on a property 81 km north-east of Winton, Queensland. The pilot was the only person on board. Following a steep dive, the aircraft collided with flat, open terrain in a steep nose-low attitude, resulting in serious damage. The pilot received fatal injuries.

The purpose of the flight was to inspect livestock watering facilities on the property. The task involved flying over the facilities at 500 to 700 ft (152 to 213 m) above ground level to visually confirm the presence of water in those facilities. Reportedly, the flight normally took about 25 minutes.

There were no witnesses to the aircraft's takeoff. However, at about 1730, a witness who was positioned about 5 km south-south-west of the departure airstrip, observed the aircraft about 2 km to the east, flying in a north-westerly direction, at what was estimated to have been the normal altitude for the type of operation. The witness also spoke to the pilot by radio. There was no indication that the flight was proceeding in other than a normal manner. A short time later, when the aircraft was about 2 km north of the witness's position, the witness saw the aircraft in a steep dive, but lost sight of it behind slightly rising ground. The witness located the aircraft wreckage adjacent to the eastern side of a road leading to the property homestead.

The terrain in the wider area surrounding the accident site was predominantly flat. The ground was dry and hard, and had a partial covering of dry tufted grass that would have been suitable as an emergency landing surface. The only obstacle was a power line 5 to 7 m above ground level running parallel to, and about 20 m west of the road leading to the homestead.

Injuries to persons

The pilot received fatal injuries from the impact.

Pilot information

The pilot had a total of about 500 hours flying experience at the time of the accident. He was

1 The 24-hour clock is used in this report to describe the local time of day, Eastern Standard Time (EST) as particular events occurred. Eastern Standard Time was Coordinated Universal Time (UTC) + 10 hours.

familiar with the aircraft and with the task, having conducted it many times previously.

According to the pilot's log book, he completed between two and seven flights per month in the 12-month period to April 2009, for a total flight time during that period of about 75 hours. There were no log book entries after 11 April 2009. However, anecdotal evidence indicated that the pilot continued to fly at about the same rate between that date and the accident.

The pilot was reported to have been in good health and well rested at the time of the accident. He had spent the previous days at the property engaged in his normal daily routine. There was no indication that he was not capable of safely conducting the flight.

Postmortem and pathology reports did not contain any suggestion of pilot incapacitation.

Weather conditions

The weather conditions around the time of the accident were reported to have been fine and clear, with a light wind and a temperature of about 30 °C.

Wreckage and impact information

The aircraft was seriously damaged[2] by impact forces (Figure 1). The right wingtip (Figure 2) struck the ground first, followed by the propeller and engine. There was extensive impact damage to the right wing. Those observations indicated that the aircraft was turning right at impact and was in a nose-low, right wing-low attitude. There was no fire. Both the left and right wing fuel tanks had been ruptured during the impact sequence and contained no fuel. There was fuel staining on the bottom surface of the right wing and a strong smell of fuel in the vicinity of the wreckage.

Figure 1: Accident site

Damage to the propeller indicated that the engine was delivering significant power at the time of impact. There was no evidence of a structural failure of the airframe; nor was there any evidence that the aircraft had struck a bird.

The extent of damage to the cockpit area prevented examination of the control runs and linkages in that area. Examination of the remainder of the flight control system did not reveal any fault.

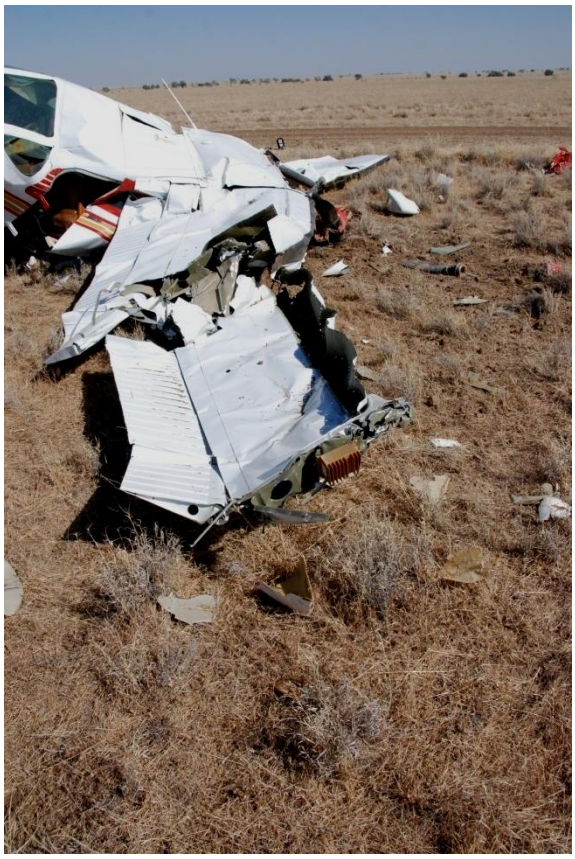
The position of the flap drive jack screw confirmed that the flaps were in the retracted position at impact.

The auxiliary fuel pump selector switch had been damaged during the impact sequence and its position at impact could not be established.

The impact was not survivable.

2 The *Transport Safety Investigation Regulations 2003* definition of 'serious damage' includes the destruction of the transport vehicle.

Figure 2: Right wing damage



Aircraft information

At the time of the accident, documentation indicated that the aircraft had a total time in service of about 4,700 operating hours. There were no outstanding maintenance issues.

Fuel system

The aircraft's fuel system included left and right wing tanks, each with a capacity of 174 L (including 7.5 L unusable fuel).

A three-position selector on the control pedestal allowed the pilot to supply fuel to the engine from either the left or right tanks (LEFT ON, RIGHT ON), or to shut off the fuel supply (OFF). Fuel could not be used from both tanks simultaneously. Fuel tank quantity for the left and right tanks was displayed on left and right tank quantity indicators situated adjacent to the fuel selector.

The Cessna U206G Pilot's Operating Handbook (POH) included a note which stated that:

> With ¼ tank or less, prolonged uncoordinated flights such as slips or skids can uncover the fuel tank outlets, causing fuel starvation and engine stoppage.

Procedures for engine failure during flight

The POH for the aircraft type included procedures in the event of engine failure during flight. Those were:

1. Airspeed – 75 KIAS[3]
2. Fuel Selector valve – OPPOSITE TANK (if it contains fuel)
3. Auxiliary Fuel Pump Switch – ON
4. Throttle – HALF OPEN
5. Auxiliary fuel pump switch – OFF

   NOTE

   If the fuel flow indication immediately drops to zero, signifying an engine driven pump failure, return the auxiliary fuel pump switch to ON.
6. Mixture – LEAN from full rich until restart occurs.

   NOTE

   If propeller is windmilling, engine will restart automatically within a few seconds. If propeller has stopped (possible at low speeds), turn ignition switch to START, lean the mixture from full rich.
7. Mixture – ADJUST as required as power is restored
8. Throttle – ADJUST power as required
9. Fuel selector Valve – AS DESIRED after fuel flow is established.

Other information

The aircraft owner had considerable flying experience on the aircraft and had flown with the pilot many times. He reported that records of the aircraft's fuel status were not retained. However, it was usual practice to have been between 120 and 150 L of fuel in each tank for the water facilities inspection flight, which took about 25 minutes. The fullest tank was selected for takeoff, and the other tank was selected when the quantities were equal.

The owner recalled a few instances when he was flying the aircraft and a tank had run dry. It was usual for the engine to 'misfire' a few times due to air in the fuel line to the engine. It could take 30 seconds or more for the engine to return to smooth running after selecting the other tank.

3 Knots indicated airspeed.

Similar occurrences

A search of aircraft accident databases revealed several reported instances of engine power loss in Cessna 206 aircraft that were the result of fuel starvation when the selected wing tank ran dry. In each case, there was fuel remaining in the other tank. In all cases, the pilot was unable to restore normal engine operation. It should be noted that there were likely to have been many events involving engine power loss due to fuel starvation where the pilot was successful in restoring engine power, but which were not reported to aviation safety authorities.

Pilot incapacitation

Pilot incapacitation is a physiological event that renders a pilot unable to fly or to safely operate the aircraft. It may be due to the effects of a pre-existing medical condition manifesting itself in flight, or the development of an acute medical condition during a flight.

In January 2007, the ATSB published a report titled Analysis of Medical Conditions Affecting Pilots Involved in Accidents and Incidents: 1 January 1975 to 31 March 2006 (also available on the ATSB web site). The results of this study demonstrate that the risk of a pilot suffering from an in-flight medical condition or incapacitation event is low. The majority of the 98 events identified during the study were due to acute gastrointestinal illness (usually food poisoning), followed by incapacitating events involving toxic smoke and fumes. Heart attack increased the risk of a fatal accident occurring.

The majority of pilot incapacitation events recorded by the ATSB during the period 1 January 1975 to 31 March 2006 did not involve a chronic or pre-existing medical condition.

ANALYSIS

The nose-low, right wing-low attitude of the aircraft at impact was consistent with loss of control following an aerodynamic stall. Typically, loss of control events are the result of an encounter with weather, structural failure of the airframe, pilot incapacitation, pilot mishandling or a combination of those factors. When loss of control occurs during flight at low level, there is generally minimal opportunity for the pilot to recover the aircraft to normal flight before ground impact.

In this case, there was no evidence that weather, structural failure, or pilot incapacitation played a part in the development of the occurrence.

Pilot incapacitation, while not a common event, is an inherent risk to single-pilot operations. In this event, there was no indication of pilot impairment or incapacitation prior to the accident. The pilot held a Class 2 aviation medical certificate and there were no reports of any illness or condition likely to significantly increase the risk of impairment or incapacitation. Postmortem examination did not identify any preconditions for, or existence of, pilot impairment or incapacitation.

Although there were no clear indications of pilot impairment or incapacitation, the investigation was mindful of the ATSB research findings that the majority of pilot incapacitation events do not involve a chronic or pre-existing medical condition. In that context, the investigation was unable to discount pilot incapacitation as a contributing factor.

There was only limited other evidence available to assist the investigation's analysis of the occurrence.

The investigation noted that there were recorded examples of engine malfunction due to fuel starvation involving the aircraft type. There were also details provided regarding the observed engine behaviour following fuel starvation in the aircraft. That information raised the possibility that the aircraft may have been involved in a fuel starvation event.

If the engine did lose power, and in the likely stressful environment associated with attempting to restore engine power at between 500 and 700 ft above ground level, the possibility existed for the pilot to have mishandled the aircraft to the extent that an aerodynamic stall was induced. Further likelihood of an aerodynamic stall may have arisen if the pilot had to take avoiding action to clear the power line near the road as he manoeuvred the aircraft.

However, without clear information regarding the actual fuel tank contents at the time of the occurrence, it was not possible to reach a definitive conclusion regarding fuel starvation as a contributory factor in the occurrence. An additional qualification in this regard was that the engine was delivering power at impact. On the one hand, that could indicate that at no stage was

there an interruption to the fuel supply to the engine. On the other, it could indicate that fuel starvation did occur, but that the pilot had managed to return the engine to normal operation before impact.

The investigation concluded that there was no other evidence available that warranted analysis.

Contributing safety factors

- For reason(s) which could not be established, the aircraft departed controlled flight.
- The aircraft impacted the ground before recovery to normal flight was achieved.

Other key findings

- The quantity of fuel in the aircraft's fuel tanks prior to impact could not be established.
- The engine was delivering power at the time of ground impact.
- The investigation could not discount the possibility of pilot incapacitation.

SOURCES AND SUBMISSIONS

Sources of information

The sources of information during the investigation included the:

- witness report
- aircraft owner
- maintenance provider
- aircraft's maintenance documentation
- aircraft pilot's operating handbook
- on-site examination of the aircraft.

Submissions

Under Part 4, Division 2 (Investigation Reports), Section 26 of the *Transport Safety Investigation Act 2003*, the Australian Transport Safety Bureau (ATSB) may provide a draft report, on a confidential basis, to any person whom the ATSB considers appropriate. Section 26 (1) (a) of the Act allows a person receiving a draft report to make submissions to the ATSB about the draft report.

A draft of this report was provided to the Civil Aviation Safety Authority and the aircraft owner. No submissions were received from those parties.