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- safety data recording, analysis and research
- fostering safety awareness, knowledge and action.

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Collision with terrain, VH-DQP

Flinders Island, Tasmania

15 October 2010

Abstract

On 15 October 2010, the pilot of a Gippsland Aeronautics GA-8 Airvan, registered VH-DQP, was conducting a charter flight from Lady Barron, Flinders Island to Bridport, Tasmania with six passengers on board. The aircraft departed Lady Barron Aerodrome at about 1700 Australian Eastern Daylight-saving Time and entered instrument meteorological conditions (IMC) several minutes afterwards while climbing to the intended cruising altitude of about 1,500 ft. The pilot did not hold a command instrument rating and the aircraft was not equipped for flight in IMC. He attempted to turn the aircraft to return to Lady Barron Aerodrome but became lost, steering instead towards high ground in the Strzelecki National Park in the south-east of Flinders Island.

At about 1715, the aircraft exited cloud in the Strzelecki National Park, very close to the ground. The pilot turned to the left, entering a small valley in which he could neither turn the aircraft nor out climb the terrain. He elected to slow the aircraft to its stalling speed for a forced landing and, moments later, it impacted the tree tops and then the ground. The first passenger to exit the aircraft used the aircraft fire extinguisher to put out a small fire that had begun beneath the engine. The other passengers and the pilot then exited the aircraft safely. One passenger was slightly injured during the impact; the pilot and other passengers were uninjured.

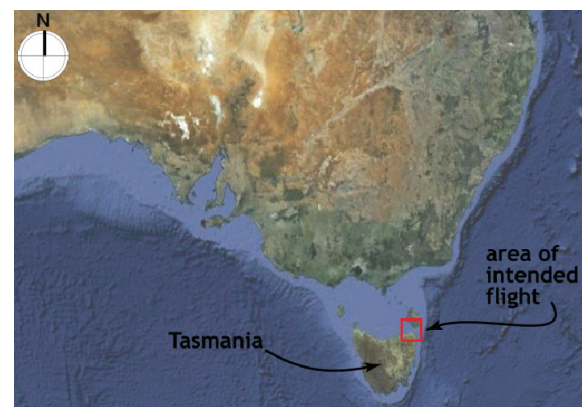
During the night, all of the occupants of the aircraft were rescued by helicopter and taken to the hospital in Whitemark, Flinders Island.

FACTUAL INFORMATION

History of the flight

On 15 October 2010, the pilot of a Gippsland Aeronautics GA-8 Airvan, registered VH-DQP, was conducting a charter flight from Lady Barron, Flinders Island to Bridport, Tasmania with six passengers on board. The aircraft departed Lady Barron Aerodrome at about 1700 Eastern Daylight-saving Time¹ for the 35-minute flight and impacted terrain in the Strzelecki National Park about 15 minutes later (Figure 1).

Figure 1: Area of the intended flight



It was the pilot's first flight of the day. He had been in regular contact with the passengers on

¹ The 24-hour clock is used in this report to describe the local time of day, Eastern Daylight-saving Time (AEDT), as particular events occurred. Eastern Daylight-saving time was Coordinated Universal Time (UTC) + 11 hours

Flinders Island during the morning and afternoon, while monitoring the weather to assess its suitability for flight to Bridport under the visual flight rules (VFR).

Shortly before departing, the pilot's assessment from the ground at Lady Barron was that the cloud base was 1,000 ft to 1,500 ft above mean sea level (AMSL). He also telephoned the operator's other pilot in Bridport for an update on the weather there and was told that it had 'improved substantially'. On that basis, the pilot decided that he could conduct a VFR flight to Bridport and departed via runway 15 at Lady Barron Aerodrome.

After takeoff, the pilot climbed to about 1,500 ft on the Lady Barron to Bridport track (Figure 2).

Figure 2: Intended track



During the climb, the weather conditions deteriorated to below those necessary for flight under the VFR. The pilot, who was not qualified to fly in instrument meteorological conditions (IMC),² reported that he was nevertheless concerned about adhering to an unwritten operator rule that he should not fly below 1,000 ft. He continued to climb into IMC instead of remaining visual below the cloud and lost all visual reference with the ground and horizon (Figure 3).

The pilot reported that he continued to fly in IMC for several minutes in the hope that he would climb above the cloud. When this did not happen, he decided to turn the aircraft back towards Lady Barron Aerodrome, initiating a gentle turn to the right. Despite not being instrument-rated, he succeeded in maintaining controlled flight with reference to the aircraft's flight instruments.

Figure 3: Indication of the conditions affecting the flight at 1705



Photo taken by a passenger on board the aircraft.

Although intending to turn through 180°, the pilot inadvertently steered a northerly course towards the high ground in the Strzelecki National Park. The passenger in the right pilot seat noted from the aircraft's Global Positioning System display that it was tracking north towards the settlement of Ranga (Figure 4), but did not realise the pilot was unaware of this.

² IMC describes weather conditions that normally require pilots to manoeuvre the aircraft primarily by reference to instruments, and therefore under Instrument Flight Rules (IFR), rather than by outside visual references under VFR. Typically, this means flying in cloud.

Figure 4: Estimated aircraft track



Visual reference to the ground was regained by the passengers when the aircraft crossed the coast of Flinders Island. The pilot reported that the workload was so high that his attention was wholly directed at the task of maintaining control of the aircraft and he continued to fly in a northerly direction. When the pilot finally became visual, he could see terrain directly before him and turned left. Moments later, he realized the aircraft was in a valley in which he could neither turn round nor out-climb the terrain. After 10 or 15 seconds, the pilot decided to conduct a forced landing into the tree tops, and slowed the aircraft to the stall speed to land at the slowest speed possible. The stall warning horn sounded, and the aircraft struck the trees and then the ground.

The pilot directed the passengers to exit through the front left door. A fire had started under the engine and was extinguished with the cockpit fire extinguisher by the first passenger to leave the aircraft.

The aircraft was seriously damaged³ by impact forces. One passenger sustained minor injuries and the pilot and other passengers were uninjured

The pilot and passengers were winched to safety by helicopter during the night and taken to the hospital in Whitemark on Flinders Island.

Personnel information

The pilot had held a Commercial Pilot (Aeroplane) Licence (CPL(A)) since February 2003. He held a Class 1 Aviation Medical Certificate that was valid until November 2010.

At the time of the accident, the pilot had accumulated 2,590 flight hours of which 2,460 hours were as pilot in command and 1,355 hours were in the GA-8 Airvan.

Aircraft information

The aircraft, a GA-8 Airvan serial number GA8-05-075, was manufactured in Australia by Gippsland Aeronautics Pty Ltd in 2005 (Figure 5). It was first registered in Australia in June 2005, and was registered to the operator on 27 July 2005. It was not equipped for flight under the instrument flight rules.

The pilots' seats were equipped with four-point safety harnesses that incorporated two shoulder straps and two waist straps. All of the passenger seats were equipped with three-point automotive-type restraint harness assemblies, with an inertia reel fitted to the shoulder strap.

Figure 5: VH-DQP



Photo courtesy of Flinders Island Aviation.

Meteorological information

The Bureau of Meteorology (BoM) reported that a cold front with an associated low pressure system moved across Flinders Island between 1100 and 1700 that day, with a moist south to south-west air stream established over the region in the wake of the front. That produced widespread cloud across Flinders Island, including at the site of the accident, prior to and at the time of the accident.

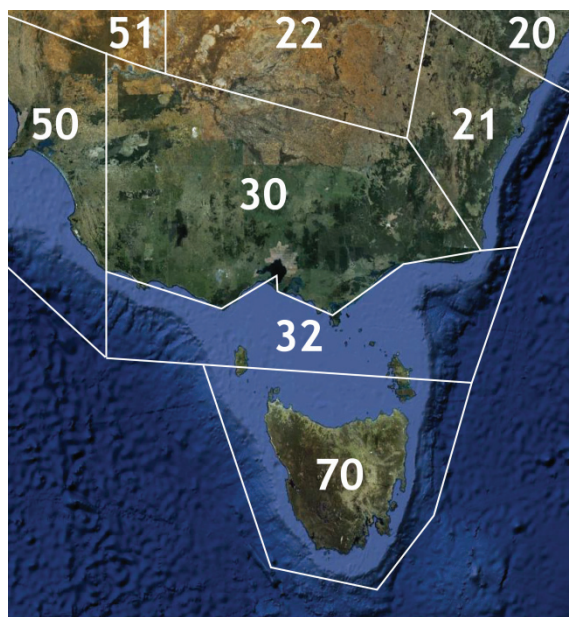
Observations from the Flinders Island automatic weather station at the Flinders Island Aerodrome

³ The *Transport Safety Regulations 2003* define 'serious damage' as including the 'destruction of the transport vehicle'.

showed there was a 'broken^[4] to overcast layer of low-level cloud with the [sic] bases between 300 ft and 1,100 ft above ground level (AGL) for a period of more than three hours prior to, and at the time of, the incident'. The BoM stated that, on the basis of the meteorological information available and the terrain at the accident site, broken to overcast cloud with a base of less than 1,000 ft AMSL was likely to have been present in the area at the time of the accident, and that the forecasts that had been issued by the BoM were generally consistent with the weather conditions recorded in the area.

The pilot accessed the National Aeronautical Information Processing System at 0659 and 1606 on the day of the flight, requesting the meteorological data for Area 70⁵ (Figure 6), and for Flinders Island and Launceston Aerodromes on both occasions.

Figure 6: Aviation weather forecast areas

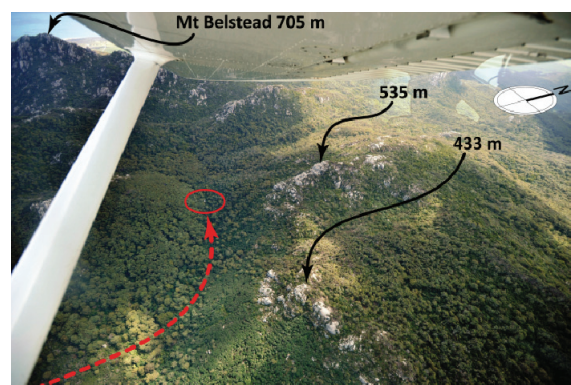


The area forecast (ARFOR)⁶ for area 70, valid from 1400 on 15 October 2010 until 0400 the following morning, indicated rain with reduced visibility and broken low-level cloud with a base of 500 ft AMSL on the windward coast and ranges. The wind at 2,000 ft was forecast to be from the south-west.

Flinders Island Aerodrome was about 17 km from the accident site. The aerodrome forecast⁷ for Flinders Island Aerodrome, valid from 1400 on 15 October 2010 until 0400 the following morning, indicated a mean visibility of 8,000 m in light rain showers with a broken layer of low cloud at 1,000 ft AGL. An INTER⁸ period was forecast from 1400 until 1900, during which the visibility was forecast to reduce to 4,000 m in moderate rain showers with a cloud base of 500 ft AGL. The flight took place during that period.

Wreckage and impact information

Figure 7: Accident site and approximate final track (indicated in red)



Background photo: The Examiner newspaper.

The aircraft impacted trees at about 1,150 ft (350 m) AMSL in the Strzelecki National Park, of which the highest point is 2,555 ft (779 m) AMSL.

4 Cloud amounts are reported in oktas. An okta is a unit of sky area equal to one-eighth of total sky visible to the celestial horizon. Few = 1 to 2 oktas, scattered = 3 to 4 oktas, broken = 5 to 7 oktas and overcast = 8 oktas.

5 For the purposes of providing aviation weather forecasts to pilots, Australia is sub-divided into a number of forecast areas. The intended flight was wholly contained in Area 70.

6 Forecasts for aircraft operations at or below Flight Level 200 (20,000 ft in the standard atmosphere).

7 Aerodrome forecasts (TAFs) are a statement of meteorological conditions expected for a specified period in the airspace within a radius of 5 NM (9 km) of the aerodrome reference point.

8 INTER is used to indicate changes expected to occur frequently for periods of less than 30 minutes duration, the conditions fluctuating almost constantly, between the times specified in the forecast.

The area was wooded with steep terrain (Figure 7).

The aircraft impacted trees at or just below its aerodynamic stall speed of about 64 knots⁹ and the aircraft's movement was slowed by the vegetation as it fell to the ground (Figure 8).

Figure 8: Aircraft wreckage



Photo taken by a passenger on board VH-DQP

VFR flight may only be conducted:

- a. in VMC;
- b. provided that, when operating at or below 2,000 ft above the ground or water, the pilot is able to navigate by visual reference to the ground or water;...

AIP ENR 2.5 *Non-Controlled Airspace - Class G* stipulated the following VMC conditions for VFR aeroplane operations in that airspace:

- below 10,000 ft AMSL, visibility 5 km or more, horizontal distance from cloud 1,500 m or more and vertical distance from cloud 1,000 ft or more
- at or below 3,000 ft AMSL or 1,000 ft AGL (whichever is higher), visibility 5 km or more and the aircraft is clear of cloud and within sight of the ground or water.

Organisational and management information

Aircraft operator

The operation comprised two VFR-only pilots operating two GA-8 Airvan aircraft and one Cessna Aircraft Co. 206 aircraft in charter and airwork around Tasmania and the islands of the Furneaux Group¹⁰.

The accident pilot reported that there was an unwritten operator rule that they were not to operate below 1,000 ft AGL.

Requirements for visual flight

The requirements for flight under the VFR were stipulated in Aeronautical Information Publication (AIP) ENR 1.2 *Visual flight rules* and included that:

Civil Aviation Regulations 1988

The requirements of Civil Aviation Regulation 157 *Low Flying* included that:

- (1) The pilot in command of an aircraft must not fly the aircraft over:
 - (a) any city, town or populous area at a height lower than 1,000 feet; or
 - (b) any other area at a height lower than 500 feet.
- ...
- (4) Subregulation (1) does not apply if:
 - (a) through stress of weather or any other unavoidable cause it is essential that a lower height be maintained; or...
 - (e) the aircraft is flying in the course of actually taking-off or landing at an aerodrome; or...

Additional information

Previous flight from Bridport to Flinders Island

On 13 October 2010, the pilot flew the passengers who were involved in the accident from Bridport to Flinders Island. Instead of landing at Lady Barron Aerodrome, bad weather had required the pilot to land 25 km to the north-west at Flinders Island Aerodrome. He reported that on that occasion, in order to remain in visual contact

⁹ The stall speed of the GA-8 Airvan is 64 knots at maximum take-off weight (1,814 kg) with wings level and flaps up. VH-DQP had a take-off weight of 1,813 kg and would have burned about 16 kg of fuel before the accident.

¹⁰ The islands of the Furneaux Group are situated at the eastern end of Bass Strait, between Victoria and Tasmania.

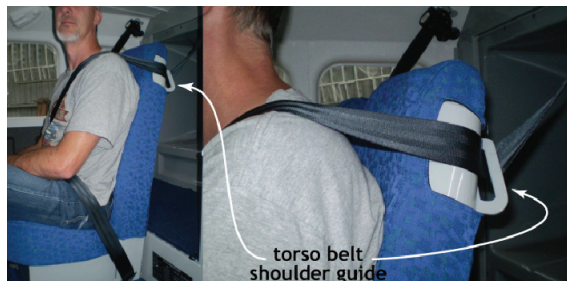
with the ground and water below cloud, he had maintained an altitude of about 500 ft AMSL during the final 20 km of the flight.

GA-8 Airvan seat and seat belt design

A key element of crashworthiness for the occupants of an aircraft is the occupant restraint system. The GA-8 Airvan occupant restraint system was designed to meet the requirements of United States (US) Federal Aviation Regulation 23.562, a standard that was introduced in the late 1990s, and dealt with dynamic seat testing and head impact criteria. The restraint system is configured to accommodate and restrain a wide range of occupant sizes from adults to children.

The GA-8 Airvan passenger seats were developed in conjunction with the Civil Aero Medical Institute in the US. The seats include a frangible base box, which crushes progressively to reduce vertical impact loads that may cause spinal injury, and a torso belt shoulder guide (Figure 9).

Figure 9: Passenger restraint harness assembly



Photos: Gippsland Aeronautics Pty Ltd.

The shoulder guide is designed to positively retain the occupant and to reduce torso belt loads on the occupant during impact by transferring loads into the seat structure itself.

The pilots' seats are rated to even higher standards.

ANALYSIS

The pilot was appropriately qualified to conduct operations under the visual flight rules (VFR). He was not, however, qualified to fly in instrument meteorological conditions (IMC) and the weather forecasts for Area 70 and Flinders Island Aerodrome indicated that the weather in the area was marginal or below the minimums for flight under the VFR.

The non-instrument-rated pilot's decision to enter and continue climbing in IMC because of the un-written operator rule to not fly below 1,000 ft above ground level was influenced by a desire not to repeat the circumstances of the flight from Bridport to Flinders Island Aerodrome two days previously. Had the pilot instead taken the same action as two days previously, and safely remained in visual contact with the ground or water after takeoff, he could have returned to land at Lady Barron Aerodrome visually, and the accident would not have occurred.

Once the pilot entered IMC, maintaining control of the aircraft by reference to the primary flight instruments alone entailed a very high workload. Due to that workload, and the associated narrowing of the pilot's attention, he was unable to concurrently maintain control of and navigate the aircraft, and he did not realise that he was flying directly towards high ground. It was only the fact that the aircraft exited cloud before it collided with the rising terrain that allowed the pilot to make a forced landing.

The design of the aircraft's seats, and the provision to passengers in the GA-8 Airvan of three-point automotive-type restraint harnesses with inertia reel should straps contributed to the passengers' survival, almost without injury.

FINDINGS

Context

From the evidence available, the following findings are made with respect to the collision with terrain involving Gippsland Aeronautics GA-8 Airvan aircraft, registered VH-DQP, on Flinders Island, Tasmania on 15 October 2010. They should not be read as apportioning blame or liability to any particular organisation or individual.

Contributing safety factors

- The weather was marginal for flight under the visual flight rules, with broken cloud forecast down to 500 ft above mean sea level in the area.
- The pilot, who did not hold a command instrument rating, entered instrument meteorological conditions because he was

adhering to an un-written operator rule not to fly below 1,000 ft above ground level.

- The pilot became lost in cloud and flew the aircraft towards the Mt Strzelecki Range, exiting the cloud in very close proximity to the terrain.
- The aircraft exited the cloud in a small valley, within which the pilot could neither turn round nor out-climb the terrain.

A draft of this report was provided to the pilot and operator of DQP, the BoM and the Civil Aviation Safety Authority. Submissions from those parties were reviewed and, where considered appropriate, the text of the draft report was amended accordingly.

Other key findings

- The aircraft exited cloud before impacting terrain and with sufficient time for the pilot to execute a forced landing.
- The design of the aircraft's seats, and the provision to passengers in the GA-8 Airvan of three-point automotive-type restraint harnesses with inertia reel shoulder straps contributed to the passengers' survival, almost without injury.

SOURCES AND SUBMISSIONS

Sources of Information

The sources of information during the investigation included:

- the pilot and passengers of VH-DQP (DQP)
- the operator of DQP
- the passengers
- the pilot of the search and rescue helicopter
- the Bureau of Meteorology (BoM)
- Southern Cross TV Tasmania
- The Examiner newspaper.

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.