Australian Government

Australian Transport Safety Bureau

Wirestrike and collision with terrain involving Cessna 172RG, VH-LCZ

Parafield Airport, South Australia, 3 July 2018

ATSB Transport Safety Report

Aviation Occurrence Investigation

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Published by: Australian Transport Safety Bureau
Postal address: PO Box 967, Civic Square ACT 2608
Office: 62 Northbourne Avenue Canberra, Australian Capital Territory 2601
Telephone: 1800 020 616, from overseas +61 2 6257 4150 (24 hours)
Accident and incident notification: 1800 011 034 (24 hours)
Facsimile: 02 6247 3117, from overseas +61 2 6247 3117
Email: atsbinfo@atsb.gov.au
Internet: www.atsb.gov.au

Addendum

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Wirestrike and collision with terrain involving Cessna 172RG, VH-LCZ

What happened

At about 1728 Central Standard Time,[1] on 3 July 2018, a Cessna 172RG aircraft, registered VH-LCZ, commenced circuit operations at Parafield Airport, South Australia (SA) with the pilot as the sole occupant. The flight commenced in day conditions and transitioned to operation under the night VFR[2] after last light, which occurred at 1743.

There were no identified aircraft defects and it was fully refuelled immediately prior to the flight. The pilot reported that he had conducted a post-refuel drain and that there was nothing abnormal in any of the fuel samples.

At about 1748, the pilot performed a touch and go landing, and departed the runway for the sixth, and intended final, circuit. The pilot recalled that the engine ‘coughed’ once as the aircraft accelerated along the runway. He noted no other abnormalities and continued the take-off normally. About 10 minutes later, the pilot received air traffic control (ATC) clearance to land. He turned the aircraft onto final at an altitude of about 500 ft approximately 1,500 m from the runway threshold, and configured it for landing (full flap and landing gear extended).

On descent through 450 ft, the pilot observed the propeller speed reduce from 1,800 to 1,300 rpm. He selected the carburettor heat, increased the throttle and changed the position of the fuel selector from BOTH to LEFT. The pilot reported that, with the exception of this troubleshooting, he did not apply carburettor heat during any of the previous circuits. The engine did not respond to the pilot’s carburettor nor fuel selection inputs and the propeller speed remained constant at 1,300 rpm. The pilot then deselected the carburettor heat and moved the fuel selector back to its original position. A short time later, he assessed that the aircraft did not have sufficient altitude to reach the runway and that a forced landing would be necessary.

At about 1758, the pilot declared a PAN[3] and informed ATC that he was unable to make the runway. The pilot recalled that he had sighted an unlit area ahead, which he assumed to be an open space. He turned the aircraft towards that area and pitched the nose down to achieve the airspeed associated with the maximum glide distance. The pilot reported that, as the aircraft approached the open space, he heard the fuselage hitting treetops. Seconds later, the aircraft stopped abruptly as the nose wheel struck a power line and it then collided with the ground (Figure 1).

After the collision, the pilot attempted to switch off the master switch but was unable to do so due to distortion of the instrument panels. He then swiftly exited the aircraft through the co-pilot’s side window and moved away from the wreckage. Emergency services attended the scene shortly after. The pilot sustained minor injuries and the aircraft was substantially damaged.

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[1] Central Standard Time (CST): Universal Coordinated Time (UTC) + 9.5 hours.

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

[3] PAN PAN: an internationally recognised radio call announcing an urgency condition, which concerns the safety of an aircraft or its occupants but where the flight crew does not require immediate assistance.

Figure 1: Aircraft wreckage (note power line fouling the nose wheel)

Source: South Australia Police

Carburettor icing

Induction icing, often referred to as carburettor icing, is the accumulation of ice within the induction system of an engine fitted with a carburettor. This ice forms as the decreasing air pressure and introduction of fuel reduces the temperature within the system. The temperature may reduce sufficiently for moisture within the air to freeze and accumulate. This build-up of ice restricts airflow to the engine, leading to a reduction in engine performance and possible engine failure. Environmental conditions influence the likelihood of carburettor ice forming.

Weather observations recorded by the Bureau of Meteorology at Parafield Airport indicated a temperature of 12.2° C and a dew point[4] of -0.6° C at the time of the accident. Figure 2 (see annotation in yellow) shows that these meteorological conditions presented a risk of moderate icing when using cruise power and serious icing when using descent power. At the time of the power loss, the engine was operating at descent power.

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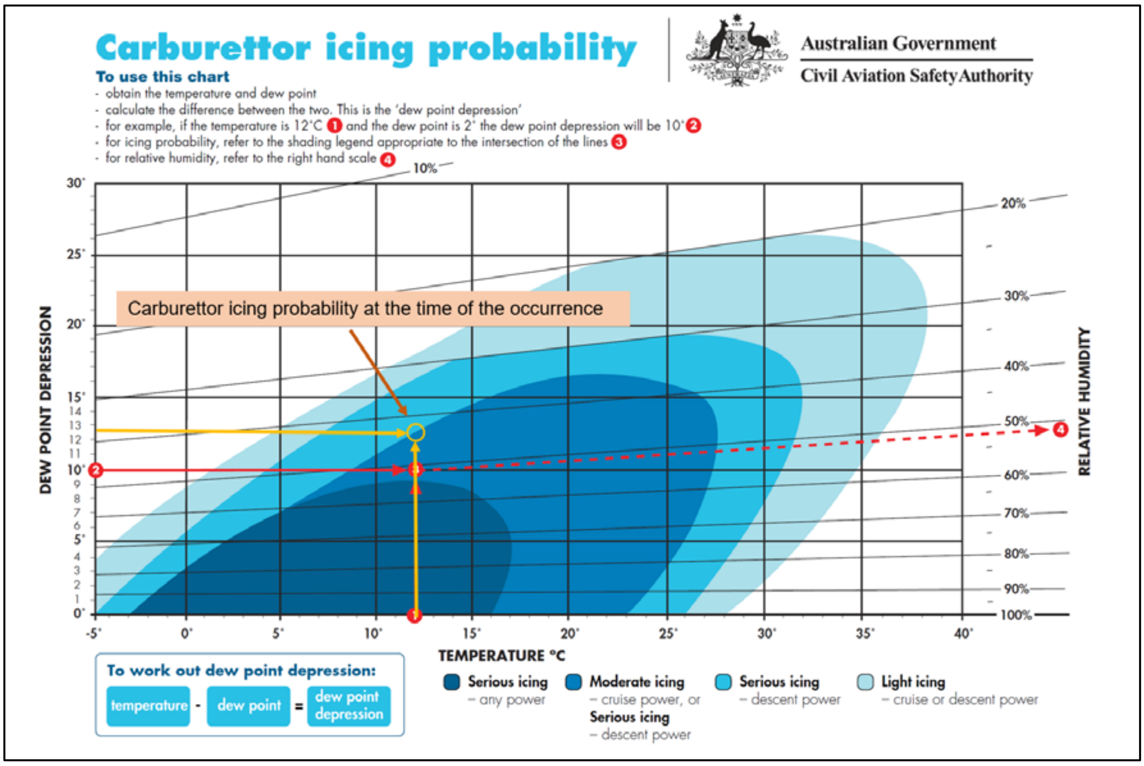
4 Dewpoint is the temperature at which water vapour in the air starts to condense as the air cools. It is used among other things to monitor the risk of aircraft carburettor icing or likelihood of fog at an aerodrome.

Figure 2: Carburettor icing probability



Source: CASA, annotated by the ATSB

The Cessna 172RG pilot operating handbook (POH) provided the following guidance for carburettor icing:

- before landing, switch carburettor heat to ON to prevent ice formation
- in the event of a rough engine running or loss of power:

    An unexplained drop in manifold pressure and eventual engine roughness may result from the formation of carburettor ice. To clear the ice, apply full throttle and pull the carburettor heat knob out until the engine runs smoothly; then remove carburettor heat and re-adjust the throttle.

Safety analysis

A post-accident examination of the engine was not conducted and therefore the possibility that a mechanical defect contributed to the accident could not be ruled out. However, the ATSB assessed the evidence with respect to some common known causes for an engine power loss. The evidence indicated that fuel contamination, fuel exhaustion and aircraft maintenance issues were unlikely.

Contrary to the guidance in the POH, the pilot reported that he did not apply carburettor heat while descending to the runway during any of the circuits. This combined with weather conditions conducive to severe carburettor icing at descent power made it likely that the power loss was due to the accumulation of carburettor ice.

The POH listed carburettor icing as a cause of the engine running rough or losing power. The actions listed in the POH to clear carburettor ice, however, do not clear ice immediately as it takes some time for the heat to take effect. The pilot first observed a reduction in propeller speed just after the turn onto final. Although he responded by applying carburettor heat, the short time between troubleshooting the engine power loss and conducting the forced landing meant there was probably insufficient time to clear enough ice for the engine to recover.

The pilot completed the turn onto final at an altitude of about 500 ft approximately 1,500 m from the runway threshold, which is within the normal profile for a powered approach. After troubleshooting the engine issues, the aircraft had already descended to about 450 ft. The POH indicated that, in ideal conditions, a maximum glide distance of about 1,500 m could be achieved from an altitude of 500 ft. However, a turn onto the final approach at that position is unlikely to permit an aircraft configured for landing to glide to the runway in the event of a power loss.

Consideration of a flight profile that balances the requirement for a stable approach while increasing the likelihood of being able to reach the runway in the event of a power loss is particularly important when flying in night VFR conditions. Selection of a suitable unprepared landing site is more difficult at night due to reduced visual discrimination. In this instance, the selected large unlit area was assumed to be clear but obstructions, such as the power lines, were not discernible.

Following the partial engine failure, the pilot resisted the temptation to lift the nose of the aircraft in an attempt to stretch the glide to the runway. That decision, to follow his training and pitch the nose of the aircraft down to establish the optimum glide speed, enabled him to maintain control of the aircraft. That action likely prevented a low altitude stall and uncontrolled collision with terrain.

Findings

These findings should not be read as apportioning blame or liability to any particular organisation or individual.

- On final approach, the engine of VH-LCZ failed, likely due to carburettor icing.
- The engine failed at a position during the final approach that did not permit the aircraft to glide to the runway and afforded limited alternative landing area options.
- While descending during the forced landing at night, the aircraft struck a power line and then collided with terrain, resulting in minor injury to the pilot and substantial damage to the aircraft.

Safety message

Engine failure during single-engine aircraft operations is by far the most serious night time emergency. The Civil Aviation Safety Authority (CASA) advisory circular, *Night VFR Rating*, provides useful recommendations for minimising risk during night visual flight rules (VFR) operations, including:

- planning to fly at a higher altitude will increase the options available
- planning the descent onto the base leg so that the aircraft is positioned to start the turn onto final at about 600 ft to 700 ft above ground level.

The routine application of carburettor heat during the period between the base turn point and late in the final approach will significantly reduce the potential for an ice-related power loss. More information regarding carburettor icing can be found in the ATSB report, *The ongoing danger of carburettor icing.*

While a successful landing was not achieved in this instance, the pilot's actions after realising he would not reach the runway closely followed the guidance in the Federal Aviation Authority pilot's handbook (*Airplane Flying Handbook*). Flying in a controlled manner, wings level and at the recommended glide speed has a better survivability outcome than when control of the aircraft is lost. The pilot's actions in maintaining control of the aircraft maximised the likelihood of a successful forced landing.

General details

Occurrence details

Date and time:	3 July 2018 – 1758 CST	
Occurrence category:	Accident	
Primary occurrence type:	Wirestrike	
Location:	Near Parafield Aerodrome, SA	
	Latitude: 34° 47.60' S	Longitude: 138° 37.98' E

Aircraft details

Manufacturer and model:	Cessna Aircraft Company 172RG	
Registration:	VH-LCZ	
Serial number:	172RG0578	
Type of operation:	Private	
Persons on board:	Crew – 1	Passengers – 0
Injuries:	Crew – 1 (Minor)	Passengers – 0
Aircraft damage:	Substantial	

About the ATSB

The 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; and 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 operations involving the travelling public.

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.

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

About this report

Decisions regarding whether to conduct an investigation, and the scope of an investigation, are based on many factors, including the level of safety benefit likely to be obtained from an investigation. For this occurrence, a limited-scope, fact-gathering investigation was conducted in order to produce a short summary report, and allow for greater industry awareness of potential safety issues and possible safety actions.