Australian Government
Australian Transport Safety Bureau

Collision with terrain involving Cessna 172, VH-JUA

1 km north-east of Murwillumbah, New South Wales on 15 October 2023

ATSB Transport Safety Report
Aviation Occurrence Investigation (Short)
AO-2023-048
Final – 14 February 2024

Cover photo: Photo courtesy of NSW Police.

Released in accordance with section 25 of the *Transport Safety Investigation Act 2003*

Publishing information

Published by:	Australian Transport Safety Bureau
Postal address:	GPO Box 321, Canberra, ACT 2601
Office:	12 Moore Street, Canberra, ACT 2601
Telephone:	1800 020 616, from overseas +61 2 6257 2463
	Accident and incident notification: 1800 011 034 (24 hours)
Email:	atsbinfo@atsb.gov.au
Website:	www.atsb.gov.au

Addendum

Page	Change	Date

Executive summary

What happened

On 15 October 2023, the pilot of a Cessna 172M, registered VH-JUA and operated by Air Gold Coast, was conducting a private flight from Gold Coast Airport, Queensland to Murwillumbah, New South Wales.

During the final approach, the pilot estimated that the aircraft was too high for a landing and elected to conduct a go-around. During the go-around, the aircraft did not climb as expected resulting in the pilot conducting a forced landing about 1km north-east of the airport. The aircraft was substantially damaged and the pilot sustained minor injuries.

What the ATSB found

The ATSB found that it was unlikely there was a mechanical fault with the engine and that the pilot's decision to maintain full flaps in the go-around created a large amount of drag and impaired the aircraft's climb performance.

The ATSB also found an unsecured nose-wheel steering tow bar in the aircraft that increased the risk of serious injury to the pilot.

What has been done as a result

Since the accident, the operator has:

- updated their quick reference handbook (QRH) to be clearer on balked landings (go-around) procedures
- issued an information circular to students and private hire pilots reminding them of the importance to secure items in the baggage area
- updated the private hiring agreements with regard to tighter recency requirements.

Safety message

This accident highlights the importance of appropriately actioning checklists and following procedures detailed in the Pilot's Operating Handbook. The improper or non-use of checklists has been cited as a factor in several aircraft accidents.

Loose items in the baggage area or cockpit can become dangerous projectiles and may cause serious injuries during an abrupt stop, turbulence or an accident sequence. Further, they may hinder an exit in an emergency egress.

The investigation

Decisions regarding the scope of an investigation are based on many factors, including the level of safety benefit likely to be obtained from an investigation and the associated resources required. For this occurrence, a limited-scope investigation was conducted in order to produce a short investigation report, and allow for greater industry awareness of findings that affect safety and potential learning opportunities.

The occurrence

On 15 October 2023, the pilot, who was the sole occupant, of a Cessna 172M, registered VH-JUA and operated by Air Gold Coast, was conducting a private flight from Gold Coast Airport, Queensland to Murwillumbah, New South Wales.

The aircraft departed Gold Coast Airport at 1100 local time, tracked directly to Murwillumbah Airport and joined the circuit on the downwind leg for runway 01.[1] During the final approach, the pilot estimated that the aircraft was approximately 300–350 ft crossing the threshold, and elected to conduct a go-around.

The pilot started to configure the aircraft for the go-around and recalled selecting the carburettor heat to OFF. When midfield over the runway, the pilot applied full throttle; however, the pilot stated that the engine did not respond with adequate power. The pilot recalled checking that the fuel mixture was rich, master switch was selected to ON, magnetos were selected to BOTH and again ensured the carburettor heat was selected to OFF. The pilot did not verify the engine RPM due to the high workload at the time.

The pilot assessed that the aircraft had insufficient power to climb, and there was insufficient runway remaining to land. They advised that turning around to land on the reciprocal runway was not an option due to the aircraft being at a low height.

Concerned about the possibility of a stall,[2] the pilot advised they decided to keep the flaps at 40 degrees to maintain as much lift as possible and to reduce the stall speed.

The pilot raised the aircraft's nose to climb over buildings located past the end of the runway, however, this resulted in the speed reducing, and the pilot felt the aircraft begin to buffet[3] in response to an approaching stall. In response, the pilot lowered the nose and selected a field about 1 km to the north of the airport, to conduct a forced landing.

The pilot recalled maintaining control of the aircraft during the landing sequence and commencing a long flare before landing hard, resulting in substantial damage to the aircraft.

The pilot selected the master and magnetos switches to OFF and exited the aircraft unassisted, sustaining only a minor injury from the shoulder strap of the seatbelt they were wearing.

Context

Aircraft

The Cessna 172 was manufactured in the United States in 1976 and registered in Australia in 1989. It was an all-metal high wing aircraft with a Lycoming O-320-D2J piston engine. The operator advised that VH-JUA had an airframe total time of 14,158 hours and the engine had 2,668.4 hours since overhaul. They further advised it had flown 18.4 hours since the last 100-hour inspection, and there were no outstanding maintenance items at the time of the incident.

---

1 Runway number: the number represents the magnetic heading of the runway.
2 Aerodynamic stall: occurs when airflow separates from the wing's upper surface and becomes turbulent.
3 A buffet is an indication of an approaching aerodynamic stall.

The post-accident engineering inspection did not reveal any faults with the engine.

Pilot

The pilot obtained a recreational pilot licence in January 2023 and at the time of the accident they had accumulated 107 hours of aeronautical experience, with about 72 hours of that in the accident aircraft. 41 of those hours were in command. The pilot had conducted regular dual and solo flights with the operator since obtaining their licence. However, prior to the accident flight, it had been 121 days since the pilot's last flight.

Witness

An experienced pilot, who was standing outside a hangar adjacent to the mid-point of the runway, observed the aircraft fly along the runway at approximately 100 ft. The witness advised that the engine sounded as though it was running at a low power setting as it flew along the runway.

At approximately halfway down the runway, adjacent to where the witness was standing, the witness observed the aircraft nose being pushed down, which the witness believed was an attempt to land. Shortly after, they observed the aircraft pitch up and they heard a bang or 'pop' sound from the aircraft's engine which they advised sounded like the throttle was pushed forward too quickly.

Meteorology

Wind

The following weather details were obtained from the Bureau of Meteorology, and taken from the nearest observation station, Gold Coast, Queensland:

Table 1: Weather details

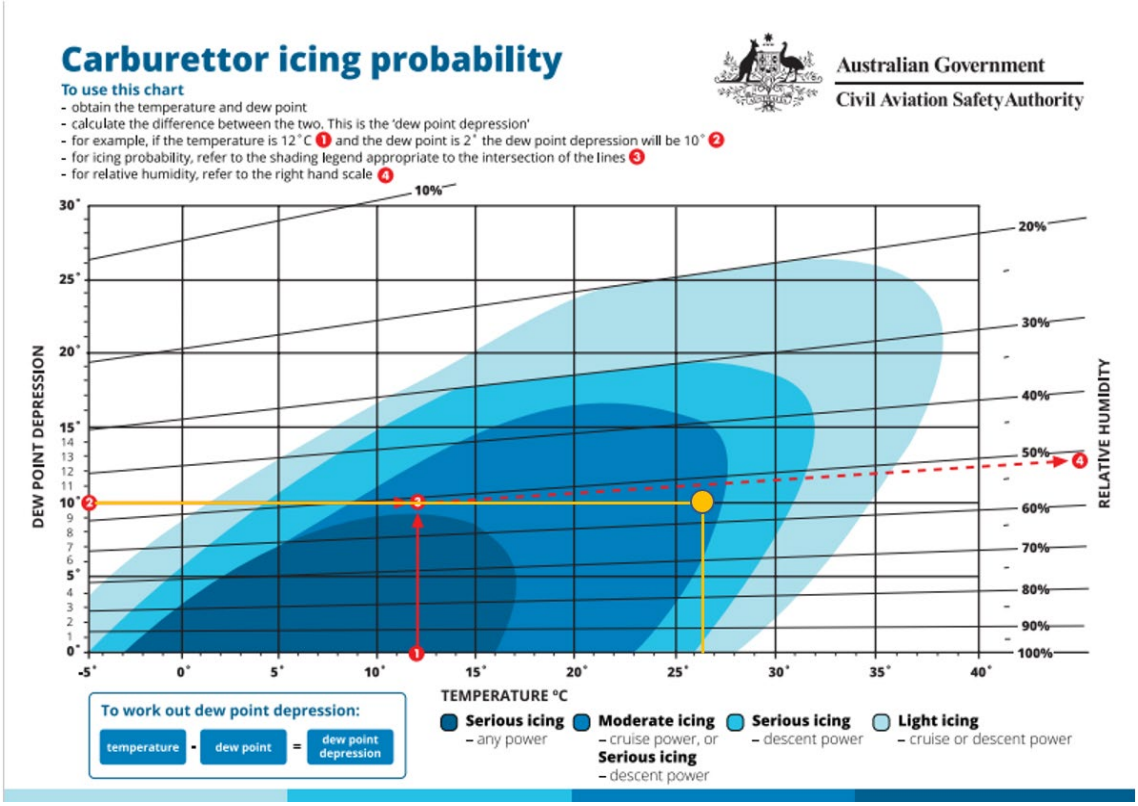
Dew point average	16.7
Temperature average	26.5
Humidity	55%
QNH	1017
Wind direction	037
Wind speed	9 kt
Wind gusts	10 kt

These observations were consistent with both the pilot and witness's recollections that wind conditions were light and northerly. The pilot stated that there was not much difference between the indicated airspeed and groundspeed on the day and did not consider that the wind had any adverse effect. As such, wind speed and direction were not considered a factor in the accident.

Carburettor icing conditions

The CASA carburettor icing probability chart predicted that serious carburettor icing at descent power was probable (Figure 1). The pilot stated that the engine was performing as expected throughout the approach. However, any loss of power associated with carburettor icing may not have been noticed at low power settings during an approach.

Figure 1: CASA carburettor icing probability chart



Source: CASA annotated by ATSB

Aerodrome information

The Airservices En Route Supplement Australia (ERSA) records Murwillumbah with an elevation of 18ft and runway 01 1,045 m in length.

Recorded data

Data for the flight was obtained from OzRunways, which recorded the aircraft's location, altitude and speed at 5 second intervals throughout the flight.

When altitude information is transmitted to OzRunways it is truncated to 100 ft increments. This means that the recorded altitude of the aircraft is within a 100 ft altitude band between the altitude recorded and the next 100 ft increment. Altitudes between 0 and 99 ft will be displayed as 0, 100 and 199ft will be displayed as 100 ft and so on.

Taking into account the terrain elevation, the data showed the aircraft crossing the threshold below 80 ft above ground level (AGL) at 58 kts ground speed. The aircraft maintained approximately the same speed and altitude until about halfway down the runway.

The aircraft then commenced a climb, to a maximum height of between 200–280 ft, maintaining approximately 60 kts, before descending towards the cane field (Figure 2).

Figure 2: VH-JUA go-around at Murwillumbah Runway 01

Source: Google Earth with OzRunways data annotated by the ATSB

Go-around procedures

The Pilot's Operating Handbook for the Cessna 172M states that the procedure for a go-around or 'balked landing' was:

- Throttle – full open
- Carburettor heat – cold
- Wing flaps – 20°
- Airspeed – 55 kt
- Wing flaps – retract slowly

On most aeroplanes the use of full flaps creates large amounts of drag and impairs climb performance. The FAA airplane flying handbook Chapter 9: Approaches and landings stated that:

> flap deflection of up to 15° primarily produces lift with minimal drag… Flap deflection beyond 15 degrees produces a large increase in drag.

In addition, the handbook stated that:

> the application of power should be smooth, as well as positive. Abrupt movements of the throttle in some airplanes cause the engine to falter.

Accident site

The ATSB did not attend the accident site and therefore did not conduct a detailed inspection of the wreckage. However, photographs of the site were provided to the ATSB (Figures 3 and 4).

These photographs showed evidence of:

- QNH subscale was set to the 1017 hPa
- flaps extended to approximately 40 degrees
- damage to the left wingtip, fuselage and right wing
- nose and right main landing gear collapsed
- engine pushed to the right
- a nose-wheel steering towbar on the front right seat of the aircraft

The operator advised that the aircraft had full fuel prior to the departure and approximately 70 l of fuel was recovered from the fuel tanks after the accident.

Figure 3: Photos of the aircraft at the accident site

Source: Operator annotated by ATSB

Figure 4: Nose-wheel steering towbar unrestrained in the cockpit

Photograph of the inside of the aircraft after the accident showed the nose-wheel steering towbar on the front passenger seat.
Source: NSW Police annotated by ATSB

The Civil Aviation Safety Regulations 91.600 state that ‘cargo must not be carried in a place where the cargo may damage, obstruct or cause the failure of a control or obstruct or restrict access to an emergency exit’.

While it could not be determined where the towbar was stored prior to the commencement of the flight, the operator’s standard procedure is to put the tow bar under the seat or to be covered by the net in the rear baggage compartment.

Safety analysis

The pilot advised that the aircraft was high on the approach and consequently they conducted a go-around. A go-around is a normal flight manoeuvre and is recommended when a pilot is not comfortable with an approach and as such it was appropriate that the pilot elected to conduct the procedure. However, consistent with the witness’s observations, the flight data indicated that the approach was stable, and that the descent stopped at less than 80 ft above the threshold, which placed the aircraft in a good position to land. It could not be determined why the pilot believed they were at 300–350 ft at this time.

The data further indicates that the aircraft started climbing, consistent with the commencement of a go-around, about half-way down the runway rather than over the threshold as recalled by the pilot.

During the go-around, the pilot advised that the engine did not produce full power. The ATSB could not verify this as there was no recorded data for engine parameters.

However, as the aircraft was able to maintain speed and height across the runway and subsequently climb with full flap, and no faults were found during the engine inspection, it is unlikely that the engine had any mechanical issues or any significant carburettor icing.

The witness’s account of the engine making a loud ‘bang’ as the engine power was applied is consistent with an abrupt forward movement of the throttle, which may have resulted in the engine faltering momentarily.

It is likely that the pilot’s decision to maintain full flap (40 degrees), which creates a large amount of drag and impaired climb performance, resulted in the pilot’s perception that the engine was not performing adequately.

While the nose-wheel steering towbar did not adversely affect the flight or injure the pilot, loose items in the cockpit or baggage area can jam flight controls and become dangerous projectiles and may cause serious injuries during an abrupt stop, turbulence or an accident sequence. Further, they can hinder an emergency evacuation.

Findings

ATSB investigation report findings focus on safety factors (that is, events and conditions that increase risk). Safety factors include 'contributing factors' and 'other factors that increased risk' (that is, factors that did not meet the definition of a contributing factor for this occurrence but were still considered important to include in the report for the purpose of increasing awareness and enhancing safety). In addition 'other findings' may be included to provide important information about topics other than safety factors.

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

From the evidence available, the following findings are made with respect to the collision with terrain involving Cessna 172M, VH-JUA, 1km north-east of Murwillumbah, New South Wales on 15 October 2023:

Contributing factors

- During the go-around, it is likely the aircraft was incorrectly configured resulting in reduced climb performance.

Other factors that increased risk

- The unrestrained object in the aircraft increased the risk of serious injury to the pilot.

Safety actions

Whether or not the ATSB identifies safety issues in the course of an investigation, relevant organisations may proactively initiate safety action in order to reduce their safety risk. All of the directly involved parties are invited to provide submissions to this draft report. As part of that process, each organisation is asked to communicate what safety actions, if any, they have carried out to reduce the risk associated with this type of occurrences in the future. The ATSB has so far been advised of the following proactive safety action in response to this occurrence.

Safety action by Air Gold Coast

Since the accident, the operator has taken the following safety actions:

- updated quick reference handbooks (QRH) to be clearer on balked landings (go-around) procedures.
- issued an information circular to students and private hire pilots reminding them of the importance to secure cockpit cargo.
- updated the private hiring agreements with regard to tighter recency requirements.

General details

Occurrence details

Date and time:	15 October 2023 – 12:20 Eastern Daylight-saving Time	
Occurrence class:	Accident	
Occurrence categories:	Collision with terrain	
Location:	1km north-east of Murwillumbah, New South Wales	
	Latitude: 28.321° S	Longitude: 153.418° E

Aircraft details

Manufacturer and model:	Cessna 172 M	
Registration:	VH-JUA	
Operator:	Air Gold Coast	
Serial number:	17266434	
Type of operation:	Part 91 General operating and flight rules	
Activity:	Private flight	
Departure:	Gold Coast, Qld	
Destination:	Murwillumbah, NSW	
Persons on board:	Crew – 1	Passengers – 0
Injuries:	Crew – minor	Passengers – N/A
Aircraft damage:	Substantial	

Sources and submissions

Sources of information

The sources of information during the investigation included the:

- pilot of the accident flight
- operator
- accident witnesses
- recorded data from OzRunways
- NSW Police

References

Cessna 1972, Pilot's Operating Handbook, Cessna 176 Skyhawk, model 172M

Federal Aviation Administration, 2022, Airplane Flying Handbook, Chapter 9 – approaches and landings'.

Submissions

Under section 26 of the *Transport Safety Investigation Act 2003*, the ATSB may provide a draft report, on a confidential basis, to any person whom the ATSB considers appropriate. That section 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 following directly involved parties:

- Pilot of the accident flight
- Air Gold Coast Pty Ltd
- Witness
- Civil Aviation Safety Authority

Submissions were received from:

- Air Gold Coast Pty Ltd

The submission was reviewed and, where considered appropriate, the text of the report was amended accordingly.

Australian Transport Safety Bureau

About the ATSB

The ATSB is an independent Commonwealth Government statutory agency. It is governed by a Commission and is entirely separate from transport regulators, policy makers and service providers.

The ATSB's purpose is to improve the safety of, and public confidence in, aviation, rail and marine transport through:

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, as well as participating in overseas investigations involving Australian-registered aircraft and ships. It prioritises investigations that have the potential to deliver the greatest public benefit through improvements to transport safety.

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

Purpose of safety investigations

The objective of a safety investigation is to enhance transport safety. This is done through:

identifying safety issues and facilitating safety action to address those issues

providing information about occurrences and their associated safety factors to facilitate learning within the transport industry.

It is not a function of the ATSB to apportion blame or provide a means for determining 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. The ATSB does not investigate for the purpose of taking administrative, regulatory or criminal action.

Terminology

An explanation of terminology used in ATSB investigation reports is available on the ATSB website. This includes terms such as occurrence, contributing factor, other factor that increased risk, and safety issue.