Australian Government
Australian Transport Safety Bureau

Collision with terrain involving Cessna 172, VH-WLF

10 km west of Wentworth Airport, NSW | 28 May 2012

Investigation

ATSB Transport Safety Report
Aviation Occurrence Investigation
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Cover photo: **Mr Ray Barber**

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Addendum

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Safety summary

What happened

VH-WLF

Source: Mr Ray Barber

At about 0930 Eastern Standard Time on 28 May 2012, the pilot of a Cessna Aircraft Company 172 aircraft, registered VH-WLF, departed Wentworth Airport, New South Wales for a private flight under the visual flight rules. No details of the flight were submitted to Air Traffic Services nor left with any other person and there was no requirement to do so. A property owner at the airport witnessed the aircraft depart and, following the failure of the aircraft to return to Wentworth, notified the police on the afternoon of 29 May 2012. As a result of that notification, a search was initiated.

Following an extensive visual search involving multiple aircraft, the crew of a search helicopter sighted the aircraft wreckage on the evening of 30 May 2012 near the Murray River, about 10 km west of Wentworth Airport. Upon landing, the helicopter crew established that the pilot had received fatal injuries.

What the ATSB found

The ATSB found that shortly after departure from Wentworth Airport the aircraft collided steeply with terrain at high speed and that the accident was not survivable. There was no evidence of any in-flight failure of the airframe structure or flight control system and the engine appeared to have been producing significant power at impact.

Based on advice from the aircraft manufacturer following their consideration of on-site evidence, and in the absence of an identified problem with the aircraft, the ATSB concluded that continual pilot input was probably applied to the flight controls immediately before the impact with terrain. However, the possibility that the pilot may have applied that input as a result of incapacitation could not be discounted.

Safety message

Although there was no requirement for details of the flight to be provided to Air Traffic Services or other agencies, the lack of such information hampered the search and rescue (SAR) response to this accident. If information on the intended flight route had been available, a more focussed search effort would have been possible and probably have resulted in the rapid location of the aircraft. In addition, although the carriage of a portable emergency locator transmitter (ELT) complied with the relevant regulations, a crash-activated ELT installation, normally associated with a permanent aircraft installation, would have expedited the provision to SAR agencies of more timely advice of an accident. Although earlier location of the aircraft would not have reduced the severity of the outcome in this instance, the availability of accurate flight information generally provides for a more timely emergency response.

Contents

The occurrence

At about 0930 Eastern Standard Time[1] on 28 May 2012, the pilot of a Cessna Aircraft Company 172 aircraft, registered VH-WLF (WLF), departed Wentworth Airport, New South Wales for a private flight under the visual flight rules.[2] The pilot was appropriately qualified for the flight and endorsed on the aircraft type.

No details of the flight were submitted to Air Traffic Services nor left with any other person and there was no requirement to do so (see the section titled *Flight notification requirements*). A property owner who resided at the airport witnessed the aircraft depart from runway 26[3] and, following the failure of the aircraft to return to Wentworth, notified the police on the afternoon of 29 May 2012. As a result of that notification, the Australian Maritime Safety Authority initiated a search for the aircraft.

No emergency satellite signals (see the section titled *Emergency locator transmitters)* were received from the aircraft. Following an extensive visual search involving multiple aircraft, the crew of one of the search helicopters sighted the aircraft wreckage on the evening of 30 May 2012 near the Murray River, about 10 km west of Wentworth Airport (Figure 1). On landing, the helicopter crew established that the pilot had received fatal injuries.

The aircraft was destroyed by the impact and post-impact fire.

Figure 1: Accident location

Source: Google Earth, modified by the ATSB

1 Eastern Standard Time (EST) was Coordinated Universal Time (UTC) + 10 hours.

2 Visual flight rules (VFR) are a set of regulations that allow a pilot to only operate an aircraft in weather conditions generally clear enough to allow the pilot to see where the aircraft is going.

3 Runways are identified by a number representing the magnetic heading of the runway. Runway 26 is aligned to a magnetic heading of about 260°.

Context

Pilot information

The pilot held a Private Pilot (Aeroplane) Licence that was issued in 1999. He was endorsed on the Cessna 172 and held a Class 2 Aviation Medical Certificate with the requirement that distance vision correction was to be worn while flying and that reading correction was to be available during flight.

The last entry in the pilot's logbook was dated 29 December 2010; however, a second document kept by the pilot contained details of flights conducted since October 2008. A review of both records indicated that the pilot had accumulated a total of 716.4 hours flight time immediately prior to the accident flight, and that almost all of that experience was gained in VH-WLF (WLF).

At the time of the accident the requirement for private pilots to undertake regular flight reviews was detailed in *Civil Aviation Regulations 1988* (CAR).[4] CAR 5.81 required that:

> (1) A private (aeroplane) pilot must not fly an aeroplane as pilot in command if the pilot has not, within the period of 2 years immediately before the day of the proposed flight, satisfactorily completed an aeroplane flight review…

A number of other flight activities, such as aeroplane conversion training, could satisfy the CAR 5.81 requirements of a flight review. Examination of the pilot's logbook and other flight documentation identified that the pilot did not satisfy these requirements at the time of the accident flight. However, on 9 August 2011 the pilot successfully completed a flight test with a flight instructor as part of compliance with a Civil Aviation Safety Authority (CASA)-imposed protocol for diabetic pilots (see the section titled *Medical and pathological information*).[5]

Aircraft information

Aircraft specifications

The aircraft, serial number 29217, was a four-seat[6], high-wing aeroplane that was powered by a six-cylinder piston engine (Figure 2). It was manufactured in the United States (US) in 1957 and purchased by the pilot in 1997. The aircraft manufacturer advised that, at the time the aircraft was built, the maximum allowable operating speed was defined in terms of a maximum glide or dive speed in smooth air. On this basis, the aircraft was limited to 160 mph (257 km/h or 139 kt); however, during its certification the aircraft had demonstrated safe flight up to a dive speed of 188 mph (303 km/h or 163 kt).

Figure 2: VH-WLF

Source: Mr Ray Barber

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4 On 1 September 2014 the conduct of flight reviews changed as part of the introduction of new flight crew licencing requirements in the *Civil Aviation Safety Regulations 1998*.

5 Satisfactory completion of this flight test did not fulfil the requirements of the biennial flight review.

6 At the time of the accident the rear passenger seats were not fitted to the aircraft.

Maintenance history

The aircraft last underwent maintenance at a CASA-approved maintenance organisation at 14,636.77 airframe hours on 21 December 2011. That maintenance consisted of a 12-month periodic inspection and the issue of a new maintenance release. Examination of the maintenance release by the Australian Transport Safety Bureau (ATSB) identified no entries on that document since its issue. However, a comparison of the final reading on an installed engine tachometer hourmeter with information recorded by the pilot for previous flights identified that the accident occurred about 9 hours after the last maintenance inspection.

Aircraft weight and performance

Weight and balance calculations by the aircraft manufacturer, using information provided by the ATSB, suggested that the aeroplane was being operated about 233 kg below the maximum allowable gross weight of 998 kg at the time of the accident. The aircraft was also within the allowable centre of gravity limits.

Meteorological information

Area weather forecasts[7] that encompassed Wentworth Airport and the accident site, together with weather reports for Mildura Airport, Victoria about 30 km south-east of the accident site, were obtained from the Bureau of Meteorology. These forecasts predicted no significant weather for the duration of the accident flight. The forecast weather conditions were consistent with the observations by the Bureau of Meteorology automatic weather station at Mildura Airport, which indicated light winds and fine conditions for the duration of the flight.

Wreckage and impact information

On-site examination

The accident site was located on the timbered riverbank of a waterway associated with the Murray River (Figure 3). Examination of the site and aircraft wreckage identified that the aircraft collided steeply with the terrain at high speed. Analysis of tree contact marks and the main impact point suggested a descent angle of about 60°. Sections of the aircraft were affected by a post-impact fire that self-extinguished prior to location of the accident site by the crew of the search and rescue helicopter. The accident was not survivable.

The majority of the wreckage came to rest on the riverbank with the engine partially submerged in the water. All major parts of the aircraft, with the exception of the pilot's (left) door, were identified on site. The witness who observed the aircraft depart Wentworth Airport stated that the pilot's door was fitted at that time. There was no evidence that the door had contacted the airframe structure or control surfaces in-flight and the aircraft manufacturer advised that there was no adverse effect on the aircraft when operating with the pilot's door off. In addition, the cabin doors were not considered during the manufacturer's structural analysis of the airframe. A damaged, GPS-capable[8] 406 MHz portable locator beacon was also identified among the aircraft wreckage (see the section titled *Emergency locator transmitters*).

The degree of impact and fire damage prevented a complete assessment of the integrity of the aircraft's flight control system. However, all control cables were terminated correctly at their respective control surface attachments and all of the damaged control cables that were identified had failed during the accident sequence as a result of overstress. There was no evidence of any in-flight failure of the airframe structure or control surfaces.

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[7] Area forecasts are issued for the purposes of providing aviation weather forecasts to pilots. Australia is subdivided into a number of forecast areas. The accident occurred in the vicinity of the boundary between areas 30 and 51.

[8] The Global Positioning System (GPS) is a space-based global navigation satellite system (GNSS) that provides location and time information in all weather, anywhere on or near the Earth, where there is an unobstructed line of sight to four or more GPS satellites.

Figure 3: Accident site

Source: ATSB

Engine and propeller

The engine was severely disrupted during the impact sequence. The level of damage to the engine and propeller, as well as two propeller contact marks identified 1 m apart in a large tree branch that was felled by the aircraft (Figure 4), indicated that the engine was producing a significant level of power at the time of the accident.

Figure 4: Propeller contact marks

Source: ATSB

Examination of the engine tachometer that was recovered from the accident site showed that the engine and propeller were rotating at about 2,700 RPM at the time of the accident. The aircraft manufacturer advised that this rotational speed was reasonable in a dive. Consideration of the propeller RPM and the distance between the observed propeller slash marks, indicated that the aircraft contacted the tree at about 320 km/h (173 kt).

A comparison of the final engine tachometer hourmeter reading with information recorded by the pilot for previous flights suggested that the accident occurred about 26 minutes after engine start.

In response to a request for advice on what circumstances would be required to produce the observed steep, high-speed impact, the aircraft manufacturer advised:

> The flight characteristics of the 172 without an airframe anomaly would preclude the accident site impact signatures you reported…from occurring without pilot input. Whether intentional or the result of an incapacitation, pilot input to the flight controls is necessary to create the signatures you described. A push over to a steep descent angle or a well developed spiral (maintaining back pressure on the yoke) could create the signatures you describe.

Following additional analysis, the manufacturer concluded that a spiral dive manoeuvre, rather than push over to a steep descent, was more likely to have produced the observed accident signature.

Medical and pathological information

The pilot was diagnosed with late-onset Type 1 diabetes in 2010. In order to continue flying activities following that diagnosis, the pilot was required by CASA to comply with a protocol designed to ensure that a Type 1 diabetic pilot could continue to safely operate an aircraft. After meeting the requirements of the protocol, the pilot was issued with a Class 2 Aviation Medical Certificate on 22 August 2011 that permitted him to resume solo flights. At the time of the accident the pilot was in the process of renewing his Aviation Medical Certificate, which expired on 14 May 2012. In the interim, on 3 May 2012, a Designated Aviation Medical Examiner re-validated the certificate to allow the pilot to continue flying until 2 July 2012.

The forensic pathologist who conducted the pilot's post-mortem examination concluded that he succumbed to multiple injuries sustained in a high-speed impact. Toxicology testing was negative for the presence of codeine or morphine and the available samples were unsuitable for other tests such as the detection of insulin. However, the pilot's record of a self-administered blood test at 0813 on the morning of the flight suggested a safe blood glucose level at that time.

Additional information

Flight notification requirements

In regard to the flight notification requirements affecting flights under the visual flight rules (VFR), the Aeronautical Information Publication Australia (AIP) stated that:[9]

> Pilots of VFR flights nominating a SARTIME [search and rescue time[10]] to ATS [air traffic services], and those intending to operate in controlled airspace (except for VFR flights in Class E airspace) must submit flight details to ATS.
>
> VFR flights in the following categories are required to submit a SARTIME flight notification to ATS, or, as an alternative, to leave a Flight Note with a responsible person:
>
> a. RPT [regular public transport] and CHTR [charter] flights;
>
> b. over-water flights;
>
> c. flights in Designated Remote Areas
>
> d. flights at night proceeding beyond 120NM [222 km] from the aerodrome of departure.

The categorisation of the accident flight did not require the nomination of a SARTIME or that a flight note was left with a responsible person.

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[9] AIP EN ROUTE (ENR) 1.10 – FLIGHT PLANNING, Section 2 *FLIGHT NOTIFICATION*, paragraphs 2.3 and 2.11.

[10] The time nominated by a pilot for the initiation of Search and Rescue action if a report has not been received by the nominated unit.

In respect of the provision of SAR services, the AIP stated:[11]

> The efficacy of the SAR action by Airservices or JRCC [Joint Rescue Coordination Centre] Australia is directly related to the amount and accuracy of details notified in the flight notification or flight note, and to any position details reported in flight. When notifying of in-flight difficulties, early advice and the degree of apprehension felt by the pilot will enhance the assistance which can be provided by the ground organisation.

Emergency locator transmitters

Emergency locator transmitters (ELT) are electronic devices that use the Cospas-Sarsat[12] distress beacon system to pass distress signals to the Australian Maritime Safety Authority. The requirements for the fitment or carriage of ELTs are detailed in CAR 252A. CAR 252A (1) stated:

> (1) The pilot in command of an Australian aircraft that is not an exempted[13] aircraft may begin a flight only if the aircraft:
>
> (a) is fitted with an approved ELT:
>
> (i) that is in working order; and
>
> (ii) whose switch is set to the position marked 'armed', if that switch has a position so marked; or
>
> (b) carries, in a place readily accessible to the operating crew, an approved portable ELT that is in working order.

The portable locator beacon that was found on board the aircraft met the requirements for an approved portable ELT as detailed in sub-regulation 1. The principal difference between an approved ELT and an approved portable ELT is that the former is automatically activated on impact, whereas a portable ELT must be manually activated.

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11 AIP GENERAL (GEN) 3.6 – SEARCH AND RESCUE, Section 5 *PROCEDURES*, paragraph 5.2.1.

12 An internationally-utilised service provider that currently provides satellite-based ELT monitoring services in Australia.

13 Exempted aircraft are defined in CAR 252A (7). The accident aircraft was not an exempted aircraft.

Safety analysis

Development of the accident

Based on the installed engine hourmeter reading and the previous flight details recorded by the pilot, the accident occurred a short time after departure from Wentworth Airport. Evidence from the accident site and aircraft wreckage identified that the aircraft collided steeply with terrain at high speed and that the accident was not survivable.

Although the extent of impact and post-impact fire damage prevented a complete examination of the aircraft, there was no evidence of any in-flight failure of the airframe structure or flight control system, and the engine was producing significant power at impact. As the pilot's (left) door was reported to have been fitted when the aircraft departed Wentworth, but was not identified at the accident site, the Australian Transport Safety Bureau (ATSB) considered whether the door may have detached in flight and rendered the aircraft uncontrollable. Based on the aircraft manufacturer's advice, any loss of control following detachment of the door could only occur if it impacted and damaged the airframe. In this respect, no evidence of door contact with either the airframe of flight controls was identified and the position of the external door attachments made it unlikely that the pilot would have been able to have released the door during flight. Therefore it was considered that the door most likely detached from the aircraft during the impact sequence and entered the nearby river or otherwise rebounded away from the main wreckage and was unable to be found.

Based on advice from the aircraft manufacturer following their consideration of the on-site evidence, and in the absence of an identified problem with the aircraft, the ATSB concluded that a pilot input was probably applied to the flight controls immediately before the accident, resulting in a spiral dive. However, and as also stated by the manufacturer, the possibility for that input to have been a result of incapacitation could not be discounted. In the absence of additional evidence, further analysis of the circumstances that led to the accident was not possible.

Emergency response

No detail of the intended flight was provided to either Air Traffic Services (ATS) or left with another person and the flight took place outside of air traffic radar coverage. As a result, an emergency response relied on either a distress call from the pilot, observation and reporting of the accident or, as in this case, notification by a concerned third party that the aircraft had not returned to Wentworth Airport.

The lack of readily available details of the flight hampered the search and rescue (SAR) response to this accident. If information on the intended route had been available, it would have led to a focussed search effort that would probably have resulted in the more expeditious location of the aircraft. Additionally, although the carriage of a portable emergency locator transmitter (ELT) complied with the relevant regulations, and that portable ELT included the 406 MHz capability necessary for satellite monitoring, an automatic impact activation feature may have provided the SAR agency with more timely advice that the aircraft was in distress. Although earlier location of the aircraft would not have reduced the severity of the outcome in this instance, the availability of accurate flight information will generally provide for a more timely and efficient emergency response.

Findings

From the evidence available, the following findings are made with respect to the collision with terrain involving a Cessna Aircraft Company 172, registered VH-WLF that occurred 10 km west of Wentworth Airport, New South Wales on 28 May 2012. These findings should not be read as apportioning blame or liability to any particular organisation or individual.

Contributing safety factor

- More likely consistent with a spiral dive, the aircraft collided steeply with terrain at about 320 km/hr (173 kt), rendering the accident not survivable.

Other factors that increased risk

- The location of the aircraft by the search and rescue authorities was delayed due to the lack of flight details available and the non-activation of the portable emergency locator transmitter.

Other findings

- The aircraft manufacturer advised that the steep, high-speed collision could only occur via an airframe anomaly or pilot input.
- There was no evidence of any defect with the aircraft that would have contributed to the accident.
- The possibility that the pilot may have applied a flight control input as a result of incapacitation could not be discounted.

General details

Occurrence details

Date:	28 May 2012	
Occurrence category:	Accident	
Primary occurrence type:	Collision with terrain	
Location:	10 km west of Wentworth Airport, New South Wales	
	Latitude: 34° 06.05' S	Longitude: 141° 47.15' E

Pilot details

Licence details:	Private Pilot (Aeroplane) Licence, issued October 1999
Ratings:	Single-engine aeroplane class rating
Medical certificate:	Class 2, valid to 2 July 2012
Aeronautical experience:	Approximately 716 hours[14]
Last flight review:	1 October 2009

Aircraft details

Manufacturer and model:	Cessna Aircraft Company 172	
Year of manufacture:	1957	
Registration:	VH-WLF	
Serial number:	29217	
Total Time In Service	14,645.94 airframe hours	
Type of operation:	Private	
Persons on board:	Crew – 1	Passengers – 0
Injuries:	Crew – 1	Passengers – 0
Damage:	Destroyed	

[14] Derived from the pilot's logbook and other flight records maintained by the pilot.

Sources and submissions

Sources of information

The sources of information during the investigation included the:

- aircraft manufacturer and maintainer
- New South Wales Police Force and Coroner
- Bureau of Meteorology
- Civil Aviation Safety Authority (CASA)
- Australian Maritime Safety Authority.

Submissions

Under Part 4, Division 2 (Investigation Reports), Section 26 of the *Transport Safety Investigation Act 2003* (the Act), 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 aircraft manufacturer, aircraft maintainer and CASA. While no submissions were received, additional technical information was provided by the aircraft manufacturer and was included in the text of the final report.

Australian Transport Safety Bureau

The Australian Transport Safety Bureau (ATSB) is an independent Commonwealth Government statutory agency. The ATSB is governed by a Commission and is entirely separate from transport regulators, policy makers and service providers. The ATSB's function is to improve safety and public confidence in the aviation, marine and rail modes of transport through excellence in: independent investigation of transport accidents and other safety occurrences; safety data recording, analysis and research; fostering safety awareness, knowledge and action.

The ATSB is responsible for investigating accidents and other transport safety matters involving civil aviation, marine and rail operations in Australia that fall within Commonwealth jurisdiction, as well as participating in overseas investigations involving Australian registered aircraft and ships. A primary concern is the safety of commercial transport, with particular regard to fare-paying passenger operations.

The ATSB performs its functions in accordance with the provisions of the *Transport Safety Investigation Act 2003* and Regulations and, where applicable, relevant international agreements.

Purpose of safety investigations

The object of a safety investigation is to identify and reduce safety-related risk. ATSB investigations determine and communicate the factors related to the transport safety matter being investigated.

It is not a function of the ATSB to apportion blame or determine liability. At the same time, an investigation report must include factual material of sufficient weight to support the analysis and findings. At all times the ATSB endeavours to balance the use of material that could imply adverse comment with the need to properly explain what happened, and why, in a fair and unbiased manner.

Developing safety action

Central to the ATSB's investigation of transport safety matters is the early identification of safety issues in the transport environment. The ATSB prefers to encourage the relevant organisation(s) to initiate proactive safety action that addresses safety issues. Nevertheless, the ATSB may use its power to make a formal safety recommendation either during or at the end of an investigation, depending on the level of risk associated with a safety issue and the extent of corrective action undertaken by the relevant organisation.

When safety recommendations are issued, they focus on clearly describing the safety issue of concern, rather than providing instructions or opinions on a preferred method of corrective action. As with equivalent overseas organisations, the ATSB has no power to enforce the implementation of its recommendations. It is a matter for the body to which an ATSB recommendation is directed to assess the costs and benefits of any particular means of addressing a safety issue.

When the ATSB issues a safety recommendation to a person, organisation or agency, they must provide a written response within 90 days. That response must indicate whether they accept the recommendation, any reasons for not accepting part or all of the recommendation, and details of any proposed safety action to give effect to the recommendation.

The ATSB can also issue safety advisory notices suggesting that an organisation or an industry sector consider a safety issue and take action where it believes it appropriate. There is no requirement for a formal response to an advisory notice, although the ATSB will publish any response it receives.

Australian Transport Safety Bureau

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Investigation

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