

Australian Government Australian Transport Safety Bureau

Collision with terrain involving a Stoddard Hamilton Aircraft Glastar, VH-BAQ

About 18 km north-west of Noosa, Queensland on 12 November 2023



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Addendum

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Executive summary

What happened

On 12 November 2023, a pilot was conducting a private, return trip in a Stoddard Hamilton Aircraft Glastar, registered VH-BAQ, from Greenfields private airstrip at Boreen Point, Queensland, with one passenger on board. During the final approach, the aircraft reportedly landed firmly and encountered a left crosswind that resulted in the pilot initiating a go-around.

Shortly after, the aircraft struck a palm tree and collided with terrain. The aircraft was substantially damaged, the pilot sustained minor injuries while the passenger was seriously injured.

What the ATSB found

The ATSB found that on touchdown the aircraft reportedly encountered a left crosswind gust that turned the aircraft towards obstacles to the south of the runway. During the subsequent go-around, the aircraft was not realigned with the runway and the best angle of climb airspeed was not achieved, resulting in a collision with terrain.

Safety message

Pilots should be prepared to conduct a missed approach/baulked landing during every approach and be aware of the factors that can significantly affect subsequent climb performance. This prevents the likelihood of experiencing slow reaction times associated with surprise/startle events and ensures a safe go-around.

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 12 November 2023, a pilot and passenger were conducting a private, return flight in a Stoddard Hamilton Aircraft Glastar, registered VH-BAQ, from Greenfields private airstrip near Boreen Point, Queensland.

The aircraft departed at approximately 0730 local time and tracked north over Gympie, then flew to Maryborough where the pilot conducted a practice forced landing. They then followed the coastline from Rainbow Beach to the township of Teewah, before tracking west back towards the Greenfields airstrip.

At 0901, the aircraft joined the circuit for runway 10¹ via a descending downwind leg. The pilot reported that the wind was a slight left crosswind of about 5–7 kt. The pilot recalled that they selected one stage of flap for the approach and when they turned final, they slowed the aircraft to about 65 kt indicated airspeed (IAS).

They advised that as they crossed a tree line in the runway undershoot (Figure 1) the aircraft encountered sink and in response, they twice increased the engine power. The pilot reported that, despite the increased engine power, the aircraft touched down firmly and simultaneously the aircraft was struck by a gust of crosswind, which picked up the left wing and turned the aircraft to the right towards the house.

In response, the pilot applied full power to go-around. The aircraft became airborne, cleared a property fence, a building and then struck the top of a palm tree and subsequently collided with terrain. The aircraft was substantially damaged, the pilot sustained minor injuries and the passenger was seriously injured.



Figure 1: Approach to Greenfields airstrip

Altitude is shown in ft above mean sea level and the groundspeed is recorded in kt. Source: Google Earth with data from OzRunways annotated by the ATSB.

¹ Runway number: the number represents the magnetic heading of the runway.

Context

Pilot experience

The pilot obtained a recreational pilot licence in November 2020 and at the time of the accident had accumulated 148.4 hours of aeronautical experience, with 22 of those hours in the accident aircraft. The pilot had flown 4.6 hours in the last 90 days, all of which were on the accident aircraft and included the 1.5 hours flown on the day of the accident.

Aircraft

The accident aircraft was a Stoddard Hamilton Aircraft Glastar GS-1 (serial no. V373X) amateur-built aircraft, which was registered for the first time in February 2001. It had a Subaru piston engine and the aircraft's annual inspection had been conducted approximately 6 weeks prior to the accident.

Weather

Meteorological data recorded at the closest airport – Sunshine Coast (about 36 km to the south-east) was provided by the Bureau of Meteorology. The 0900 METAR/SPECI report indicated that there was a light wind of approximately 7 kt from 110° at the Sunshine Coast Airport around the time of the accident.

Flight data

Flight data obtained from OzRunways, recorded the time, aircraft location, altitude and groundspeed several times per minute.

This data identified that the aircraft joined downwind at approximately 853 ft above sea level² while descending at 108 kt groundspeed³ (Figure 1). The aircraft subsequently turned base at 427 ft and slowed to 71 kt. The groundspeed when the aircraft turned final was approximately 62 kt and during approach, the speed continued to reduce. The speed as the aircraft crossed the tree line was approximately 55 kt, with the aircraft crossing the threshold at 49 kt.

During the go-around, the speed reduced from approximately 50 kt to between 40–44 kt until the aircraft struck the tree (Figure 2).

The ATSB was unable to verify the windspeed and direction at Greenfield airstrip. However, the windspeed at Sunshine Coast Airport was consistent with the pilot's report of 5–7 kt, although there was about a 90° difference in wind direction between that recorded at the Sunshine Coast and the direction reported at Greenfield by the pilot.

² The aerodrome elevation is 30 ft above sea level.

³ Groundspeed: speed of the aircraft over the ground. This is the airspeed affected by the wind.



Figure 2: Missed approach and track divergence

Source: Google Earth with data from OzRunways, annotated by the ATSB

Approach procedure

The pilot operating handbook (POH) for the aircraft recommended a normal approach speed of 65 kt IAS slowing to 60 kt over the threshold. It also advised that the aircraft can be 'landed with no flaps, half flaps or full flaps but the recommended speeds remained the same'. The POH also noted that 'at slower airspeeds, the power-off sink rate increases rapidly'.

The published stall speed for the aircraft varied between 43–49 kt IAS, depending on whether flaps were retracted or fully deployed.

Go-around procedure

The go-around procedure from the POH required the addition of full power and a speed of 65 kt IAS to 'achieve the best angle of climb when clearing obstacles'.

Decision making

The Federal Aviation Administration's (FAA) publication <u>The art of aeronautical decision-making</u> advised that aviation decision making can be broken down into 3 parts - perceive, process and perform. In addition, the FAA publication <u>Airplane flying handbook Chapter 18 Emergency</u> <u>procedures</u> advised that a pilot takes about 4 seconds to perceive and react to an emergency situation.

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 (Figure 3) were provided to the ATSB and they showed:

- damage to the nose cone, with the propeller largely detached from the engine
- substantial damage to the cockpit windshield
- damage to both wings from contact with terrain.

Figure 3: Aircraft damage



Source: Pilot, annotated by the ATSB

Safety analysis

During the final approach with one stage of flap selected, the aircraft's speed reduced to a groundspeed of 56 kt and reportedly as the aircraft flew clear of a line of trees, it encountered unexpected sink. While that was possibly influenced by wind/terrain interaction at the low operating height, it was also consistent with the POH advice of increased sink at reduced airspeed. As the approach continued, despite reported engine power increases, the speed continued to reduce with the aircraft crossing the threshold at approximately 49 kt groundspeed. As there may have been some headwind component (consistent with the wind speed and direction at Sunshine Coast Airport), the indicated airspeed (IAS) may have been higher than this value, but probably below the recommended 65–60 kt during the final stages of the approach and crossing the threshold.

On touchdown the aircraft reportedly encountered a left crosswind gust that the pilot was unable to counter, resulting in the aircraft turning right towards the house to the south of the runway.

It is likely that the pilot was surprised by divergence as, although they applied full power to conduct a go-around, they did not realign the aircraft with the runway, resulting in the aircraft becoming airborne heading towards obstacles. A pilot's decision making can take up to 4 seconds to perceive and react to an unexpected action and in this time frame the aircraft had travelled towards the obstacles.

As the aircraft likely became airborne at less than the best angle of climb airspeed, V_X (65 kt IAS) the available climb performance was relatively poor and, due to the immediate proximity of obstacles, there was limited ability to accelerate to V_X via a shallow climb profile. Consequently the aircraft's speed and height remained low, resulting in the aircraft striking the top of the tree close to the stall speed, before colliding with terrain.

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 a Glastar, VH-BAQ, about 18 km north-west of Noosa, Queensland, on 12 November 2023.

Contributing factors

- On touchdown the aircraft reportedly encountered a left crosswind gust that turned the aircraft towards obstacles to the south of the runway.
- During the go-around, the aircraft was not realigned with the runway and the best angle of climb airspeed was not achieved, resulting in a collision with terrain.

General details

Occurrence details

Date and time:	12 November 2023 0903 Eastern Standard Time		
Occurrence class:	Accident		
Occurrence categories:	Collision with terrain		
Location:	About 18 km north-west of Noosa, Queensland		
	Latitude: 26.2930 S	Longitude: 152.9617 E	

Aircraft details

Manufacturer and model:	Stoddard-Hamilton Glastar GS-1		
Registration:	VH-BAQ		
Serial number:	V373X		
Type of operation:	Part 91 General operating and flight rules		
Activity:	General aviation/Recreational-Pleasure and personal transport		
Departure:	0730		
Destination:	Greenfields airstrip, Queensland		
Actual destination:	Greenfields airstrip, Queensland		
Persons on board:	Crew – 1	Passengers – 1	
Injuries:	Crew – minor	Passengers – serious	
Aircraft damage:	Substantial		

Sources and submissions

Sources of information

The sources of information during the investigation included:

- the pilot
- recorded data from the GPS unit (OzRunways) onboard the aircraft.
- Bureau of Meteorology

References

Federal Aviation Administration 2004, Airplane Flying Handbook, Chapter 2-14, page 53, United States Department of Transportation.

Martin, WL, Murray, PS & Bates, PR 2012, The Effects of Startle on Pilots During Critical Events: A Case Study Analysis, Brisbane, Griffith University.

Stoddard-Hamilton Aircraft, Inc. 1998, GlaStar Model GS-1 Tricycle Gear Owner's Manual, P/N 063-02001-01, Stoddard-Hamilton Aircraft, Inc., Arlington, WA.

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:

- the pilot
- Civil Aviation Safety Authority

No submissions were received.

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.