Australian Government
Australian Transport Safety Bureau

Collision with terrain involving Cirrus SR22, VH-CKS

Boxwood, Victoria, on 27 June 2013

ATSB Transport Safety Report
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Addendum

Page	Change	Date
5	Waypoint distance amended to 2 NM (4 km) in text and figure	12 October 2020

Safety summary

What happened

On 27 June 2013, a Cirrus SR22 aircraft, registered VH-CKS, collided with a tree that was adjacent to the private airstrip at Boxwood, Victoria. The pilot of the aircraft was attempting to land on the unlit airstrip after last light. As a result of the collision, the pilot lost control and the aircraft continued for a short distance before impacting terrain inverted. The pilot was fatally injured and the aircraft destroyed

Cirrus SR22 VH-CKS

Source: ATSB

What the ATSB found

The pilot was appropriately licensed to operate the visual flight rules category aircraft at night and had passed a number of airports in the vicinity, all of which were appropriate for a night landing. However, consistent with a degree of self-imposed pressure to get home after a series of business commitments and prior to a 1-month period away from home, the pilot bypassed these airports and continued to their property airstrip. This airstrip did not meet the physical, lighting and obstacle clearance requirements for night operations.

The final approach to land was made after last light, with a family member positioned in a motor vehicle ‘at the end of the strip’. The vehicle’s headlights were intended to illuminate the upwind end of the strip, facing the oncoming aircraft. However, this lighting was inadequate and provided insufficient guidance for the approach and landing. This increased the risk of a collision with terrain.

Safety message

Night landings at inadequately lit airstrips are inherently dangerous and increase the risk of a collision with terrain. The requirements for the conduct of operations at night, including lighting, pilot qualifications, aircraft equipment and systems and aerodrome equipment are intended to reduce this risk.

It is likely that, had these risk controls been given effect, this accident would not have happened.

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The occurrence

The pilot departed Moorabbin Airport, Victoria at 1723 Eastern Standard Time[1] on 27 June 2013 on a private flight in a Cirrus SR22 aircraft, registered VH-CKS. The night visual flight rules[2] flight was to an airstrip on a private property at Boxwood, about 40 km east-north-east of Shepparton Airport, Victoria.

A family member reported that at about 1750, the pilot made contact by mobile phone and advised where to position a vehicle on the airstrip to provide guidance for a landing. In accordance with the family member's understanding of those instructions, the vehicle was positioned at the western end of the airstrip facing east towards the aircraft's expected approach path. The vehicle's headlights were selected to high beam and flashed to ensure identification. The family member observed the aircraft's landing light travel from south to north before turning west towards the airstrip. During that period, mobile phone communication was maintained between the pilot and family member and the pilot confirmed that the vehicle headlights were visible. The conversation with the pilot was reported to be normal with no indication of any problems.

Last light[3] for Boxwood on 27 June 2013 was 1737. The private airstrip was not illuminated by fixed or portable lighting. The pilot attempted the approach and landing at about 1806-1808. There would have been no celestial light, such as from the moon, at that time.

As the aircraft approached the airstrip, the family member saw from the aircraft's landing light that the aircraft was not aligned with the extended runway centre-line. As the aircraft continued the approach the family member advised the pilot that the aircraft appeared to be too close to the trees north-adjacent to the airstrip. The pilot appeared to continue the approach until the aircraft collided with a tree adjacent to the airstrip. The aircraft rolled to the left and impacted terrain coming to rest inverted. The pilot was fatally injured and the aircraft destroyed.

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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 Last light is the time when the centre of the sun is at an angle of 6° below the horizon following sunset. At this time large objects are not definable but may be seen and the brightest stars are visible under clear atmospheric conditions. Last light can also be referred to as the end of evening civil twilight.

Context

Pilot information

The pilot held a Commercial Pilot (Aeroplane) Licence, a valid Command Instrument Rating (Single-engine aeroplanes) and a valid Class 1 Medical Certificate. This certificate required the pilot to wear distance vision correction and to have reading correction available during flight.

The pilot renewed his instrument rating on 25 May 2013. The pilot's application for renewal indicated that a significant proportion of his flying since his last renewal was at night, reportedly associated with business travel.

At the time of the accident, the pilot had accumulated a total of 633 flying hours, including 101 hours of night flying. The pilot had flown the accident aircraft for a total of 267 flight hours, 34 hours of which were at night. During the last 90 days the pilot accumulated 59 flying hours.

The pilot was reported to have intended to fly the aircraft to Boxwood for several days previous, but work commitments detained him in Melbourne. On return to Boxwood, the pilot was scheduled to depart on a 1-month period away from home.

The pilot's post-mortem examination and toxicological testing found no underlying factor that might have contributed to the accident.

Aircraft information

The Cirrus SR22 aircraft was manufactured in 2005, was appropriately registered and had a valid Certificate of Airworthiness and current aircraft Maintenance Release with no recorded defects. The aircraft was approved for instrument and night flight in the charter category, and had accumulated about 1,788 flight hours.

The aircraft was equipped with a factory-fitted advanced cockpit 'glass panel' instrument display that consisted of 2 Avidyne integrated flight displays (flat screens) mounted side-by-side (Figure 1). The left screen was referred to as the Primary Flight Display (PFD) and the more centrally mounted screen as the Multi-Function Display (MFD). The brightness of the screens is controlled manually for night operations.

Information displayed on these glass panel displays included from a Stormscope, Active Traffic Awareness, Jeppesen Chartview, an Embedded Terrain Awareness Warning System and a CMax engine and fuel monitoring system. Conventional analogue flight instruments were located on the lower left of the instrument panel and indicated the aircraft's airspeed, attitude and altitude.

The PFD screen was divided laterally to depict flight information on the upper part of the screen and azimuth information on the horizontal situation indicator, which formed the lower part of the display. Within this lower display, a horizontal deviation indicator displayed any left or right deviations from a selected course.

A vertical deviation indicator on the PFD directed the pilot to adjust the rate of descent in order to fly a constant descent path. This provided the pilot with a form of descent guidance between waypoints.

The MFD had a pilot checklist, approach chart and map function, which allowed the selection of chart images to show the aircraft's progress on a 'moving-map' display. The type, scale and orientation of these images could be selected manually by the pilot.

Figure 1: Aircraft instrument panel showing the Primary Flight Display (left screen), the Multi-Function Display (right screen) and analogue instruments during a daylight flight

Source: A pilot that had flown VH-CKS

Wreckage

The aircraft impacted terrain in a nose-down attitude of approximately 70°-90° with significant forward speed. Both wings were breached from impact forces and all of the remaining fuel on board leaked from the damaged integral wing fuel tanks. There was no evidence of fire (Figure 2).

An examination of the wreckage identified no pre-existing mechanical defect that may have contributed to the accident. Consistent with there being no report from the pilot of a problem with the aircraft, there was evidence that the engine was producing power prior to the impact.

Figure 2: Aircraft wreckage showing the trees adjacent to the airstrip, one of which was struck by the aircraft (looking back along the direction of the approach)

Source: ATSB

The aircraft's primary structure and flight control surfaces were identified at the accident site. Flight control continuity was established with no pre-impact defects identified. Furrowing of the horizontal stabilisers and elevators and impact damage to the elevator leading edges was consistent with their striking tree branches during flight. In addition, portions of tree branches were embedded in the lower centre wing section, between the left and right main landing gear.

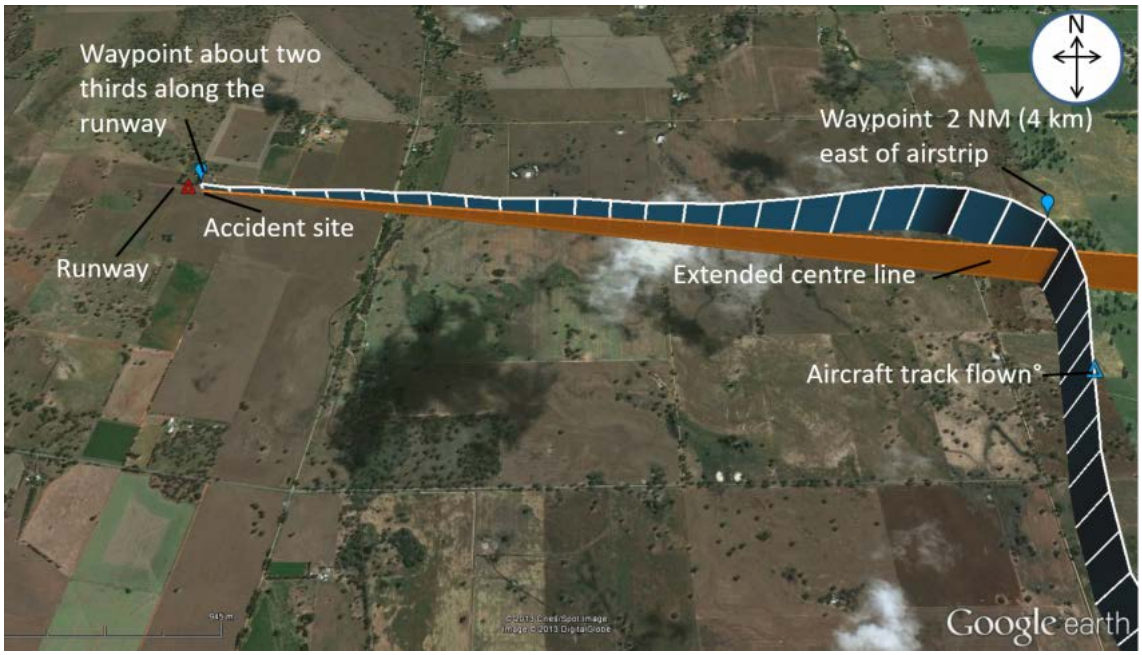
The aircraft's two batteries remained secure in the aircraft and had retained voltage. The instrument panel was severely disrupted and the MFD and PFD were liberated from the panel by impact forces. Both units included memory storage devices that stored engine and flight information and were recovered for examination in the Australian Transport Safety Bureau's technical facilities in Canberra, Australian Capital Territory.

Recorded electronic data

The MFD had a compact flash card and the PFD two non-volatile memory chips that recorded engine and flight information, including data from the flight to Boxwood that night. Data was downloaded from those devices with assistance from the United States National Transportation Safety Board.

The recovered flight information included the aircraft's speed, track, altitude and a number of engine parameters. The flight data also included a number of waypoints, including one on the extended runway centre-line about 2 NM (4 km) east of the airstrip, and another about two thirds along the runway (Figure 3).

Figure 3: Approach flight path



Source: Google Earth and GPS track data overlaid by ATSB

The recorded data showed that at 1806:08 the aircraft was at 1,600 ft above mean sea level on a northerly heading on what appeared to be a base leg. The aircraft was then turned onto about 267° for the final leg of the approach. The aircraft was flown through the 2 NM (4 km) waypoint before the turn, which positioned it to the north of the extended centre–line. This required a number of heading corrections by the pilot to regain track to the final waypoint. The aircraft maintained a steady descent path and airspeed of 93 kt toward the last waypoint.

At 1808:01, all recordings ceased, indicating the likely time of impact.

Weather

The nearest available Bureau of Meteorology aerodrome forecasts[4] were for Benalla and Shepparton Airports, 30 and 40 km respectively from Boxwood. The forecasts for those airports at the time of the pilot's arrival at Boxwood predicted partly cloudy conditions and nil wind.

Airstrip details

The airstrip was oriented in an approximately east–west direction. It was constructed from hard-packed earth and was about 760 m long with an upslope of 2°-3° in the direction of landing. There was rising terrain to the west of the strip and a power cable about 10 m above ground level situated about 200 m to the east of the strip. A line of trees north-adjacent and parallel to the strip was about 30 m (98 ft) high.

There were no markers or lighting associated with the airstrip.

It was reported that the pilot's previous landings at Boxwood were all in daylight. The airstrip did not conform to the physical dimensions for night operations as recommended in Civil Aviation Advisory Publication 92-1(1) *Guidelines for aeroplane landing areas*, nor did the single set of vehicle headlights meet the recommended minimum night lighting requirements.

[4] Aerodrome Forecasts are a statement of meteorological conditions expected for a specific period of time, in the airspace within a radius of 5 NM (9 km) of the relevant aerodrome.

In contrast, the aerodromes at Benalla and Shepparton were suitable night destinations for the flight. The pilot was reported to have previously landed at Benalla when returning to the Boxwood area after dark.

Safety analysis

Introduction

The aircraft was capable of normal operation until the collision with the tree. Similarly, there was no operational reason for the attempted night landing on the ill-equipped property airstrip when there was a suitable aerodrome 30 km away. This analysis will focus on the pilot's decision to continue the flight to, and attempt a night landing on the property airstrip.

Landing on an unlit airstrip at night

There were indications of a conscious decision by the pilot to land at their property's airstrip, knowing that the lighting was inadequate. Likely influencing the pilot was a degree of self-imposed pressure to get home after a series of business commitments and prior to a 1-month period away from home.

Given the decision to continue to the property airstrip, the pilot planned his final approach using two pre-selected waypoints and with vehicular headlights illuminating the airstrip. This contrasted with the pilot's recorded night flying experience, which showed that all previous night landings were on licenced aerodromes that were equipped with appropriate runway and obstruction lighting.

It was concluded that the pilot was either unaware of or accepted the risks associated with the night approach and landing at Boxwood. In addition to the influence of any self-imposed pressure to get home, the potential for the pilot to have accepted these risks may have also been influenced by confidence that his experience and ability, aircraft equipment and his local knowledge would be sufficient to conduct the landing.

Navigation

The approach was consistent with reliance by the pilot on the provision of lateral and vertical guidance from the course deviation and vertical speed indications on the aircraft's primary flight display. In this context, although the decent path was relatively constant, the turn onto final was commenced overhead the 2 NM (4 km) waypoint, resulting in the aircraft overshooting the extended centre-line. As a result, the aircraft was to the north of the intended track to the airstrip and required the pilot to track back to the centre-line during the remainder of the approach. This increased the risk that, given the inadequate lighting, the aircraft would strike the trees north-adjacent to the airstrip.

The use of Global Positioning System-derived waypoints for the final approach may have given the pilot a false sense of accuracy and an expectation that a single-point light source was adequate for the attempted night approach and landing. In contrast, the only means of judging the latter stages of the approach, flare and touchdown was by the aircraft's landing light. Together with the closer-than-recommended location of the trees to the runway, this sole reliance on the landing light increased the risk of the pilot not comprehending the trees in time to take avoiding action.

Findings

From the evidence available, the following findings are made with respect to the collision with terrain involving Cirrus SR22 aircraft, registered VH-CKS, which occurred at Boxwood, Victoria on 27 June 2013 and should not be read as apportioning blame or liability to any particular organisation or individual.

Contributing factors

- The pilot attempted a landing at Boxwood after last light, knowing that the lighting was inadequate.
- The single-point light from vehicle headlights did not provide adequate guidance for an approach and landing at night.
- The airstrip did not meet the physical and obstacle clearance requirements for night operations.

General details

Occurrence details

Date and time:	27 June 2013, 1807 Eastern Standard Time	
Occurrence category:	Accident	
Primary occurrence type:	Collision with terrain	
Location:	Boxwood, Victoria	
	Latitude: 36º 20.155’S	Longitude: 145º 47.121’E

Aircraft details

Manufacturer and model:	Cirrus Design Corporation SR22	
Registration:	VH-CKS	
Serial number:	1645	
Type of operation:	Private	
Persons on board:	Crew – 1	Passengers – Nil
Injuries:	Crew – 1(fatal)	Passengers – Nil
Damage:	Destroyed	

Sources and submissions

Sources of information

The sources of information during the investigation included:

- Airservices Australia
- the Bureau of Meteorology
- the Civil Aviation Safety Authority (CASA)
- the maintenance provider
- the United States National Transportation Safety Board (NTSB)
- the aircraft manufacturer
- a family member at Boxwood
- Victorian Police.

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 family member, the aircraft manufacturer, CASA and the NTSB.

Submissions were received from some of the parties to the investigation. The submissions were reviewed and where considered appropriate, the text of the report was amended accordingly

Australian Transport Safety Bureau

The Australian Transport Safety Bureau (ATSB) is an independent Commonwealth Government statutory agency. The Bureau 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 safety factors related to the transport safety matter being investigated. The terms the ATSB uses to refer to key safety and risk concepts are set out in the next section: Terminology Used in this Report.

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.