Australian Government

Australian Transport Safety Bureau

Loss of control and collision with terrain involving Cessna 182 VH-AUT

Hamilton Airport, Victoria | 23 September 2013

Investigation

ATSB Transport Safety Report

Aviation Occurrence Investigation

AO-2013-163

Final – 7 May 2015

Cover photo: Bernard Schiffl

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

Publishing information

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

Page	Change	Date

Safety summary

What happened

VH-AUT

Source: Bernard Schiffl

In the early evening of 23 September 2013, the student pilot of a Cessna Aircraft Company 182R aircraft, registered VH-AUT, was conducting solo night circuit consolidation training at Hamilton Airport, Victoria. On the fourth circuit the pilot made a radio call indicating he was aborting the landing. Witnesses observed the aircraft climb, then turn to the right and descend, followed by a collision with terrain. The aircraft was destroyed by the impact and post-impact fire and the pilot was fatally injured.

What the ATSB found

The ATSB found that following an aborted landing during circuit training in dark night conditions, the solo student pilot lost control of the aircraft, resulting in a collision with terrain. There was insufficient evidence to determine the reason for the loss of control.

The student pilot's post-mortem examination identified a cardiac condition capable of causing incapacitation and their medical history included another condition that, if having effect at the time, had the potential to have contributed to the development of the accident. The Civil Aviation Safety Authority (CASA) was unaware of either condition.

In addition, the aircraft's flaps were found to have been in the fully-extended position at impact, which was not consistent with either the operator's or manufacturer's procedures for a go-around. The ATSB was unable to determine when the flaps were extended and to what extent the misconfiguration influenced the accident.

Safety message

This accident highlights the importance of the shared responsibility by holders of aviation medical certificates, examining physicians and CASA to report, assess and manage medical and other conditions as they might affect the issue/renewal of those certificates. A full understanding by CASA of an aviation medical certificate applicant's current and prior medical conditions, and use of medications, informs the consideration and development of appropriate risk controls to ensure continued safe flight. This can include the applicant continuing in, or recommencing their participation in the industry.

Contents

The occurrence

In the early evening of 23 September 2013, the student pilot of a Cessna Aircraft Company 182R aircraft, registered VH-AUT, was conducting solo night circuit consolidation training at Hamilton Airport, Victoria.

At about 1845 Eastern Standard Time[1], following a pre-flight briefing, the student pilot and a qualified instructor commenced dual circuit training on runway 35 in order for the instructor to assess the student's proficiency, prior to the student conducting solo night circuits on that runway. It was reported that when the aircraft took off the light was fading and, by the end of the second circuit, it was completely dark.

After four circuits, the instructor was satisfied with the student's performance and instructed them to conduct a 'full stop' landing to allow the instructor to exit the aircraft. The student pilot then commenced solo night visual circuits.

The instructor observed some of the student pilot's solo landings and reported that those landings were normal. The instructor reported proceeding inside the school where they heard an engine noise consistent with that of AUT, and observed the red tail light of an aircraft pass by the window 'in a slight climb'. The instructor estimated that this aircraft was about 100–150 ft above the runway at that time. The instructor recalled hearing a radio call from the student pilot shortly after,[2] indicating that they were 'going around' (see the section titled *Go-around procedure*).

At 1946, two other witnesses who were walking to the school from a nearby hangar observed an aircraft turning right with a descent angle of about 30°, followed by a collision with terrain (Figure 1). The pilot was not heard to make any distress call on the aircraft's radio.

The student pilot was fatally injured and the aircraft was destroyed by the impact and post-impact fire.

Figure 1: Image of runway 35 showing the location of the accident site and witnesses

Source: Google earth, modified by the ATSB

---

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

2 The operator maintained a radio in the flying school building that was tuned to the Hamilton Airport Common Traffic Advisory Frequency of 124.2 MHz.

Following the collision with terrain, the witnesses immediately telephoned emergency services. In response, a search was commenced by Victoria Police and the aircraft was located at 1957. Fire and ambulance vehicles arrived at the site soon after.

Context

Personnel information

The student pilot was undertaking training as part of a cadet scheme associated with an airline based in south-west Victoria. The flying school used an integrated training syllabus designed to train and prepare students for positions as first officers with the airline. The pilot had completed 8 months of the 18-month training course.

At the time of the accident the pilot held a student pilot's licence with the appropriate aircraft endorsements to operate the aircraft and had passed their General Flying Progress Test on 29 April 2013. The pilot held a valid Class 1 Aviation Medical Certificate, issued by the Civil Aviation Safety Authority (CASA), without restrictions.

The student pilot had accumulated a total flying experience of 135.5 hours, of which 60 hours were flown in the previous 90 days. The pilot's total experience on the Cessna182 was 34.6 hours, of which 24.6 hours were accumulated in the last 90 days. Prior to the flight that night, the pilot had accumulated 4.7 hours of night flying experience, including 1.8 hours solo.

The student was conducting night solo consolidation training in order to meet the requirement for 10 hours of night flying experience prior to undertaking their instrument rating flight test. The student's night circuit training was all conducted at Hamilton Airport and their logbook contained an entry, made by the operator's chief flying instructor on 26 August 2013, certifying that the student met the 'Night V.F.R.[3] handling requirements for unrated pilots' of the Civil Aviation Regulations (CAR) 1988.[4] These requirements detailed the minimum level of instrument flight proficiency for the student to conduct solo night circuits.

Aircraft Information

General

The aircraft was a high-wing, fixed-undercarriage, single-engine, propeller-driven aeroplane (Figure 2). Its maintenance release was destroyed in the post-impact fire.

A review of the aircraft's maintenance records did not identify any defects or unserviceable equipment prior to the flight. A copy of the maintenance release showed it was issued in the instrument flight rules[5] category on 17 September 2013 for 12 months or 100 hours flight time, whichever occurred first. The aircraft had accumulated about 32 hours since the issue of the maintenance release.

The aircraft was fitted with an emergency locator transmitter[6] that was destroyed during the impact sequence and post-impact fire.

The Cessna 182 is fitted with wing flaps that can be extended to assist control and performance in low-speed flight, including during take-off and landing. According to the aircraft manufacturer, the approved range of flap extension for landing was between their being fully-retracted (0°) and fully-extended (40°).

---

[3] 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.

[4] At the time detailed in CAR 5.01A but since superseded.

[5] Instrument flight rules (IFR) permit an aircraft to operate in instrument meteorological conditions (IMC), which have much lower weather minimums than visual flight rules. IFR-capable aircraft have greater equipment and maintenance requirements.

[6] A crash-activated radio beacon that transmits an emergency signal that may include the position of a crashed aircraft. Also able to be manually activated.

In the Cessna 182, the wing flap lever and position indicator are located to the lower right of the central control panel. The instructor reported that the flap setting was illuminated by a nearby cockpit light.

Figure 2: VH-AUT

Source: Bernard Schiffl

Weight and Balance

It was estimated that at the time of the accident the aircraft's weight and balance were within the operational limits for the aircraft.

Meteorological information

The aerodrome forecast for Hamilton Airport predicted high cloud and the wind to be almost aligned with runway 35 at 15 kt, with gusts to 28 kt for the duration of the intended training. From 2100, the wind was forecast to change to a westerly direction and reduce to 14 kt. Moderate turbulence was forecast at the circuit altitude throughout the forecast period.

Other pilots who were also operating in the circuit at the time reported experiencing light turbulence in the circuit and that a westerly crosswind increased at circuit altitude. This necessitated heading adjustments to correctly position the aircraft in the circuit pattern.

Last light at the accident site was 1856 and the moon did not rise until 2228. There was little celestial light due to high cloud and no moon. Ground lighting was minimal to the north of the airport, and other pilots who were flying in the circuit at the time reported that it was 'a really dark night'. However, this level of illumination was reported normal when flying from Hamilton Airport at night.

Wreckage and impact information

The wreckage trail was oriented on a bearing of 086°, consistent with a right turn through 96° from the runway heading of 350° following the go-around (Figure 3). The first impact was 650 m from the upwind end of runway 35 on a bearing of 061°. Based on ground scar measurements, at impact the aircraft was descending and banked to the right, with a slightly nose-down attitude and at a minimum speed of 100 kt (185 km/h).

Figure 3: Accident site

Source: Google earth, modified by the ATSB

The aircraft came to rest 115 m after the first ground impact. The engine separated from the fuselage after impact and travelled 150 m on a bearing of 094°. The aircraft was severely damaged by a post-impact fire (Figure 4). No evidence was found of any pre-impact faults that could have influenced the accident, nor was there any indication of an in-flight break-up. Damage to the surrounding vegetation indicated that aviation fuel was liberated from the wreckage about 70 m after the first point of impact. All the major components of the aircraft were identified, except the nose wheel.

Figure 4: Aircraft wreckage

Source: ATSB

The engine separated from the fuselage during the impact sequence and was unaffected by fire. On-site examination of the engine did not identify any faults that would have prevented normal operation. Propeller damage was consistent with the engine producing significant power at impact.

The wing flap actuator was found to have been at the fully-extended position at impact. During normal circuit operations, the flaps would generally be fully retracted on the upwind leg of the circuit. The wing flap control system was unable to be examined due to damage sustained during the post-impact break-up and fire. The elevator trim tabs were found in a neutral position; however, due to the extensive disruption of the aircraft and its systems, the position of the trim at impact could not be determined.

Medical and pathological information

Post-mortem examination

The forensic pathologist who conducted the post-mortem examination concluded that the student pilot succumbed to injuries sustained during the accident sequence. The examination also identified a congenital anomaly with the pilot's heart. In their report, the pathologist stated that the possibility that the accident was precipitated by a cardiac event could not be completely excluded. A CASA aviation medical specialist advised that the standard aviation medical examination procedure for a person of the pilot's age may not have detected the condition.

Toxicology results did not identify any substances that could have impaired the pilot's performance.

Attention deficit hyperactivity disorder

The student pilot's medical history included prior treatment for attention deficit hyperactivity disorder (ADHD) and the pilot last filled a prescription for medication to treat the symptoms of ADHD 23 months before the accident, or 15 months before beginning their cadetship. It could not be determined if the pilot was still affected by the condition at the time of the accident as no specialist aviation medical assessments were performed following the cessation of medication.

The CASA Designated Aviation Medical Examiner (DAME) clinical guidelines advised the following effects of the condition with the potential to affect aviation operations:

- Premature and ill-considered actions
- Restlessness and excess of movement causing distraction
- Impaired split attention affecting multi-tasking and situational awareness.

Advice was sought from two medical specialists as to the likelihood of the student pilot still having symptoms of the condition at the time of the accident, based on the reported behaviour of the pilot during flight training. Opinion was also sought on the potential for the condition to have influenced the accident. However, due to the limited available information, neither was able to provide conclusive advice.

In order for CASA to issue an Aviation Medical Certificate to a pilot with a history of ADHD, CASA requires the applicant to be absent of symptoms for a minimum of 6 months after completing treatment. There is also a requirement for ongoing surveillance of the pilot for a period of time, determined on a case by case basis, of up to 5 years. Information regarding this process is published on the CASA web site at www.casa.gov.au.

For reasons that could not be conclusively established, CASA was unaware of the student pilot's prior treatment for ADHD. As a result, CASA was unable to determine whether the pilot was free of symptoms prior to beginning their airline pilot cadet scheme and consider any ongoing surveillance of the pilot.

The chief flying instructor reported that the flying school was made aware during the recruitment process that the student pilot had previously been diagnosed with ADHD. The student was told to report this condition to their DAME, and it was assumed by the instructor that there was no ongoing risk associated with ADHD as the student had passed a Class 1 medical examination and his performance as a student was considered satisfactory.

Operational information

Go-around procedure

A go-around may be initiated by a pilot when an aircraft is on an approach to land. A go-around is intended to change an aircraft's flight profile from descending in an approach or landing configuration to a climb in a climbing configuration. A go-around procedure is considered a normal procedure and, although it is not often required, it should not result in increased risk.

The operator was unable to provide the ATSB with the go-around procedure that was in use at the time; however, the procedure that was effective from November 2013 is shown in Figure 5. This procedure was consistent with that published by Cessna.

Figure 5: Go-around procedure

3.16 GO AROUND PROCEDURE

PILOT FLYING (PF)	PILOT NOT FLYING (PNF)
"GOING AROUND" **MIXTURE RICH, PITCH FINE,** Advance power lever to **MAXIMUM** and select climbing attitude Carburetor heat cold **"FLAP 20° SELECTED"** Airspeed 70 kts Monitor Go Around and set missed approach altitude on APA if not already set. Once clear of obstacles	
"FLAP 10° SELECTED"	
"FLAP 0° SELECTED"	
At a safe altitude in VMC or the missed approach altitude in IMC, carry out after climb scan-action flow.	
Complete missed approach procedure	

CAUTION

Crews must ensure a positive rate of climb away from the ground is achieved before reconfiguring.

Do not retract the flaps straight from 30° to 0°, pause at each increment to check positive climb is still being achieved.

Source: Aircraft operator

The flying school taught students that when their aircraft was descending through a height of 300 ft above ground level on approach to land, the pilot should initiate a go-around unless the:

- aircraft was within 10 kt of the correct airspeed
- aircraft was established on the extended runway centre-line
- approach profile was aligned with the visual approach slope indicator
- aircraft was configured to land.

Flap settings

The aircraft's wing flaps were found to have probably been in the fully-extended, 40° position at impact. The instructor who approved the student pilot for night solo circuits that night reported that the student had been trained and observed to conduct landings at night with a maximum of 20° flap extension.

It was further reported that students were trained to use full flap extension in certain circumstances, including short-field landings and practice forced landings during the day. Practice forced landings would include a go-around from the full flap extension configuration. According to the flying school's integrated training syllabus, practice forced landings were not conducted at night.

At 40° flap extension, the aircraft can be flown at a particular airspeed with a lower nose attitude than when conducting the same manoeuvre with a lesser degree of flaps, or with flaps retracted.

Cessna advised that a go-around from a trimmed approach with 40° flap extension would require about 20 kg of forward control yoke force to maintain 55 kt. About 25 kg of forward control yoke force is required at 20° flap extension in the same scenario. Cessna also advised that on the night, the aircraft's climb performance at 40° flap extension would have been about half that expected if the flaps had been fully retracted.

It was reported that the pilot was trained to retract the flaps in 10° stages during the go-around, removing the force required on the control yoke.

Spatial disorientation

Overview

Spatial disorientation (SD) occurs when a pilot does not correctly sense the position, motion and attitude of an aircraft in relation to the surface of the earth.[7] It is often simply described as the inability to determine 'which way is up', although the effects of disorientation can be considerably more subtle than this description.

Pilots obtain information about their orientation from:

- The visual system (eyes), which can obtain information from a range of cues outside the aircraft and relevant flight instruments inside the aircraft.
- The vestibular system, which consists of the balance organs located in the inner ears. The semicircular canals provide information about angular or rotational accelerations in the normal (yaw), lateral (pitch) and longitudinal (roll) axes, and the otolith organs provide information about linear accelerations.
- The somatosensory system, which includes a range of receptors in the muscles, tendons, joints and skin that sense gravity and other pressures on the body. Such perceptions are often known as the 'seat of the pants' aspect of flying.[8]

The visual system generally provides about 80 per cent of a person's raw orientation information, with the remainder provided by the vestibular and somatosensory systems, both of which are prone to misinterpretation and illusions during flight (Newman 2007). Although the visual system can overcome these limitations, the risk of SD is significantly increased if the relevant visual cues are absent, ambiguous or not attended to.

Nature of spatial disorientation accidents

Almost all pilots will experience SD at some time, but the instances are usually recognised and do not result in adverse consequences. Nevertheless, SD has always been involved in a significant proportion of aviation accidents, particularly those with more serious consequences.

When SD does result in an accident, it is usually in the form of controlled flight into terrain or in-flight loss of control, resulting in collision with terrain or in-flight break-up. With most SD accidents, the pilot does not recognise the problem, or at least does not recognise it in time to

---

7 Although implied by the definition, errors of geographical orientation, or incorrectly perceiving an aircraft's distance or bearing from a fixed location, are generally not considered as examples of SD.

8 Some researchers state that the vestibular and somatosensory systems together produce the 'seat of the pants' perceptions.

effectively recover from the situation. This unrecognised SD, often known as Type I, can occur for an extended period of time lasting up to tens of seconds or even longer (Previc and Ercoline 2004).

A range of factors can influence the extent to which a pilot may experience SD or be able to recover from SD. Common factors include limited or ambiguous visual cues outside the cockpit, not directing sufficient attention to the flight instruments due to workload or distraction, and not being proficient in instrument flying skills.

Many types of sensory illusions can result in gradually increasing bank angles and undetected and uncorrected descent. These include roll movement below the pilot's detection threshold, the 'leans' (where the sudden detection and correction of a gradual roll leads to misperceptions about roll), somatogyral illusion (where prolonged exposure to angular rotation leads to that rotation no longer being accurately perceived) and somatogravic illusion (where the perception of the orientation of the aircraft relative to the earth is distorted due to the combination of centrifugal and linear forces).

Research

The ATSB report *An overview of spatial disorientation as a factor in aviation accidents and incidents* found that SD is among the most common factors contributing to aviation accidents and incidents. This study, which is available on the ATSB website at www.atsb.gov.au provides a comprehensive explanation of the various types of SD in the aviation environment, and suggests strategies for managing the risk associated with SD.

Related occurrences

Many aircraft accidents have occurred at night. As stated in CAAP 5.13-2(0):

> Night flying accidents are not as frequent as daytime accidents because less flying is done at night. However, statistics indicate that an accident at night is about two and a half times more likely to be fatal than an accident during the day. Further, accidents at night that result from controlled or uncontrolled flight into terrain (CFIT or UFIT) are very likely to be fatal accidents. Loss of control by pilots of night visual flight rules (NVFR) aircraft in dark night conditions has been a factor in a significant number of fatal accidents in this country…

The ATSB has investigated several occurrences involving VFR flight into dark night conditions. A number are reviewed in the following sections. All are available at www.atsb.gov.au.

VFR flight into dark night conditions and loss of control involving Piper PA-28-180, registered VH-POJ, which occurred 31 km north of Horsham Airport, Vic., on 15 August 2011 – ATSB investigation AO-2011-100

On 15 August 2011, the pilot of a Piper PA-28-180 Cherokee aircraft, registered VH-POJ, was conducting a private flight transporting two passengers from Essendon to Nhill, Victoria under the VFR. The flight was arranged by the charity Angel Flight to return the passengers to their home location after medical treatment in Melbourne. Global positioning system (GPS) data recovered from the aircraft indicated that when about 52 km from Nhill, the aircraft conducted a series of manoeuvres followed by a descending right turn. The aircraft subsequently impacted the ground at 1820, fatally injuring the pilot and one of the passengers. The second passenger later died in hospital as a result of complications from injuries sustained in the accident.

The ATSB found that the pilot probably encountered reduced visibility conditions approaching Nhill due to low cloud, rain and diminishing daylight, leading to disorientation, loss of control and impact with terrain. One of the passengers was probably not wearing a seatbelt at the time of the accident. The ATSB also established that flights are permitted under the VFR at night in conditions where there are no external visual cues for pilots. In addition, pilots conducting such operations are not required to maintain or periodically demonstrate their ability to maintain aircraft control with reference solely to flight instruments.

VFR flight into dark night involving Aérospatiale, AS355F2 (Twin Squirrel) helicopter, registered VH-NTV, which occurred 145 km north of Marree, South Australia on 18 August 2011 – ATSB investigation AO-2011-102

On 18 August 2011, an Aérospatiale AS355F2 (Twin Squirrel) helicopter, registered VH-NTV, was being operated under the VFR in an area east of Lake Eyre, South Australia. At about 1900 Central Standard Time[9], the pilot departed an island in the Cooper Creek inlet with two film crew on board for a 30-minute flight to a station for a planned overnight stay. It was after last light and, although there was no low cloud or rain, it was a dark night. The helicopter levelled at 1,500 ft above mean sea level, and shortly after entered a gentle right turn and then began descending. The turn tightened and the descent rate increased until, 38 seconds after the descent began, the helicopter impacted terrain at high speed with a bank angle of about 90°. The pilot and the two passengers were fatally injured, and the helicopter was destroyed.

The ATSB found that the pilot probably selected an incorrect destination on one or both of the helicopter's GPS units prior to departure. The ATSB concluded that, after initiating the right turn at 1,500 ft, the pilot probably became spatially disoriented. Factors contributing to the disorientation included dark night conditions, high pilot workload associated with establishing the helicopter in cruise flight and probably attempting to correct the fly-to point in a GPS unit, the pilot’s limited recent night flying and instrument flying experience, and the helicopter not being equipped with an autopilot.

VFR flight into dark night conditions and loss of control involving Cessna T210N, registered VH-MEQ, which occurred 2 km north-west of Roma Airport, Queensland on 25 March 2013 - ATSB investigation AO-2013-057

At about 0518 on 25 March 2013, a Cessna T210N aircraft, registered VH-MEQ, took off in dark night conditions from runway 36 at Roma Airport on a flight to Cloncurry, Queensland. Following the activation of the aircraft’s emergency locator transmitter, a search was commenced for the aircraft by the Australian Maritime Safety Authority. The aircraft was subsequently located 2 km to the north-west of the airport, having collided with terrain while heading in a south-westerly direction. The aircraft was destroyed and the pilot and passenger were fatally injured.

The ATSB found that the departure was conducted in dark night conditions, despite the pilot not holding a night visual flight rules rating and probably not having the proficiency to control the aircraft solely by reference to the flight instruments. During the climb after take-off, the pilot probably became spatially disorientated from a lack of external visual cues, leading to a loss of control and impact with terrain.

9 Central Standard Time (EST) was Coordinated Universal Time (UTC) + 9.5 hours.

Safety analysis

Introduction

During solo night circuit consolidation training in dark night conditions the aircraft collided with terrain following a go-around. The ATSB identified that the pilot satisfied the requirements to undertake the training and, while the degree of post-impact fire damage prevented a complete examination, no evidence was found of a mechanical fault with the aircraft or engine.

The analysis will discuss the loss of control and potential reasons for the loss, including the pilot's medical history, the ambient conditions on the night and the aircraft's configuration.

The occurrence

It could not be determined why the pilot conducted the go-around; however, it was a normal procedure and he was trained to do so if not stabilised by 300 ft above ground level on final approach. Reported increasing crosswinds and minor turbulence in the circuit may have affected the positioning of the aircraft and influenced the pilot's decision to go-around, however there was insufficient evidence to determine whether that was the case.

Examination of the aircraft wreckage and accident site identified that the aircraft collided with terrain while turning to the right with a slight nose-down attitude, and at high speed. In the context of that apparent departure from controlled flight, the ATSB considered several possibilities for the loss of control.

Aircraft configuration

The aircraft's flaps were found to have probably been in the fully-extended, 40° position at impact. This was contrary to the operator's go-around procedures, the student pilot's training and their use of the flaps in previous night circuits. As a result, the ATSB considered the potential for this configuration to have contributed to a loss of control.

It is possible that the flaps were inadvertently set to 40° during the approach and not retracted during the go-around. If this was the case, climb performance and acceleration during the upwind leg of the circuit would have been reduced. The need for the pilot to wait for their airspeed and/or rate of climb to increase prior to retracting the flaps would have prolonged that situation.

The ATSB could not determine if the use of 40° of flap impacted on the pilot's ability to control the aircraft; however, if the pilot's instrument scan deteriorated while dealing with the effects of this unanticipated configuration, they may have become susceptible to spatial disorientation. The pilot would have had very little, if any, experience dealing with this situation.

Pilot medical condition

The pilot's post-mortem examination revealed a congenital heart anomaly that the examining pathologist advised could not be completely excluded from having precipitated a cardiac event. No other evidence was found to support or oppose an incapacitation event as contributing to the loss of control following the go-around radio call.

The student pilot had previously been treated for attention deficit hyperactivity disorder (ADHD) and last filled a prescription for medication to treat the symptoms 23 months before the accident. The degree, if any, to which the pilot was still affected by this condition at the time of the accident could not be determined as no specialist aviation medical assessments were performed following the cessation of medication. Similarly, due to the limited available information, conclusive medical advice on the potential for the condition to have influenced the accident was not possible. However, given the known effects of ADHD on aviation, any residual effects may have, if present, impacted on the pilot's ability to manage the aircraft in the unexpected circumstances affecting the go-around.

Dark night conditions

The student pilot's training records indicated that, in accordance with the relevant Civil Aviation Safety Authority (CASA) requirements, they were adequately trained to perform solo night circuits. Despite this training, the pilot had limited experience flying at night.

The risk of spatial disorientation during dark night conditions can be increased by any distraction that diverts a pilot's attention from the aircraft's flight instruments. In this occurrence, it remains possible that ADHD symptoms, if present, may have impacted on the student pilot's ability to give sufficient attention to the flight instruments. Similarly, as previously mentioned, the pilot may have been distracted by a possible flap mis-configuration or fault.

In either case, there was insufficient evidence to determine the contribution of each of these potential hazards to this accident. However, with most accidents involving spatial disorientation, the pilot does not recognise the problem, or does not recognise it in time to effectively recover from the situation.

Knowledge of the pilot's medical condition

It was reported by the chief flying instructor that the student pilot disclosed their previous treatment for ADHD to the flying school. However, as the pilot had passed a Class 1 medical examination, the flying school assumed that the pilot's previous condition no longer represented an ongoing safety risk. In addition, the pilot's performance as a student was regarded as satisfactory.

For reasons that could not be conclusively determined, CASA was unaware of the pilot's previous treatment for ADHD and this precluded their consideration of any implications of the pilot's condition before joining the airline pilot cadet scheme. An awareness of the condition would have allowed CASA to, if required, invoke an appropriate surveillance regime that likely would have involved and therefore informed the operator, and reduced safety risk.

Findings

From the evidence available, the following findings are made with respect to the loss of control and collision with terrain involving Cessna Aircraft Company 182R, registered VH-AUT, which occurred near Hamilton Airport, Victoria on 23 September 2013. These findings should not be read as apportioning blame or liability to any particular organisation or individual.

Contributing factors

- Following a go-around during night circuit consolidation training the aircraft departed controlled flight and collided with terrain.

Other factors that increased risk

- The pilot had an undiagnosed heart anomaly that predisposed him to a cardiac event and incapacitation.
- For reasons that could not be conclusively determined, the Civil Aviation Safety Authority was unaware of the student's prior treatment for attention deficit hyperactivity disorder, preventing its consideration and management of any ongoing safety risk associated with the condition.

Other findings

- Post-mortem examination was unable to completely exclude the possibility that the accident was precipitated by a cardiac event.

General details

Occurrence details

Date and time:	23 September 2013 – 1946 EST	
Occurrence category:	Accident	
Primary occurrence type:	Collision with terrain	
Location:	Near Hamilton Airport, Victoria	
	Latitude: 37° 38.37’ S	Longitude: 142° 04.14’ E

Aircraft details

Manufacturer and model:	Cessna Aircraft Company – 182R	
Registration:	VH-AUT	
Serial number:	18268111	
Type of operation:	Flight training - Solo	
Persons on board:	Crew – 1	Passengers – 0
Injuries:	Crew – 1 fatal	Passengers – 0
Damage:	Destroyed	

Sources and submissions

Sources of information

The sources of information during the investigation included:

- the aircraft operator
- the Civil Aviation Safety Authority (CASA)
- an attention deficit hyperactivity disorder medical specialist
- a number of witnesses
- the Bureau of Meteorology (BoM)
- the Victorian Institute of Forensic Medicine
- Victoria Police
- the Cessna Aircraft Company.

References

Newman, D. 2007 *An overview of spatial disorientation as a factor in Aviation accidents and incidents*. ATSB investigation report B2007/0063

Previc, FH & Ercoline, WR 2004, Spatial disorientation in aviation: Historical background, concepts and terminology, in FH Previc & WR Ercoline (Eds.) *Spatial disorientation in aviation*, Lexington MA, American Institute of Aeronautics and Astronautics, Inc, pp. 1–36.

Submissions

Under Part 4, Division 2 (Investigation Reports), Section 26 of the *Transport Safety Investigation Act 2003* (the Act), the 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 CASA, the aircraft maintainer and operator, the pilot’s next-of-kin and Designated Aviation Medical Examiners.

Submission were received from CASA, the aircraft operator and the pilot’s next-of-kin. The submissions were reviewed and where considered appropriate, the text of the draft report was amended accordingly.

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

Enquiries 1800 020 616
Notifications 1800 011 034
REPCON 1800 011 034
Web www.atsb. gov.au
Twitter @ATSBinfo
Email atsbinfo@atsb.gov.au

Investigation

ATSB Transport Safety Report
Aviation Occurrence Investigation

Loss of control and collision with terrain involving
Cessna 182 VH-AUT, Hamilton Airport, Victoria, 23 September 2013

AO-2013-163
Final – 7 May 2015