



Australian Government

Australian Transport Safety Bureau

Flight below the minimum safe altitude involving Fairchild SA227, VH-OZV

9 km east of Melbourne Airport, Victoria on 18 January 2021

ATSB Transport Safety Report

Aviation Occurrence Investigation - Short

AO-2021-003

Final – 25 June 2021

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

Publishing information

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Addendum

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Safety summary

What happened

On 18 January 2021, at 2029 Eastern Daylight-saving Time, a Sharp Airlines Fairchild SA227 aircraft, registered VH-OZV, departed Launceston Airport, Tasmania for a scheduled freight flight to Melbourne Airport, Victoria with one pilot on board.

At 2133, the aircraft was being positioned to commence a night-time Instrument Landing System approach to runway 27 at Melbourne. While joining the approach, a turn was not commenced until after the aircraft crossed the localiser track.

After crossing the localiser track and while descending along the approach glideslope, the aircraft descended clear of cloud and the pilot sighted the runway. At that time, the aircraft was positioned slightly less than full-scale on the course deviation indicator (CDI) to the right of, and tracking away from, the localiser track. From this position, the pilot elected to continue the approach visually. However, exacerbated by a prevailing southerly wind, the aircraft continued tracking away from the localiser and, shortly after, proceeded beyond the full scale of the CDI, requiring that a missed approach be initiated. Despite that, the pilot assessed that the visual approach could be continued.

The aircraft continued to deviate from the localiser track and at 2135, reached a maximum lateral deviation of 0.55 nautical miles. The pilot then turned the aircraft further to track toward the localiser while continuing to descend. At about the same time, the Melbourne Tower air traffic controller noticed the deviation and contacted the pilot.

At 2136, at about 980 ft above mean sea level (about 583 ft above ground level), the aircraft was re-established within full-scale CDI deflection and landed shortly after.

What the ATSB found

The ATSB found that during approach to the airport in darkness, the aircraft was not maintained within the required navigational tolerance. While that should have resulted in the conduct of a missed approach, the approach was continued with the aircraft manoeuvring significantly below the minimum safe altitude.

Safety message

Handling of approaches is one of the ATSB's [SafetyWatch](#) priorities. Adherence to operational procedures ensures consistency of pilot action and aircraft operation during the approach and landing phases of flight. This, along with careful monitoring of aircraft and approach parameters, provides assurance that an instrument approach can be safely completed.

Most importantly, if the criteria for safe continuation of an approach are not met, the pilot should conduct a missed approach to negate the risk of colliding with obstacles or terrain.

The investigation

Decisions regarding whether to conduct an investigation, and the scope of an investigation, are based on many factors, including the level of safety benefit likely to be obtained from an investigation. For this occurrence, a limited-scope 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 18 January 2021, at 2029 Eastern Daylight-saving Time,¹ a Sharp Airlines Fairchild SA227 aircraft, registered VH-OZV (Figure 1), departed Launceston Airport, Tasmania for a scheduled freight flight to Melbourne Airport, Victoria with one pilot on board.

Figure 1: VH-OZV



Source: Jayden Laing

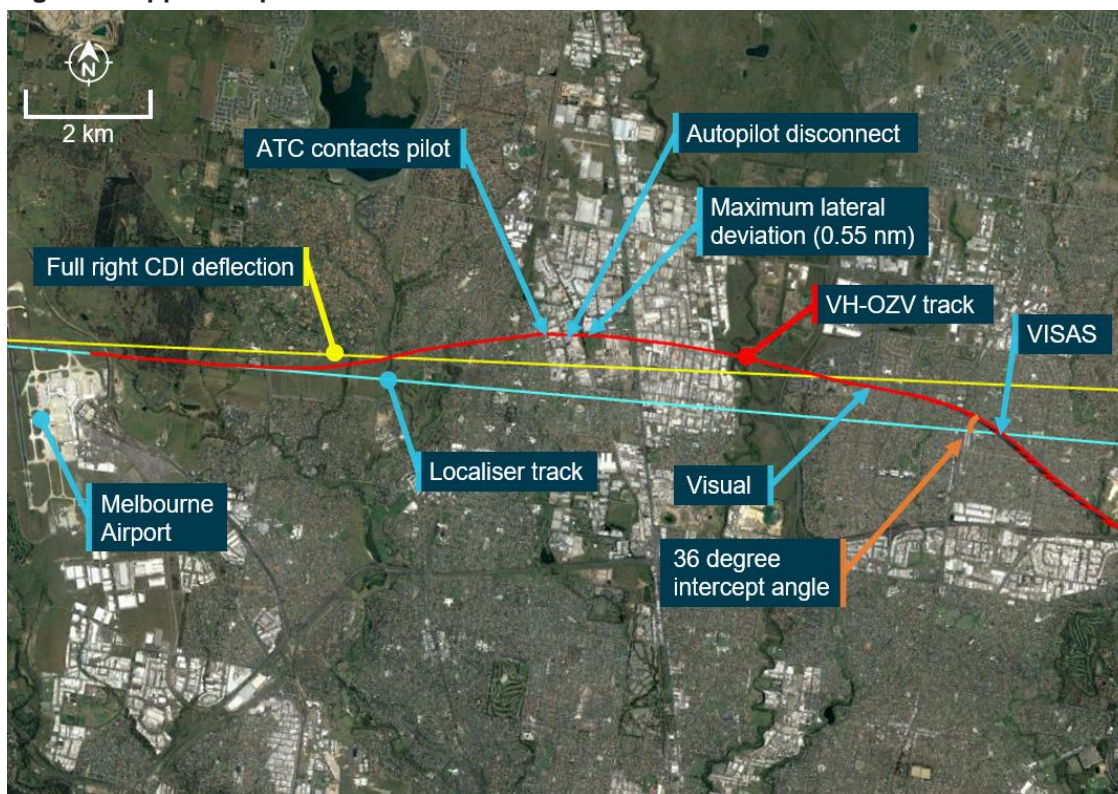
At 2122, the pilot commenced descending the aircraft in darkness from the cruising altitude prior to starting an Instrument Landing System (ILS) approach (see the section titled *Instrument landing system*) to runway 27 at Melbourne. During the descent, and prior to commencing the approach, the aircraft entered cloud.

At 2133, as the aircraft approached the ILS localiser track from the south-east, in preparation to intercept the localiser track, the pilot changed the autopilot mode from navigation (NAV) to heading (HDG).² The selected heading, in combination with the prevailing southerly wind, resulted in a 36° intercept angle of the ILS localiser track (Figure 2).

¹ Eastern Daylight-saving Time (EDT): Coordinated Universal Time (UTC) + 11 hours.

² In NAV mode, the autopilot system follows the lateral path commanded by the ILS localiser. When HDG mode is selected, the autopilot steers the aircraft according to a heading manually selected by the pilot.

Figure 2: Approach profile



Source: Google earth, annotated by the ATSB

The aircraft crossed the localiser track at the waypoint³ VISAS on a continuation of the intercept angle. After the aircraft crossed the localiser track, the pilot reselected NAV mode to commence the intercept and establish the aircraft on the inbound track. However, the autopilot-commanded turn toward the localiser track did not occur as quickly as the pilot anticipated so HDG mode was again selected with a commanded heading of 250° magnetic. Soon after selecting HDG mode, the aircraft approached the ILS glideslope. The pilot reported that the aircraft was still within half scale of the localiser course deviation indicator (CDI) so commenced descending along the glideslope and extended the landing gear.

Shortly after intercepting the glideslope, the aircraft descended clear of the cloud base at about 2,000 ft above mean sea level (AMSL) and the pilot sighted the runway. At that time, the aircraft was positioned slightly less than full-scale CDI deflection to the right of the localiser track and diverging away at an angle of about 9°. From this position, the pilot elected to continue the approach visually (see the section titled *Night visual approach criteria* and Figure 2). The pilot did not advise air traffic control (ATC) that the approach was continuing visually and was not cleared by ATC to conduct a visual approach. Had a visual approach clearance been provided, the pilot would have been required maintain the aircraft within full-scale CDI deflection and above the glideslope.

The aircraft continued tracking away from the localiser with the autopilot in HDG mode. Shortly after the pilot had elected to continue visually, about 6.8 NM from the runway 27 threshold, the aircraft proceeded beyond the full scale of the CDI. The pilot reported that they did not observe the CDI exceed full-scale deflection.

The aircraft continued to deviate from the localiser track. At 2135:17, the aircraft reached a maximum lateral deviation of 0.55 nautical miles (NM) and the pilot disconnected the autopilot to manually intercept the track. At about the same time, ATC personnel in both the Melbourne Airport

³ Waypoint: A defined position of latitude and longitude coordinates, primarily used for navigation

control tower and Melbourne air traffic control centre observed the aircraft deviating to the north of the localiser track. The tower controller notified the pilot of the deviation and the pilot responded 'adjusting'. A few seconds later, the aircraft reached a maximum angular deviation from the localiser track of 4.92° at about 1,680 ft AMSL.

The pilot then turned the aircraft further to track toward the approach track as it descended. At 2136:20, at about 980 ft AMSL (about 583 ft above ground level), the aircraft was re-established within full scale CDI deflection.

The aircraft did not significantly deviate from the ILS glideslope angle during the approach and landed at 2137:39. No defect with the autopilot system or navigation instrumentation was identified after the occurrence.

Meteorology

At 2130, shortly before the approach, the Bureau of Meteorology (BoM) automatic weather station at Melbourne Airport recorded the wind being 18 kt from 228° magnetic. Three cloud layers: Few⁴ at 2,034 ft, Scattered at 2,634 ft, and Broken at 3,634 ft AMSL were also present.

Instrument landing system

An Instrument Landing System (ILS) is an instrument approach procedure that provides lateral (localiser) and vertical (glideslope) position information necessary to align an aircraft with the runway for approach and landing. The system uses angular deviation signals from the glideslope antennas (located approximately 1,000 ft from the runway threshold) and the localiser antennas (located past the far end of the runway).

The localiser signals provide the angular deviation from the runway centreline, which in VH-OZV were presented as fly-left or fly-right commands on the CDI. A pilot or the autopilot (in NAV mode) follows these commands to track the localiser centreline. Localiser deviation was displayed in units of dots, where typically full-scale deflection (5 dots) equates to 105 m deviation from the localiser centreline at the runway threshold.

The glideslope signals provide the angular deviation from the nominal glideslope (usually 3°) which were presented as fly-up or fly-down commands on the glideslope indicator to follow the glideslope to the decision altitude.

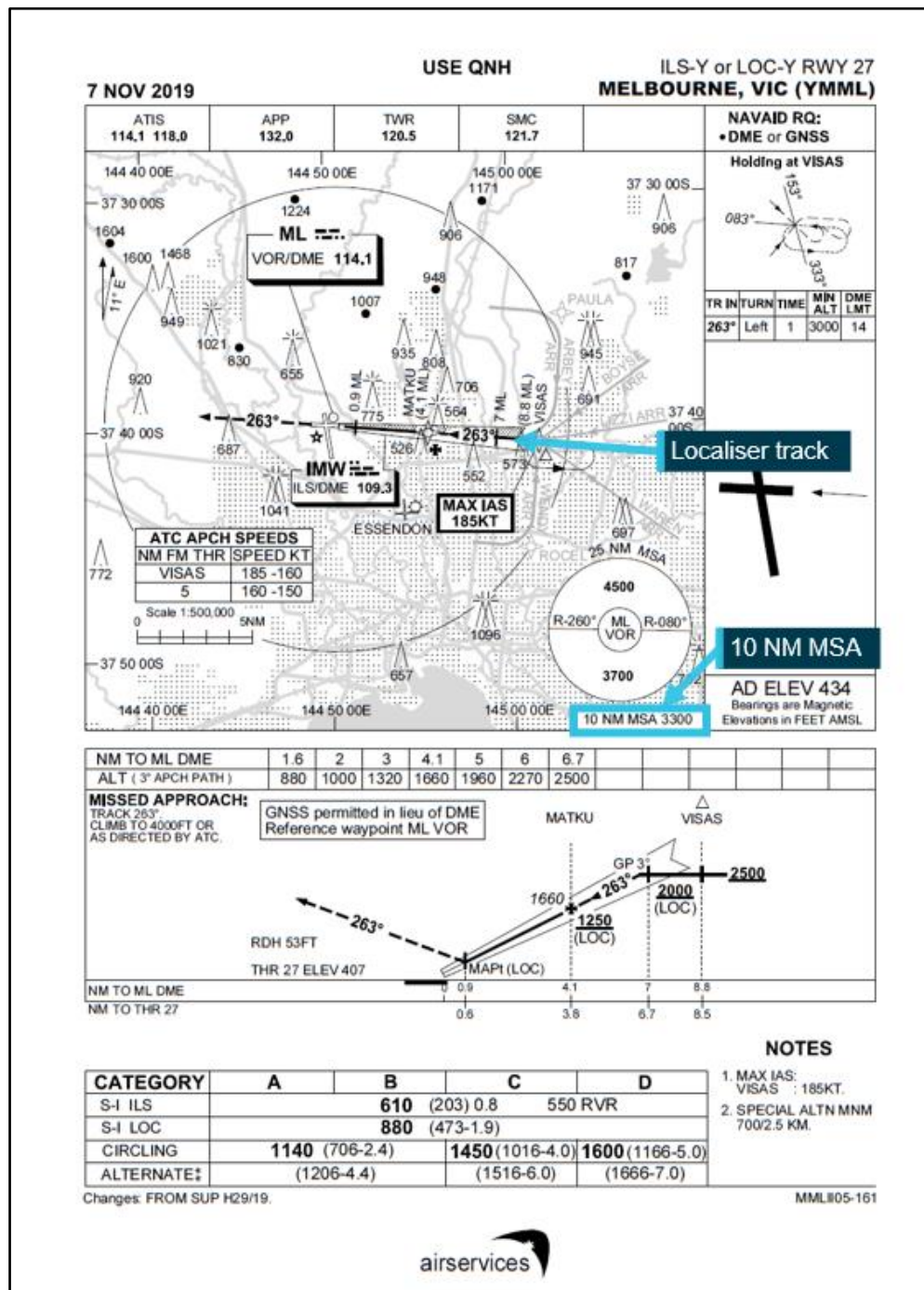
For both the localiser and glideslope, no additional deviation indications are provided beyond full scale indicator deflection.

Minimum sector altitude

The ILS approach chart (Figure 3) included minimum sector altitudes (MSAs) that provided a minimum terrain clearance of 1,000 ft above all objects located inside a defined area. Within a 10 NM radius of Melbourne Airport, the MSA was 3,300 ft AMSL.

⁴ Cloud cover: in aviation, cloud cover is reported using words that denote the extent of the cover – 'few' indicates that up to a quarter of the sky is covered, 'scattered' indicates that cloud is covering between a quarter and a half of the sky, 'broken' indicates that more than half to almost all the sky is covered, and 'overcast' indicates that all the sky is covered.

Figure 3: Melbourne Airport runway 27 ILS approach chart



Source: Airservices Australia

Night visual approach criteria

Relevant guidance for the conduct of an instrument approach at night in controlled airspace is provided in sections 1.1 and 1.5 of the [Aeronautical Information Publication \(AIP\) En Route:](#)

En Route 1.1:

- Paragraph 2.11.2.1 ATC Authorisation

Unless authorised to make a visual approach, an instrument flight rules (IFR) flight must conform to the published instrument approach procedure nominated by ATC.

- Paragraph 2.11.3.7 Minimum Altitude Requirements

During the conduct of a visual approach, a pilot must descend as necessary to:

...b. by night:

(1) for an IFR flight:

Maintain an altitude not less than the route segment MSA...until the aircraft is:

...within 10 NM of the aerodrome, established not below the ILS glide path with less than full scale azimuth deflection.

En Route 1.5:

- Paragraph 1.10 Missed Approach – Standard Procedures

(1) A missed approach must be executed if:

during the final segment of an instrument approach, the aircraft is not maintained within the applicable navigation tolerance for the aid in use.

Safety analysis

At about 2133, the aircraft was descending toward Melbourne Airport prior to commencing a night-time ILS approach to runway 27. The intercept of the ILS localiser track did not begin until after the aircraft had already crossed that track at an angle of about 36°. The southerly wind acting on the westbound aircraft resulted in it quickly deviating to the right of the localiser track.

While the aircraft continued deviating right of the track, as long as it was within the full-scale CDI deflection, the pilot was permitted to continue the ILS approach visually only with ATC authorisation. As this authorisation was not requested and provided, the pilot was required to adhere to the tracking tolerances of the ILS approach. Therefore, once the aircraft tracked beyond full-scale localiser CDI deflection, the pilot was required to conduct the published missed approach procedure.

The pilot reported that they did not observe the CDI exceed full-scale deflection, instead assessing that the visual approach could be continued. Continuing the approach took the aircraft significantly beyond the localiser tracking tolerance at altitudes as low as 980 ft AMSL (2,320 ft below the minimum sector altitude).

As the incident took place at night, the pilot's ability to visually identify obstacles was limited. The continuation of the night approach outside of the localiser tolerance and below the minimum sector altitude was contrary to the required approach requirements. This in turn removed obstacle clearance assurance, increasing the collision risk to the flight.

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 flight below minimum altitude involving Fairchild SA227, VH-OZV 9 km east of Melbourne Airport, Victoria on 18 January 2021.

Contributing factors

- During approach to the airport in darkness, the aircraft was not maintained within the required navigational tolerance. While that should have resulted in the conduct of a missed approach,

the approach was continued with the aircraft manoeuvring significantly below the minimum safe altitude.

Sources and submissions

Sources of information

The sources of information during the investigation included the:

- operator
- pilot
- Airservices Australia
- Bureau of Meteorology

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:

- operator
- pilot
- Airservices Australia
- Civil Aviation Safety Authority

No submissions were received on the draft report.

General details

Occurrence details

Date and time:	18 January 2021 – 2134 EDT	
Occurrence category:	Incident	
Primary occurrence type:	Flight below minimum altitude	
Location:	9 km east of Melbourne Airport, Victoria	
	Latitude: 37° 41.380' S	Longitude: 144° 56.770' E

Aircraft details

Manufacturer and model:	Fairchild Industries SA227-AC	
Registration:	VH-OZV	
Operator:	Sharp Airlines	
Serial number:	AC-610B	
Type of operation:	Charter - Freight	
Departure:	Launceston, Tasmania	
Destination:	Melbourne, Victoria	
Persons on board:	Crew – 1	Passengers – Nil
Injuries:	Crew – Nil	Passengers – Nil
Aircraft damage:	None	