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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

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Significant wind change during takeoff involving Boeing 737, VH-VZL

What happened

On 4 December 2012, at about 1618 Western Standard Time[1], a Qantas Airways Boeing 737-838 aircraft, registered VH-VZL (VZL), was taking off on runway 06 at Perth Airport, Western Australia on a flight to Canberra, Australian Capital Territory. The captain was the pilot not flying and the first officer was the pilot flying.

During the take-off run, approaching the take-off reference speeds[2] of V_1[3] and V_R[4], the airspeed stopped increasing and did not start increasing again for several seconds. The captain noticed that the wind vector on the navigation display was showing a tailwind[5] of about 20-25 kt. The captain disconnected the auto-throttle and 'fire-walled'[6] the thrust levers. During the initial climb, the first officer performed a windshear[7] escape manoeuvre.[8]

While there was some cumulonimbus cloud[9] activity about 20–30 NM north of the airport, there were no indications of an impending wind change before takeoff.

After takeoff, the crew advised air traffic control (ATC) that they had experienced a significant tailwind component of about 20 kt during the take-off run. ATC advised the next aircraft due to depart from runway 06 that there was now a threshold wind of 060°T at 10 kt and a centre-field wind of 280°T at 15 kt. Takeoffs were then temporarily suspended from runway 06 and aircraft departed using runway 03.

Automatic terminal information service (ATIS)[10]

ATIS 'Delta', issued at 1613:12, was current and monitored by the crew before the aircraft lined-up for takeoff. This gave the wind direction as 060°M and the wind speed as 8 kt. For a takeoff on runway 06 this was a direct headwind of 8 kt. The temperature was 37°C and conditions were CAVOK[11].

Take-off performance

The aircraft was equipped with two CFM56-7B24/3 engines, which enabled takeoffs to be planned up to a maximum thrust of 24,200 lbs (24K). In addition, during takeoff, there was a 'take-off bump' feature where 'fire-walling' the thrust levers could temporarily provide 27,300 lbs (27K) thrust irrespective of whether a 24K thrust setting had been selected.

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1 Western Standard Time (WST) was Coordinated Universal Time (UTC) + 8 hours.

2 Take-off reference speeds or V speeds assist pilots in determining when a rejected takeoff can be initiated, and when the aircraft can rotate, lift off and climb.

3 V_1: the critical engine failure speed or decision speed. Engine failure below this speed shall result in a rejected takeoff; above this speed the take-off run should be continued.

4 V_R: the speed at which the aircraft rotation is initiated by the pilot.

5 Although the wind data displayed on the navigation display is considered to be inaccurate while the aircraft is on the ground, it can still give an indication of whether there is a headwind or tailwind component.

6 The thrust levers were pushed forward to their mechanical stops.

7 Windshear is a change of wind speed and/or direction over a short distance along the flight path.

8 The windshear escape manoeuvre is a memory item which required the flight crew to carry out the procedure from memory.

9 Thunderstorms are associated with cumulonimbus cloud.

10 ATIS: An automated pre-recorded transmission indicating the prevailing weather conditions at the airport and other relevant operational information for arriving and departing aircraft.

11 CAVOK: ceiling and visibility OK, meaning that visibility, cloud and present weather were better than prescribed conditions. For an aerodrome weather report, those conditions are visibility 10 km or more, no significant cloud below 5,000 ft or cumulonimbus cloud and no other significant weather within 9 km of the aerodrome.

An electronic flight bag (EFB) was used by the crew for take-off performance calculations. For an aircraft gross take-off weight of 66.1 tonnes, nil wind and an air temperature of 37°C, a takeoff on runway 06 could be performed using a 24K thrust setting, no assumed temperature[12] and a flap setting of 5 degrees. The take-off speeds V_1, V_R and V_2[13] were 137, 139 and 144 kt respectively.

Windsocks

There were three windsocks at Perth Airport (Figure 1); however, there was no windsock near the threshold of runway 06. Before takeoff, the captain observed that windsock 1 was indicating a headwind component. The first officer also confirmed that windsock 2 was showing a headwind component. Any headwind component was acceptable for takeoff as the performance figures had assumed nil wind.

Figure 1: Take-off path and windsock locations

Source: Google Earth

Onboard windshear detection systems

The aircraft was equipped with predictive and reactive windshear detection systems. The predictive system used the aircraft's weather radar system to detect windshear prior to the aircraft

[12] An assumed temperature is a temperature higher than ambient, which causes the engine control system to reduce the amount of thrust the engines deliver, thereby reducing the wear on the engines.

[13] V_2: the minimum speed at which a transport category aircraft complies with those handling criteria associated with climb, following an engine failure. It is the take-off safety speed and is normally obtained by factoring the stalling speed or minimum control (airborne) speed, whichever is the greater, to provide a safe margin.

entering the windshear and automatically began scanning when the thrust levers were set for takeoff. New warnings were inhibited after the aircraft reached 100 kt until it was over 50 ft above ground level.

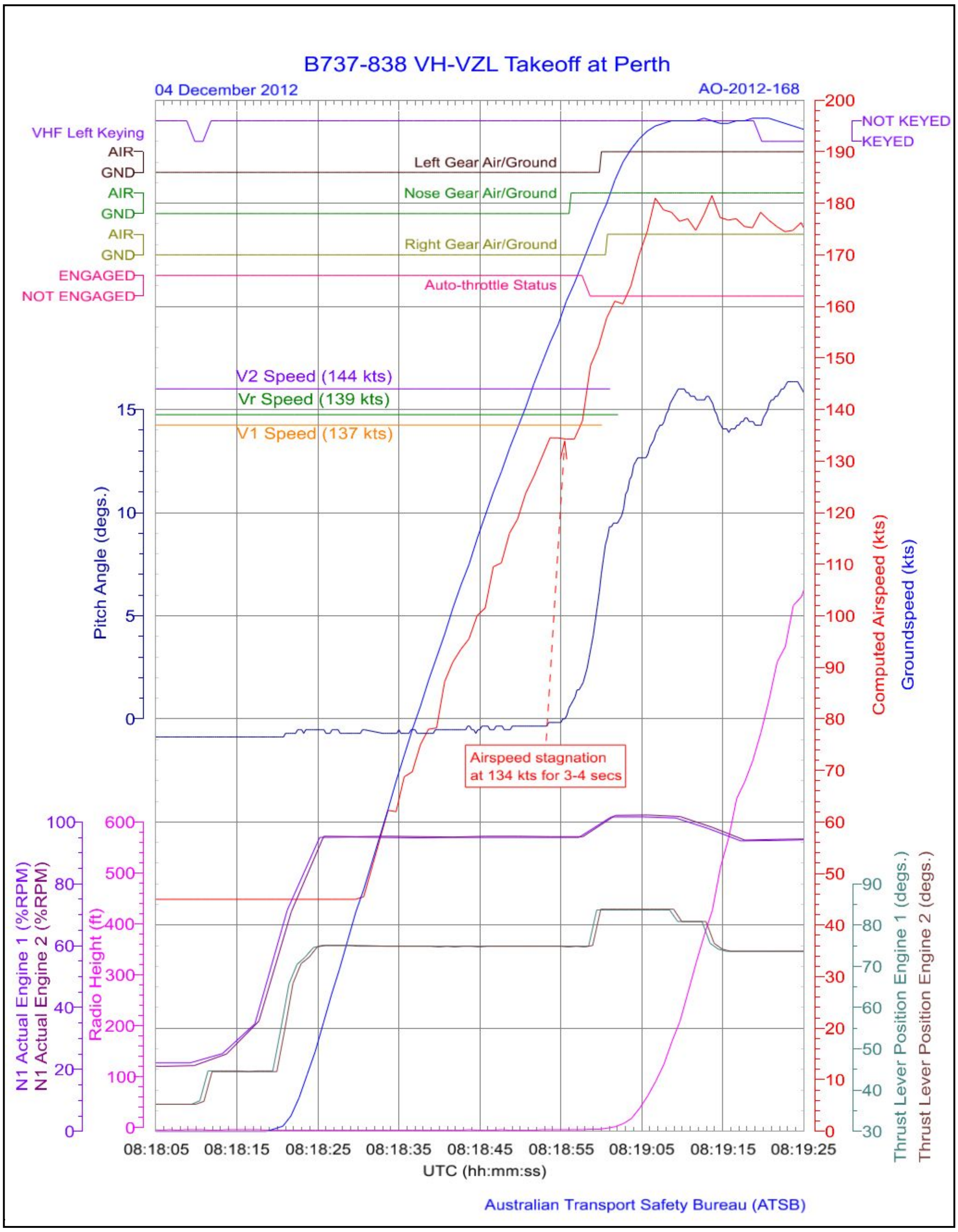
The reactive system used the aircraft's ground proximity warning system to detect when the aircraft was actually experiencing windshear. Detection began at rotation.

No windshear warnings were received by the crew.

Recorded flight data

Quick access recorder (QAR) data was obtained from the operator and analysed by the ATSB (Figure 2). The data showed that the airspeed stagnated[14] at 134 kt for 3-4 seconds just below the V_1 speed of 137 kt, the auto-throttle was disconnected and maximum thrust was set.

Figure 2: QAR data



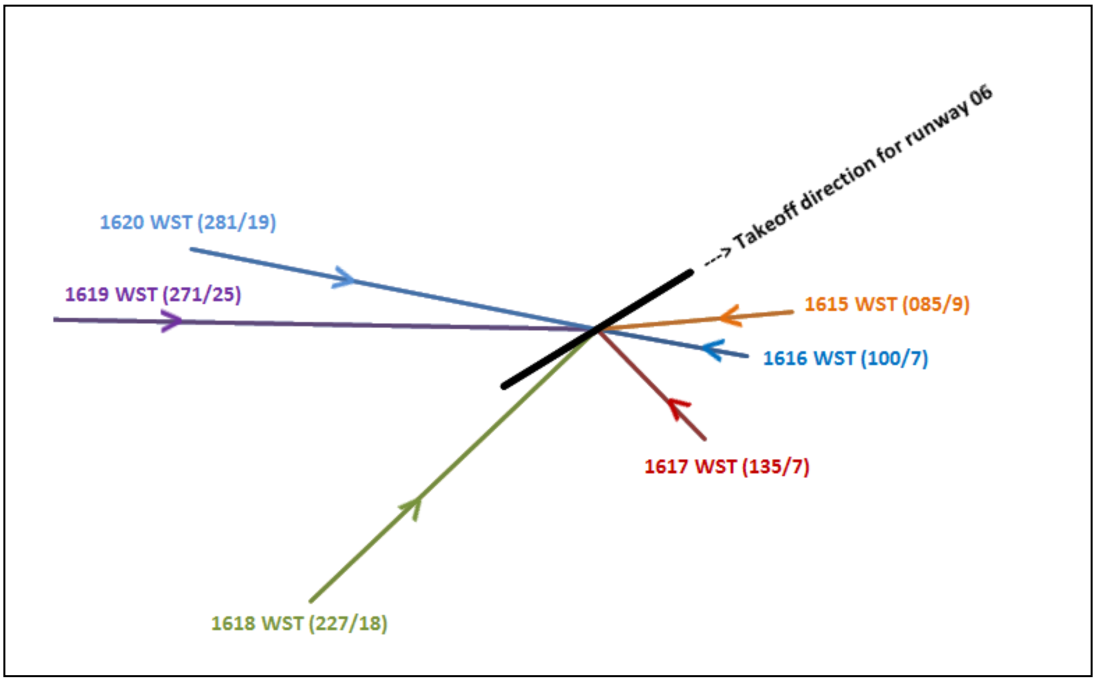
14 The airspeed was a function of groundspeed and wind speed/direction. As the groundspeed was smoothly increasing, any airspeed fluctuations were a result of wind speed/direction fluctuations.

Just after the aircraft became airborne, the wind was recorded at 282°T and 25 kt. No windshear warnings were recorded. Recorded latitude, longitude and radio altitude data showed that the aircraft passed over the end of runway 06 (threshold of runway 24) at a height of about 10 ft above ground level.

Recorded wind information

The Bureau of Meteorology (BoM) provided one minute wind readings from their airport anemometer. The anemometer was located near the northern end of runway 06 (Figure 1). The maximum wind gusts during the one minute periods around the time of takeoff are shown to scale in Figure 3. The wind direction value is averaged over a one minute period. Wind values are given in wind direction/wind speed format in units of °T/kt.

Figure 3: BoM anemometer data – maximum wind gusts



Source: BoM

The anemometer experienced a significant wind change at 1618 that would have resulted in tailwind conditions at least near the northern part of runway 06.

ATSB comment

Before takeoff, both pilots checked the windsocks, which showed that headwind conditions existed. Late in the take-off run, a significant wind change occurred and the aircraft began to experience tailwind conditions of about 20 kt. As the performance calculations had assumed nil wind for takeoff, the aircraft failed to achieve the predicted take-off performance.

Safety message

This incident serves as a reminder to pilots that significant wind changes can occur during takeoff, can be difficult to predict, and can occur in the absence of thunderstorm activity. The wind conditions at each end of a runway may differ significantly so that headwind conditions can exist at one end and tailwind conditions at the other end.

Although it did not assist in this case, it is important to monitor the available windsocks before takeoff as it is the final opportunity to detect wind changes before the take-off roll begins.

The Flight Safety Foundation, approach and landing accident reduction toolkit contains information on awareness, avoidance and recognition of windshear, as well as recovery procedures. It is available at; www.flightsafety.org/files/alar_bn5-4-windshear.pdf

Aircraft details

Manufacturer and model:	The Boeing Company 737-838	
Operator:	Qantas Airways	
Registration:	VH-VZL	
Type of operation:	Air transport - high capacity	
Location:	Perth Airport, Western Australia	
Occurrence type:	Environment - weather	
Occurrence category:	Serious incident	
Persons on board:	Crew – 7	Passengers – 99
Injuries:	Crew – Nil	Passengers – Nil
Damage:	Nil	

Turboprop aircraft

Aircraft proximity event between a Piper PA-28, VH-PZK and a Cessna 441, VH-VEJ

What happened

Rottnest Island, WA

Source: Google Earth

On 23 September 2012, a Cessna 441 aircraft, registered VH-VEJ (VEJ), was conducting flight safety checks[1] at a number of aerodromes in south-west Western Australia, including Rottnest Island. The flight safety checks required VEJ to conduct approaches to both duty and non-duty runways and to descend below the minimum altitudes. At Rottnest Island, the pilot of VEJ made all the necessary broadcasts on the common traffic advisory frequency (CTAF)[2].

On the same day, the pilot of a Piper PA-28 aircraft, registered VH-PZK (PZK), conducted a scenic flight from Jandakot, through the Perth Control Zone, to Rottnest Island with three passengers. PZK's radios were fully serviceable for the departure from Jandakot and through the Perth Control Zone. After conducting an orbit of the Island, the pilot of PZK joined the circuit for runway 09, the runway favoured by the wind and in use by other aircraft. At the same time, VEJ was conducting an approach to runway 27, the reciprocal runway.

At 1221 Western Standard Time[3], as PZK approached the threshold for runway 09 at about 200 ft above mean sea level, the pilot observed an aircraft about 650 m ahead on the reciprocal heading at the same level. As the pilot of PZK initiated a sharp right turn, he observed the other aircraft also turn right (Figure 1). The other aircraft was later identified as VEJ. The lateral distance between the aircraft reduced to 0.2 NM.

The pilot of PZK then realised that, although he had earlier observed an aircraft depart from runway 09, he had not heard any radio broadcasts on the Rottnest Island CTAF. The pilot checked PZK's radio plugs and cables, and ensured that he had the correct frequency selected, but could still not hear any broadcasts. The pilot of PZK then conducted a number of orbits of the Island, broadcasting his intentions as required, prior to landing on runway 09 without further incident. VEJ conducted a number of other missed approaches to both runways before landing on runway 09 without further incident.

After shutting the aircraft down, the pilot of PZK liaised with another pilot and, after restarting PZK, conducted a successful radio check. On the return flight to Jandakot later in the day, PZK's radio was fully serviceable. The aircraft operator checked PZK's radios and found no fault. The pilot of PZK later reported that he had made all the necessary CTAF broadcasts at Rottnest Island.

Pilot comments (VH-PZK)

The pilot of PZK later stated that if a Notice to Airmen (NOTAM)[4] had been issued on the flight safety check flight, he would not have amended his flight plan, but would have been aware of the

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1 The checks are conducted for the Civil Aviation Safety Authority to make sure flight paths at aerodromes continue to be safe. A series of low level flights will be undertaken at each aerodrome to check the flight paths. This will ensure that navigational aids are operational and not suffering interference, as well as looking for any new obstacles.

2 The CTAF is the radio frequency on which pilots operating at a non-towered aerodrome should make positional radio broadcasts.

3 Western Standard Time (WST) was Coordinated Universal Time (UTC) + 8 hours.

4 NOTAMs are used to advise pilots of hazards and provide information that is of direct operational significance.

potential for non-standard operations on his arrival at Rottnest Island. The pilot of PZK had checked the NOTAMs on the evening prior to the flight and again on the morning of the flight.

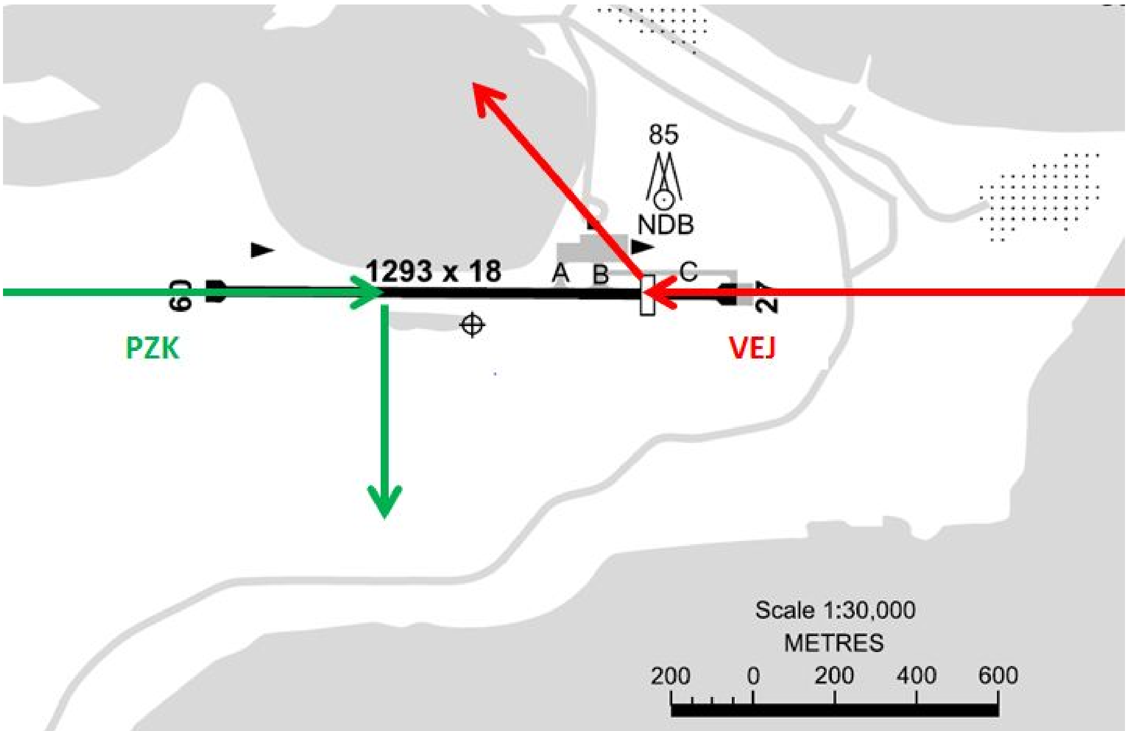
Notification of the flight safety check flights

The flight safety checks were conducted on behalf of the Civil Aviation Safety Authority (CASA). The crew of VEJ were responsible for coordinating the flight check with aerodrome operators and CASA was responsible for communicating with aircraft operators. CASA issued a '… standard press release that was posted on [their] website …' and the information '… was also tweeted on twitter however no NOTAM was issued nor were any newspaper advertisements made.'

The pilot of VEJ had submitted a flight plan for Rottnest Island stating that the flights were for navigation aid validation. When pilots requested traffic information for the Rottnest area from Perth Centre air traffic control (ATC), they were advised of the flight safety check flight. However, the pilot of PZK did not request traffic information prior to changing from the Perth Centre frequency to the CTAF, nor was he required to do so. Following the incident, while the pilot of PZK was attempting to find the cause of the aircraft's radio problem, he contacted Perth Centre and was given traffic on VEJ.

The CASA *Western Australia aerodrome flight safety checks* media release is available here at www.casa.gov.au/scripts/nc.dll?WCMS:STANDARD::pc=PC_101069

Figure 1: Estimated track of VH-PZK (green) and VH-VEJ (red)



Source: Underlying image from Airservices Australia

Safety action

Whether or not the ATSB identifies safety issues in the course of an investigation, relevant organisations may proactively initiate safety action in order to reduce their safety risk. The ATSB has been advised of the following proactive safety action in response to this occurrence.

Aircraft operator

As a result of this occurrence, the aircraft operator of VEJ advised the ATSB that they will not conduct flight safety check flights during busy periods at non-towered aerodromes.

Civil Aviation Safety Authority

In conjunction with the aircraft operator of VEJ, CASA will ensure a NOTAM is issued for future flights to promulgate information applicable to this type of operation.

Safety message

When operating outside controlled airspace, it is the pilot's responsibility to maintain separation with other aircraft. For this, it is important that pilots utilise both alerted and unalerted see-and-avoid principles.

Pilots should not assume that an absence of traffic broadcasts means an absence of traffic. CASA have published a number of Civil Aviation Advisory Publications (CAAPs) dealing with operations at non-towered aerodromes and the importance of not relying solely on radio broadcasts for traffic advice.

The following publications provide useful information on radio use and the limitations of see-and-avoid.

- Civil Aviation Advisory Publication 166-1(0) – *Operations in the vicinity of non-towered (noncontrolled) aerodromes* is available at www.casa.gov.au/wcmswr/_assets/main/download/caaps/ops/166-1.pdf
- Civil Aviation Advisory Publication 166-2(0) – *Pilots' responsibility for collision avoidance in the vicinity of non-towered (non-controlled) aerodromes using 'see-and-avoid'* is available at www.casa.gov.au/wcmswr/_assets/main/download/caaps/ops/166-2.pdf
- Civil Aviation Advisory Publication 5-59(1) – *Teaching and Assessing Single-Pilot Human Factors and Threat and Error Management* is available at www.casa.gov.au/wcmswr/_assets/main/download/caaps/ops/5_59_1.pdf
- *Limitations of the see-and-avoid principle* (1991) is available at www.atsb.gov.au/publications/2009/see-and-avoid.aspx
- *A pilot's guide to staying safe in the vicinity of non-towered aerodromes* (AR-2008-004(1)) is available at www.atsb.gov.au/publications/2008/ar-2008-044(1).aspx
- *Pilots' role in collision avoidance* (Federal Aviation Administration Advisory Circular AC 90-48C) is available at www.rgl.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/list/AC%2090-48C/$FILE/AC90-48c.pdf

General details

Occurrence details

Primary occurrence type:	Airprox	
Occurrence category:	Serious incident	
Location:	Rottnest Island, Western Australia	
	Latitude: 32° 00.40' S	Longitude: 115° 32.38' E

Piper PA-28-161

Manufacturer and model:	Piper Aircraft Corporation PA-28-161	
Registration:	VH-PZK	
Type of operation:	Private	
Persons on board:	Crew – 1	Passengers – 3
Injuries:	Crew – Nil	Passengers – Nil
Damage:	None	

Cessna 441

Manufacturer and model:	Cessna Aircraft Company 441	
Registration:	VH-VEJ	
Type of operation:	Aerial work	
Persons on board:	Crew – 3	Passengers – 0
Injuries:	Crew – Nil	Passengers – Nil
Damage:	None	

Aircraft proximity event between a Beech B200C, VH-AMQ and a Ventus glider, PH-1234

What happened

A Schempp-Hirth Ventus 2cT

Source: Michael Clarke

On 6 January 2013, at about 1402 Eastern Daylight-saving Time,[1] a Hawker B200 aircraft, registered VH-AMQ (AMQ), was inbound to Griffith from Sydney, New South Wales, on an aero-medical retrieval flight. Onboard the aircraft were the pilot and a flight nurse.

When 25 NM to the east of Griffith, the pilot of AMQ broadcast his position and intentions on the Griffith common traffic advisory frequency (CTAF). At that time, the aircraft was descending through 8,500 ft and tracking for a straight-in approach using the runway 24 area navigation global naviation satellite system (RNAV (GNSS)) approach. The pilot advised he would call again when closer to the airport.

The pilot of a Schempp-Hirth Ventus glider, with the Netherlands registration of PH-1234 (1234), replied to AMQ's broadcast, advising that he was12 NM east of the airport, at 3,300 ft, and tracking to the north. At that time, 1234 was pursuing a thermal along the Cocoparra Range, east of Griffith, which lies almost at right angles to the RNAV approach for runway 24 (Figure 1).

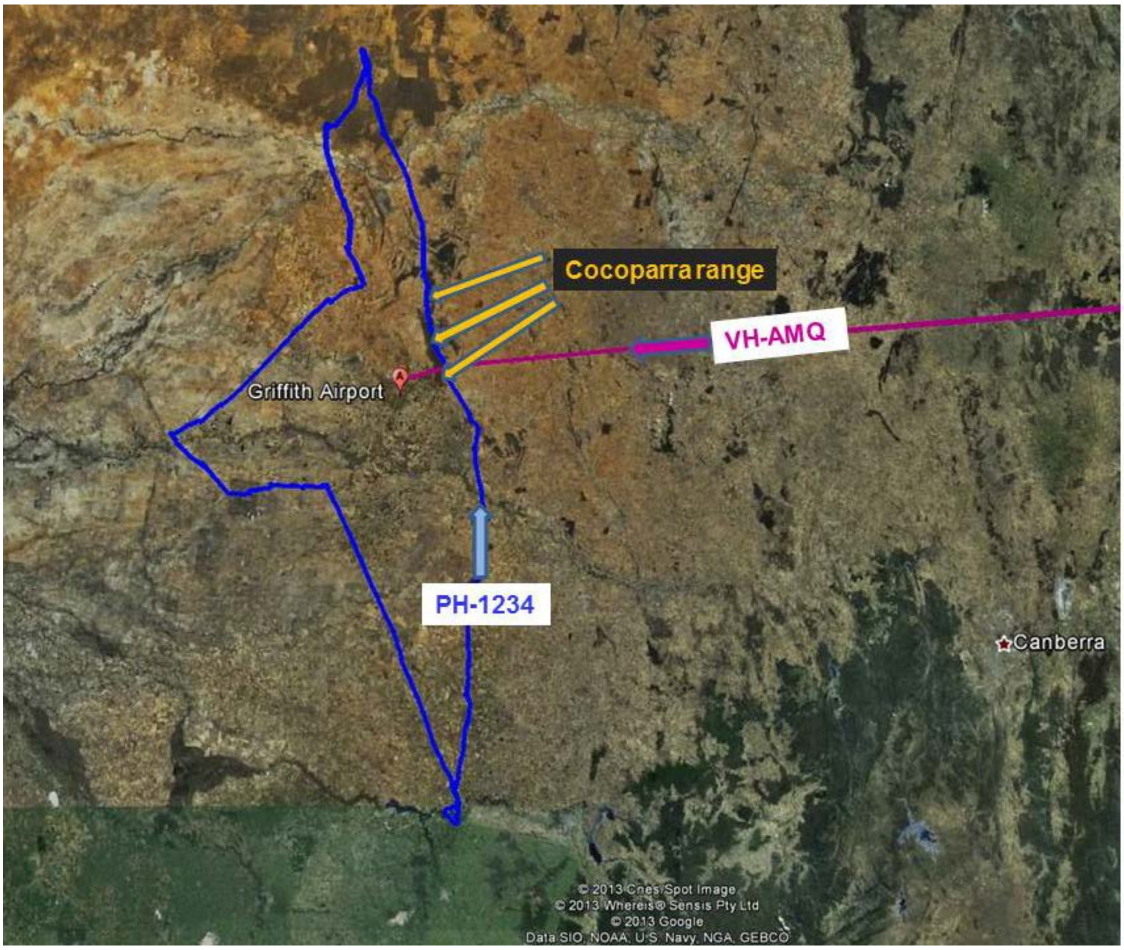
Several fire-bombing aircraft landing and taking off from both runway 06 and 24 were also broadcasting on the CTAF. These aircraft were being coordinated by a ground-controller also on frequency.

After clarifying the number of fire-bombing aircraft, the pilot of AMQ broadcast on the CTAF when 13 NM to the east, descending through 4,500 ft, and requested 1234's current position. Another glider, VH-HDE, from a group of over 30 involved in a friendly competition transitting the area, responded that he was at about 5,000 ft.

Shortly after, the pilot of AMQ reported that the aircraft's traffic alert and collision avoidance system (TCAS) indicated 'traffic 800 ft below'. The pilot made visual contact with a climbing glider. He broadcast on the CTAF that AMQ was in the two o'clock high position relative to the glider. Initiating avoiding action, the pilot of AMQ discontinued the RNAV approach, and commenced a right turn and shallow climb. Shortly after, at about 1405 (Figure 2), AMQ passed about 275 m laterally and 62 ft vertically over 1234. Both pilots commented on the CTAF the closeness of the event.

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

Figure 1: Flight paths of VH-AMQ and PH-1234



Source: Google Earth

Pilot experience and comments (VH-AMQ)

The pilot of AMQ held an Air Transport Pilot (Aeroplane) Licence with over 11,000 hours total flight time.

The pilot commented that the CTAF was very busy, and although the weather was good, a single-pilot, high performance aircraft on descent, dictates a high workload for the pilot. The added requirement to safely self-separate visually from such a diverse mix of traffic adds yet another dimension to the workload.

The pilot noted the following:

- As he had broadcast the aircraft's position and intentions, he made the assumption that the glider pilot would appreciate the potential conflict.
- As he had only heard 1234 as a potential conflict, he made the assumption that this was the traffic dislayed on the TCAS.
- To enhance situation awareness, when broadcasting to visual flight rules (VFR) traffic, the pilot uses generic terms such as north-east, rather than approach specific instrument flight rules (IFR) terminology.
- There was no Notice to Airmen (NOTAM)[2] issued regarding gliding activity in the area.
- He did not realise there was a large group of gliders in the area.

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2 NOTAMs are used to advise pilots of hazards and provide information that is of direct operational significance.

- He suggested an educational approach may assist all users sharing uncontrolled airspace. In particular, a poster showing how instrument approaches, utilising up to three different entry points can operate to within 15 NM of an aerodrome, may better facilitate understanding between VFR and IFR pilots.

Pilot experience and comments (PH-1234)

The pilot of 1234 had previously held a fixed-wing Commerical Pilot's licence, IFR rating, and had been a Flight Engineer on the Boeing 747-300. He had about 3,500 gliding hours, including over 1,000 hours of those gained in Australia.

The pilot noted the following:

- He was part of a group of gliders conducting an on-line competition[3]. A triangular course was flown from Corowa, New South Wales via the Griffith area among other places, back to Corowa.
- He had broadcast on the Griffith CTAF when 20 NM south-east of the airport, and again in response to AMQ's first inbound call.
- He assumed the pilot of AMQ would know his position from his broadcast, so did not make direct contact with him.
- The glider was also fitted with a Mode S transponder and automatic dependent surveillance-broadcast (ADS-B) capability[4]. When the transponder is switched on, it goes automatically to the standby (non-active) mode. The pilot activates the altitude mode by pressing the mode button, this is part of his pre-takeoff checklist. The pilot believed the transponder was transmiting Mode S; however, it was was not transmitting ADS-B. The transponder antenna on 1234 was fitted to the lower right side of the fuselage under the wing. The pilot suggested that the position of the antenna may have influenced the ability of AMQ's transponder to interrogate the signal.
- He had commenced flying a thermal over the Cocoparra range, but as it was not suitable, he resumed gliding in a northerly direction.
- When he first saw AMQ, the aircraft was very close, and had commenced a shallow climbing right turn.

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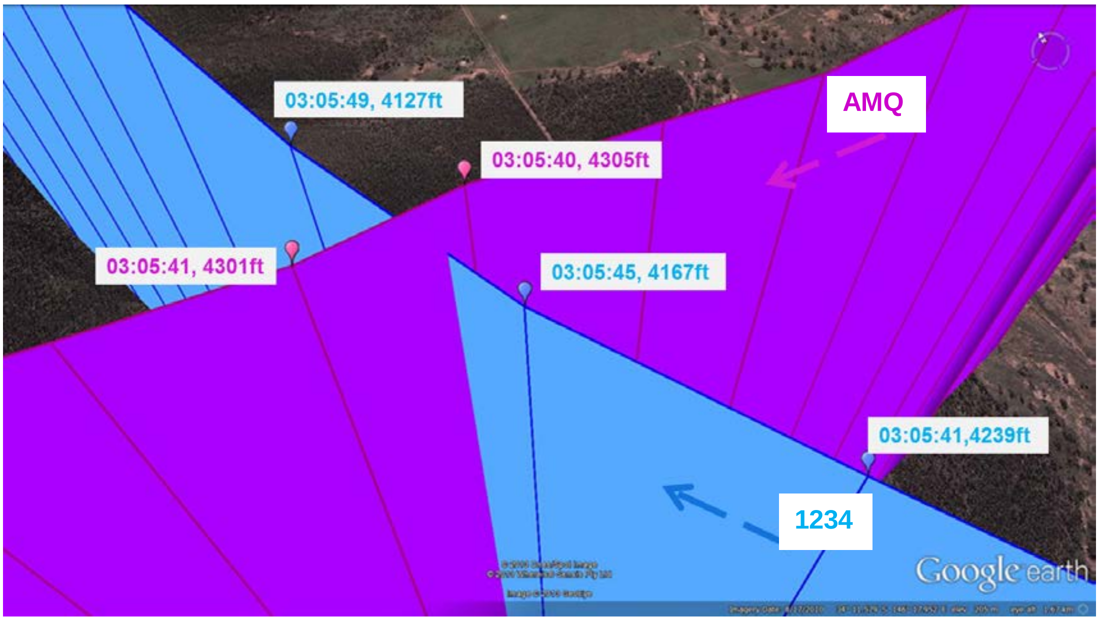
3 An on-line gliding competition was not an organised competition, but rather the rapid registration and recording of cross-country soaring flights without the requirement of a flight declaration, in order to enable a centralised comparison of current preformances. Any glider pilot could upload their tracks electronically to www.onlinecontest.org/olc-2.0/gliding after they completed a private cross-country flight. Glider pilots from around the world uploaded their flight details, which provided the basis for an on-line competition and scoring between pilots. In this instance, a number of pilots elected to conduct pirvate flights towards an on-line competition, in the same location and at the same time.

4 ADS-B is an air traffic surveillance technology that enables aircraft to be accurately tracked by air traffic controllers and other pilots without the need for conventional radar.

Figure 2: Close-up of airprox between VH-AMQ and PH-1234[5]



Source: Google Earth

Gliding Federation of Australia (GFA) comments

The Gliding Federation of Australia (GFA) advised that gliders operating within Australian airspace are only required to have one radio. Most gliders do not carry power generating equipment, relying on batteries for power, hence carry only the minimum of powered avionics equipment. To enhance safety, and mitigate an elevated risk of a collision between gliders when flying in large numbers, it was common practice to use a discrete glider frequency, along with a vigilant lookout to maintain separation. A list of frequencies was available in the Airservices Australia Aeronautical Information Publication (AIP).

The GFA noted that the on-line competition was not organised or formally sanctioned by the GFA.

The GFA also suggested that guidance material alerting general aviation (GA) pilots about the danger of flying in proximity to common IFR approach routes would assist in keeping all parties safe.

ATSB comment

In 2012, the Civil Aviation Safety Authority (CASA) commenced a safety review into the level of risk from gliders in aircraft proximity (airprox) events in uncontrolled airspace. More recently, in response to discussions at a Regional Aviation Safety Forum and following advice from the ATSB of an increase in the number of airprox events across all categories of operations, CASA has established an Industry Airprox Working group to examine ways to reduce airprox events and enhance safety. Many regional airlines, industry groups including the Gliding Federation of Australia are members of this group.

Safety action

Whether or not the ATSB identifies safety issues in the course of an investigation, relevant organisations may proactively initiate safety action in order to reduce their safety risk. The ATSB has been advised of the following proactive safety action in response to this occurrence.

[5] Times in the figure are Coordinated Universal Time (UTC)

Operator of VH-AMQ and the Gliding Federation of Australia (GFA)

As a result of this occurrence, the operator of AMQ and the GFA have taken the following action:

- The GFA will email the operator of AMQ before gliding events, where there is expected to be increased levels of glider activity. Although some of these events may be promulgated in NOTAMs, the GFA will provide additional detail regarding the number of gliders and the proposed tracks and altitudes.

In addition, the operator of AMQ will be incorporating an article about this incident in their next company safety newsletter.

Local gliding club

As a result of this occurence, the local gliding club has taken the following action:

- Disscussed this near miss in the briefing to the pilots and undertook to continue reminding pilots about position reports and transponder use.

Safety message

In areas outside controlled airspace, it is the pilot's responsibility to maintain separation with other aircraft. For this, it is important that pilots utilise both alerted and unalerted see-and-avoid principles. Pilots should never assume that an absence of traffic broadcasts means an absence of traffic.

The use of transponders greatly enhances safety in non-controlled airspace. The AIP states that pilots of aircraft fitted with a transponder must activate it at all times during flight. Transponders can be detected by aircraft equipped with TCAS, allowing them to detect other aircraft and initiate avoidance action. The use of ADS-B provides additional information to equipped aircraft.

The following publications provide information that may assist pilots avoid airprox events:

- Staying clear of other aircraft in uncontrolled airspace www.atsb.gov.au/publications/2011/staying-clear-of-other-aircraft-in-uncontrolled-airspace.aspx
- Collision avoidance strategies and tactics www.aopa.org/asf/publications/sa15.pdf
- A Flight Safety Australia article, *Sharing the skies – gliders* printed in Issue 87 July-August 2012, is available at www.casa.gov.au/scripts/nc.dll?WCMS:STANDARD::pc=PC_93249
- CAAP 166-1(1) provides advice in relation to making radio broadcasts to reduce the risk of coming in close proximity with other aircraft: www.casa.gov.au/wcmswr/_assets/main/download/caaps/ops/166-1.pdf

General details

Occurrence category:	Serious incident	
Primary occurrence type:	Aircraft proximity event	
Location:	22 km ENE of Griffith Airport, New South Wales	
	Latitude: 34° 11.20’ S	Longitude: 146° 17.35’ E

Hawker Beechcraft B200, VH-AMQ

Manufacturer and model:	Hawker Beechcraft Corporation B200C	
Registration:	VH-AMQ	
Type of operation:	Aerial work	
Persons on board:	Crew – 1	Passengers – 1
Injuries:	Crew – Nil	Passengers – Nil
Damage:	Nil	

Schempp-Hirth Ventus, PH-1234

Manufacturer and model:	Schempp-Hirth Flugzeugbau GMBH, Ventus 2cT (18m)	
Registration:	PH-1234	
Type of operation:	Private	
Persons on board:	Crew – 1	Passengers – Nil
Injuries:	Crew – Nil	Passengers – Nil
Damage:	Nil	

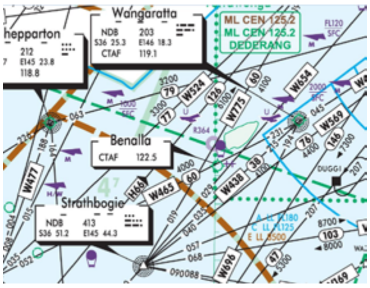
Aircraft proximity event between a Beech B200C, VH-VAE and an unidentified glider

What happened

On 16 February 2013, a Beech B200C aircraft, registered VH-VAE (VAE), was being operated on an aero-medical flight under instrument flight rules (IFR). On board the aircraft were the pilot and a paramedic.

The aircraft was cleared by air traffic control at Flight Level (FL)[1] 150 from Essendon to Wangaratta, Victoria, via the Strathbogie IFR reporting point[2] (Figure 1). The flight path of VAE passed within about 5 NM of Benalla Airport.

Detail from ERC L2 chart



Source: Airservices Australia

At 1453 Eastern Daylight-saving Time,[3] VAE was about 15 NM from Wangaratta on descent through 6,000 ft above mean sea level, with an indicated air speed of 240 kt, when the pilot observed a white glider with red markings approaching at the same level. The pilot reported that the windscreen's central pillar may have obscured the approaching glider, as he first saw it about 150 m in front of his aircraft tracking from the 1230 to 1 o'clock position.[4] The glider passed the left side of the aircraft with separation reducing to about 70 m at the same altitude.

Due to the relative speeds of both VAE and the glider, the pilot of VAE did not have an opportunity to take evasive action, nor did he observe the glider take evasive action. The glider did not appear on VAE's traffic alert and collision avoidance system (TCAS),[5] nor were any broadcasts[6] heard from the glider pilot on the area very high frequency (VHF).

Attempts to identify the glider were unsuccessful.

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1 At altitudes above 10,000 ft in Australia, an aircraft's height above mean sea level is referred to as a flight level (FL). FL 150 equates to 15,000 ft.

2 Reporting points are normally referenced to a radio-navigation aid, aerodrome, town or within 10 NM of a town or a geographical feature. Where this is not possible, names have been invented.

3 Eastern Daylight-saving Time (EDT) was Coordinated Universal Time (UTC) + 11 hours.

4 The clock code is used to denote the direction of an aircraft or surface feature relative to the current heading of the observer's aircraft, expressed in terms of position on an analogue clock face. Twelve o'clock is ahead while an aircraft observed abeam to the left would be said to be at 9 o'clock.

5 Traffic alert and collision avoidance system (TCAS) is an aircraft collision avoidance system. It monitors the airspace around an aircraft for other aircraft equipped with a corresponding active transponder and gives warning of possible collision risks.

6 'Broadcast' means a radio broadcast from an aircraft (or glider) on the appropriate frequency to provide advisory traffic information to other aircraft.

Gliding operations

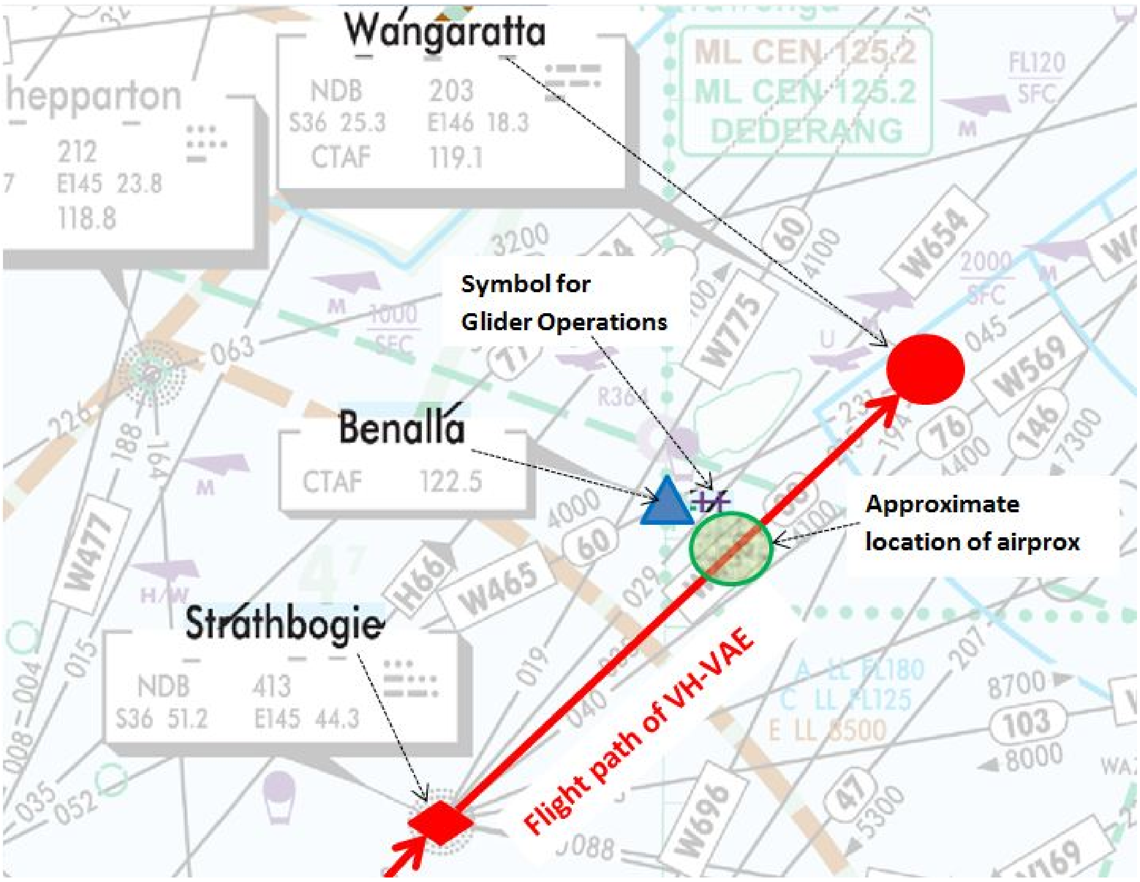
The Airservices Australia Aeronautical Information Publication (AIP) notes that glider pilots are encouraged, but not required, to monitor the area VHF when operating above 5,000 ft in Class G airspace. The AIP further states:

> *Except for operations in controlled airspace, gliding operations may be conducted no-radio, or may be on frequencies 122.5MHZ, 122.7MHZ or 122.9MHZ, which have been allocated for use by gliders. … Except when operationally required to maintain communications on a discrete frequency listed above, glider pilots are expected to listen out on the area VHF and announce if in potential conflict.*

The Gliding Federation of Australia's (GFA's) *Airways and Radio Procedures for Glider Pilots* states:

> *The presence of a glider in an area into which a medium-sized aircraft may be descending at more than 200 knots is a clear case when "un-alerted" see and avoid is not sufficient and needs to be supplemented by use of radio.*

Figure 1: Map showing VAE's track (red) and the Gliding Operations symbol at Benalla



Source: Underlying image from Airservices Australia

Industry liaison

In early 2012, and following a submission from the operator of VAE, the Civil Aviation Safety Authority (CASA) commenced a safety review into the level of risk from gliders in aircraft proximity (airprox) events in uncontrolled airspace. More recently, in response to discussions at a Regional Aviation Safety Forum and following advice from the ATSB of an increase in the number of airprox events across all categories of operations, CASA has established an Industry Airprox Working group to examine ways to reduce airprox events and enhance safety.

Safety message

When operating outside controlled airspace, it is the pilot's responsibility to maintain separation with other aircraft. For this, it is important that pilots utilise both alerted and unalerted see-and-avoid principles. Pilots should never assume that an absence of traffic broadcasts means an absence of traffic.

The use of transponders greatly enhances safety in non-controlled airspace. The AIP states that pilots of aircraft fitted with a transponder must activate it at all times during flight. Transponders can be detected by aircraft equipped with TCAS, allowing them to detect other aircraft and initiate avoidance action.

Issues associated with unalerted see-and-avoid have been documented in an ATSB research report *Limitation of the See-and-Avoid Principle*. Unalerted see-and-avoid relies entirely on the ability of the pilot to sight other aircraft. A traffic search in the absence of traffic information is less likely to be successful than a search where traffic information has been provided because knowing where to look greatly increases the chance of sighting the traffic.

The *Limitations of the See-and-Avoid Principle* is available at www.atsb.gov.au/publications/2009/see-and-avoid.aspx

The following publications provide information that may assist pilots avoid airprox events:

- Staying clear of other aircraft in uncontrolled airspace www.atsb.gov.au/publications/2011/staying-clear-of-other-aircraft-in-uncontrolled-airspace.aspx
- Collision avoidance strategies and tactics www.aopa.org/asf/publications/sa15.pdf
- A Flight Safety Australia article, *Sharing the skies – gliders* printed in Issue 87 July-August 2012, is available at www.casa.gov.au/scripts/nc.dll?WCMS:STANDARD::pc=PC_93249

General details

Occurrence details

Manufacturer and model:	Hawker Beechcraft Corporation B200C	
Registration:	VH-VAE	
Type of operation:	Aerial work	
Occurrence category:	Serious incident	
Primary occurrence type:	Airprox	
Location:	8 km SE of Benalla Airport, Victoria	
	Latitude: 36° 36.52' S	Longitude: 146° 03.65' E
Persons on board:	Crew – 2	Passengers – Nil
Injuries:	Crew – Nil	Passengers – Nil
Damage:	Nil	

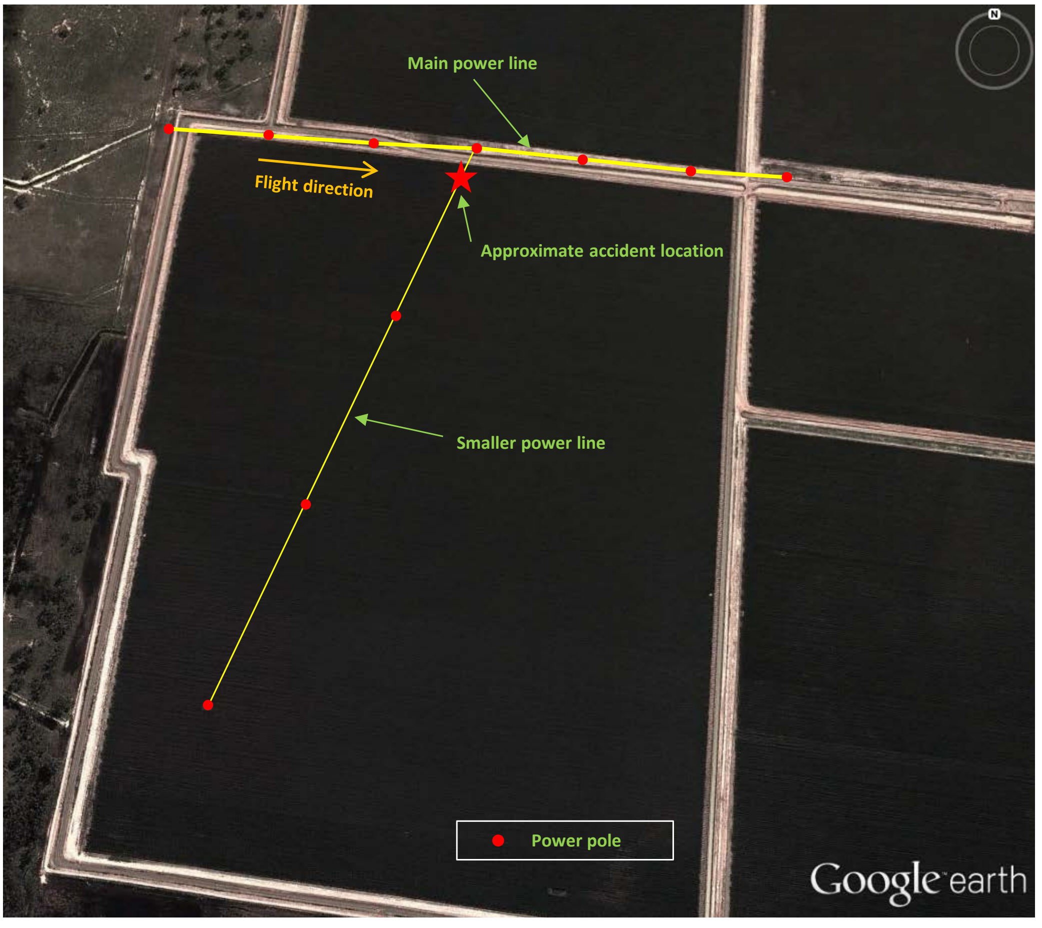
Wirestrike involving an Ayres Thrush S2R-T34, VH-HAH

What happened

On 19 February 2013, at about 1000 Eastern Daylight-saving Time,[1] an Ayres Thrush S2R-T34 aircraft, registered VH-HAH (HAH), struck power lines while conducting aerial agricultural spraying operations, about 7 km south-east of Condobolin aerodrome, New South Wales. The pilot was the only person on board.

The pilot was carrying out the final spray run (clean-up run), to use the last of the spray product on the edge of the field, before returning to the loading airstrip that was located about 1 km away. The pilot was flying from west to east, parallel to the main power line (Figure 1), which was located beside the field, outside of the area being sprayed. Another smaller power line with three wires ran diagonally across the field from the main power line and went for about 1 km across the field to a farm yard. When the pilot had run out of product, he pulled up to gain altitude before returning to the loading airstrip, when he struck the smaller power line that ran diagonally across the field. Two of the wires were cut by the aircraft's wire protection system and the third wrapped around the propeller hub, arresting the aircraft and pulling it around in a half circle, where it came to rest on the ground (Figure 2). The aircraft sustained serious damage, while the pilot was uninjured.

Figure 1: Representation of field being sprayed



Source: Google Earth

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

Figure 2: Accident site **Power line wrapped around propeller**

Source: NSW Police

Pilot comments

The pilot reported that this was his first day back at work after 6 days off and he had been spraying for about 2 hours prior to the accident. He had sprayed this field six or seven times during the cotton season and was familiar with the field and the power line. The pilot stated that he had discussed spraying the field and the location of the power line with the chief pilot the night before. He had marked the power line on a map in red, and conducted a few circuits as a refresher and to check if there were any new obstacles, before he commenced spraying the field.

The pilot reported that there were cable cutters located on the leading edge of each main landing gear, a cable cutter going up the windscreen, and a deflector cable that went from the cockpit to the top of the vertical stabiliser.

Safety action

Whether or not the ATSB identifies safety issues in the course of an investigation, relevant organisations may proactively initiate safety action in order to reduce their safety risk. The ATSB has been advised by the aircraft operator that arrangements have been made for the electricity distribution company to install a marking system on the power line.

Safety message

The practice within the aerial agricultural industry is to extensively pre-plan an application task that takes into account the specific hazards affecting an application. Any change from the previously planned application runs, including an unplanned change of direction, has the potential to affect a pilot's awareness of the relative position of previously known power lines and other hazards.

For this reason, the Aerial Agricultural Association of Australia recommends that an additional hazard check should be performed from a safe height prior to every change of direction or 'clean up run'. The extra safety check for wires is important, as the obstructions may appear new or different from the new direction of flight.

For further reading of suggested approaches to risk management for Agricultural Pilot please see the *Aerial Application Pilots Manual,* available from the Aerial Agricultural Association of Australia at www.aerialag.com.au/Home.aspx.

In addition, the ATSB released two research reports on wirestrikes in 2011.

AR-2011-028: Wirestrikes involving known wires: A manageable aerial agriculture hazard.

This report is available at www.atsb.gov.au/publications/2011/ar2011028.aspx.

This report covers relevant safety information about factors associated with wirestrikes, involving known wires and strategies to manage them. While most of the strategies should be taken into account during the entire operation, some of these are most pertinent when there is a change of plans. The information and strategies include:

- Reassessing the risks when things change. Clean-up runs are similar to an unplanned spray run and also require a reconnaissance before commencing.
- Actively looking for and reminding yourself of wires. Remind yourself of the position of the wires at the top of every turn, and actively look for wires when flying the spray run.
- Vigilance limitations, the chance of detecting hazards, and the time taken to detect hazards, will decrease greatly after the first 30 minutes of many aerial spraying tasks. In addition, defences are often lowered at the end of a job and pilots may start to think about the next job or the impending break.
- Wire markings can enhance the visibility of wires.

AR-2011-004: Under reporting of aviation wirestrikes.

This report is available at www.atsb.gov.au/publications/2011/ar2011004.aspx.

This publication contains a section on current initiatives to reduce aviation wirestrikes. One such initiative is the formation of a working group from the relevant government agencies to examine ways to establish an electronic terrain and obstacle database (eTOD). The final regulatory requirements in relation to eTOD will form part of the provisions of a new Part 175 of the Civil Aviation Safety Regulations covering aeronautical information services currently being prepared by the Civil Aviation Safety Authority (CASA) in consultation with the Office of Parliamentary Counsel.

General details

Manufacturer and model:	Ayres Thrush S2R-T34	
Registration:	VH-HAH	
Type of operation:	Aerial work – aerial agriculture	
Occurrence category:	Accident	
Primary occurrence type:	Wirestrike	
Location:	7 km SE of Condobolin aerodrome, New South Wales	
	Latitude: 33° 05.865’ S	Longitude: 147° 15.546’ E
Persons on board:	Crew – 1	Passengers – Nil
Injuries:	Crew – Nil	Passengers – Nil
Damage:	Serious	

Piston aircraft

Power loss (both engines) involving Piper PA-39, VH-RMA

VH-RMA

Source: Charles Taylor Adjusting

What happened

On 9 December 2012, at about 1245 Eastern Daylight –saving Time[1], a Piper PA-39 aircraft, registered VH-RMA (RMA), departed on a private flight from Tamworth, New South Wales for Bacchus Marsh, Victoria. The pilot, the sole person on board, was ferrying the aircraft for a pre-purchase engineering inspection.

As he was unfamiliar with RMA, and the aircraft had not flown for about seven months, the pilot elected to fly via Dubbo and land at Griffith, New South Wales to re-assess the flight.

During the departure and cruise, the pilot took the opportunity to check the handling of the aircraft at different altitudes and profiles. He also operated the engines on different fuel tank combinations[2] and power settings, and spent time testing the auto-pilot functionality.

At about 1530, and 75 NM from Griffith, he prepared for a descent from 4,500 ft above mean sea level (AMSL) to 2,500 ft AMSL. He set the fuel selectors onto the main tanks (Figure 1), reduced the manifold pressure (MAP) on both engines, and left the propeller controls set at 2,300 revolutions per minute (RPM). The pilot increased the MAP on both engines, intending to arrest the descent and fly level, as the aircraft approached 2,500 ft AMSL. He then noticed an uncommanded decrease in the left engine RPM to 2,000. He moved the left propeller lever to the maximum position of 2,700 RPM; however, the RPM failed to respond, staying at 2,000, and the aircraft continued to descend.

The pilot initiated the emergency checklist by moving the left engine mixture control to the full rich position, the throttle to the maximum MAP and turned on the fuel pump. The left engine was unresponsive and the aircraft continued to descend. To utilise all available power, he commenced the emergency checklist for the right engine. Almost immediately, the right engine began to vibrate severely, with a noticeable loss of power, and an increased rate of descent.

Concerned about the aircraft's proximity to the critical V_{mca}[3] airspeed (70 kt), the pilot maintained about 90 kt, while searching for a suitable landing site. He commenced an approach and broadcast the aircraft's position and his intentions on the Melbourne Centre frequency. On final approach, he turned off the fuel pumps. During the round-out, he decided to extend the landing gear, as the surface looked more suitable than first thought. He pulled back on the control column to gain height and selected the landing gear down. The aircraft stall warning briefly sounded, so the pilot lowered the aircraft nose. Moments later, the propellers contacted the ground and the aircraft skidded to a halt.

The pilot secured the aircraft, broadcast his situation and exited the aircraft. The pilot was uninjured and the aircraft sustained serious damage.

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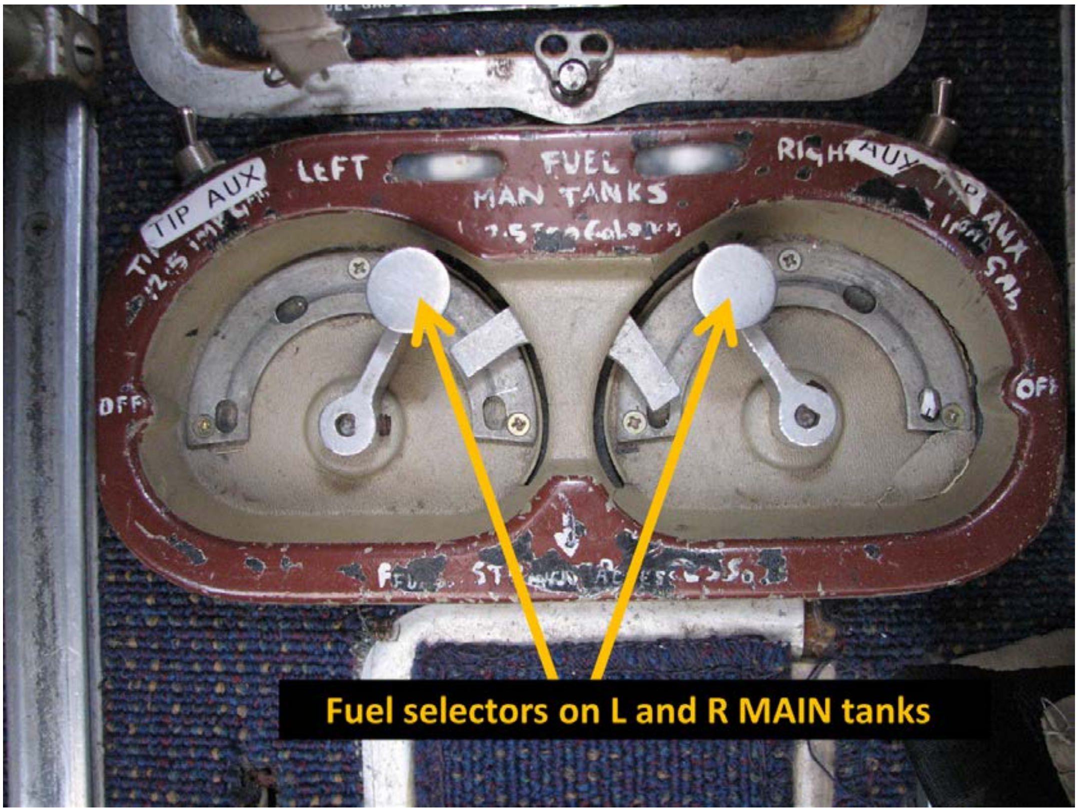
1 Eastern Daylight-saving Time (EDT) was Coordinated Universal Time (UTC) + 11 hours.

2 RMA had three fuel tanks for each engine (main, auxiliary and tip tanks) and cross feed capability.

3 V_{mca} is the minimum flight speed at which an aircraft with an engine mounted on each wing is controllable with a maximum 5° bank toward the operative engine, when the critical engine suddenly becomes inoperative with the remaining engine operating at take-off power. The value presented represents the most critical combination of power, weight, and centre of gravity.

Figure 1: VH-RMA fuel selectors



Source: Charles Taylor Adjusting

Pilot experience and comments

The pilot held a Private Pilot (Aeroplane) Licence with about 2,400 hours total time and 1,918 hours on type.

The pilot, assisted by an engineer, reported conducting a full pre-flight inspection of the aircraft. He did recall, however, that he was distracted during this inspection and did not keep to his normal routine. This departure from routine included not dipping the fuel tanks prior to adding fuel, as there was no dipstick available.

The pilot recalls completing the following pre-flight items:

- checking the oil quantity, with the maximum 8 quarts of oil in each engine
- all fuel tanks were filled to the level of the filler neck - using 223 L of fuel from the bowser
- checking the fuel tanks for water and contamination after refuelling
- noting the right fuel cap was very loose in sealing. Although the cap fitted okay after refuelling, he noted the rubber seal needed replacing
- during pre-start checks, he found the left tip tank solenoid valve not operating. He endorsed the maintenance release with this unserviceability as this prevents fuel from being transferred from the left tip tank, rendering fuel in the left tip-tank unuseable
- during the initial engine run-up there was a 150 RPM drop[4] on the right magneto of the left engine. After some power test runs, this reduced to about a 90 RPM drop prior to takeoff.

4 The maximum acceptable drop was 175 RPM.

Aircraft details

The last 100-hourly maintenance check had been conducted on 9 January 2012 at 4,561.4 hours, about 16 flight hours prior to the accident. The aircraft had not been flown for about seven months.

The pilot reported the maintenance release had been endorsed with an operational restriction. This limitation restricted the aircraft to only operations under the aerial work category and visual flight rules (VFR) until the left engine magnetos were overhauled.

The following technical details were taken from a generic Information Manual and Flight Manual for a PA-39 C/R, the same type as RMA.

> All fuel cells are equipped with fuel caps that periodically need to be inspected for proper sealing. Fuel cells should be kept full of fuel during storage and the aircraft refuelled as soon as possible after each flight to prevent accumulation of moisture and deterioration of the cells. For storage of more than ten days without fuel, the cells should be coasted with light engine oil to prevent excessive drying.

The oiling of the fuel cells applies only to the main and auxiliary tanks.

Aircraft examination

An insurance representative attended the accident site (Figures 2 and 3) and noted that there was sufficient fuel remaining in the main fuel tanks to complete the flight. An assessment for contaminants such as water could not been undertaken at the accident site. The reason for the reported performance loss on either engine could not be definitively determined.

Figure 2: Accident site

Figure 3: Accident site

Source: Charles Taylor Adjusting

Safety message

The Australian 'Tribe' of the International Comanche Society maintain a website for pilots who fly or maintain an interest in Comanche aircraft such as RMA. This keeps readers up to date with Civil Aviation Safety Authority (CASA) airworthiness directives, and any other maintenance issues for the Comanche series of aircraft. They also conduct pilot proficiency programs on the type. Further information is available at www.comancheflyer.com.au.

An article titled, 'That was then, this is now' highlights the need to take into consideration performance loss as an aircraft ages. This is available in the January-February 2013 edition of *Flight Safety Australia* at www.casa.gov.au/scripts/nc.dll?WCMS:STANDARD::pc=PC_101369.

General details

Manufacturer and model:	Piper Aircraft Corporation PA-39	
Registration:	VH-RMA	
Type of operation:	Private	
Primary occurrence type:	Engine(s) – Partial power loss	
Location:	52 km north-west of West Wyalong, New South Wales	
	Latitude: 33° 36.43' S	Longitude:146° 47.18' E
Persons on board:	Crew – 1	Passengers – Nil
Injuries:	Crew – Nil	Passengers – Nil
Damage:	Serious	

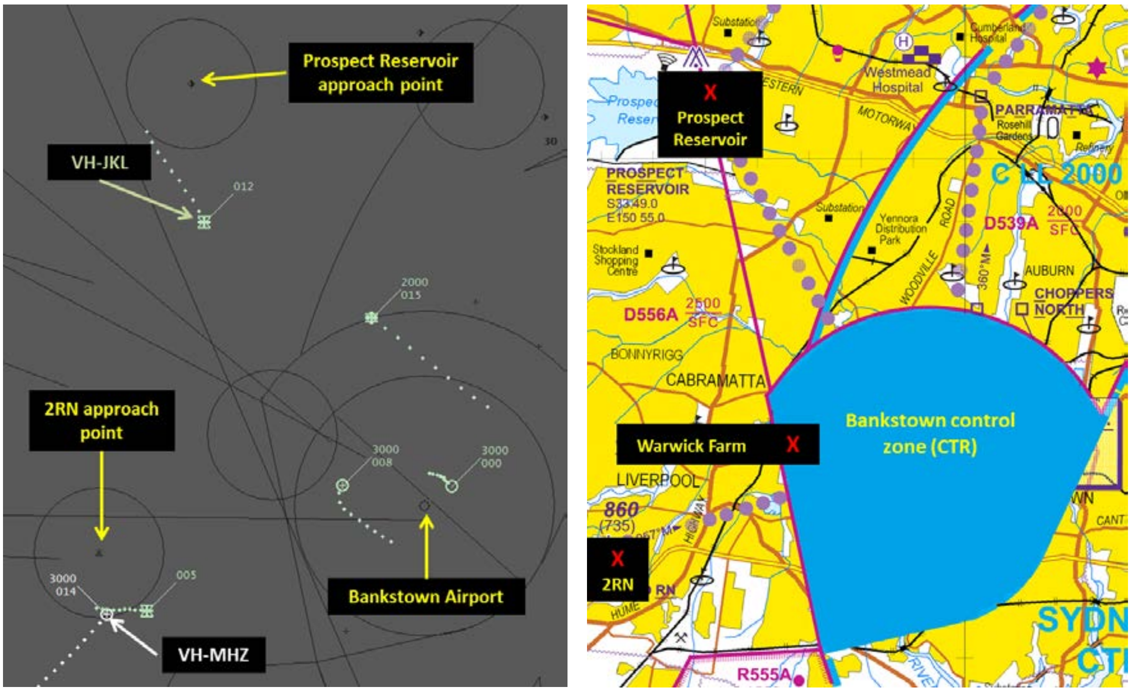
Aircraft proximity event between a Piper PA-44, VH-MHZ and a Hawker G36, VH-JKL

What happened

On 19 January 2013, the pilot and passenger of a Hawker G36 aircraft, registered VH-JKL (JKL), were conducting a private flight from Bathurst to Bankstown, New South Wales (NSW). When at the ‘Prospect Reservoir’ visual flight rules (VFR) approach point (Figure 1), at about 1025 Eastern Daylight-saving Time[1], the pilot broadcast an inbound call to Bankstown Tower air traffic control (ATC). The pilot was instructed by ATC to join the final leg of the circuit for runway 11 Left and to report when at 3 NM.

At the same time, the pilot of a Piper PA-44 aircraft, registered VH-MHZ (MHZ), was conducting a ferry flight from Wedderburn (NSW) to Bankstown. At about 1026, when at the ‘2RN’ VFR approach point, the pilot attempted to broadcast an inbound call to Bankstown Tower; however, the pilot reported that the call was over-transmitted. Shortly after, a second inbound call was broadcast, which the pilot reported was again over-transmitted.

Figure 1: VH-MHZ and VH-JKL inbound to Bankstown



Source: Airservices Australia

At about 1027, the pilot of JKL advised ATC that he was at 3 NM. About 30 seconds after, ATC attempted to establish communications with an unidentified aircraft (MHZ) observed at Warwick Farm. Airservices Australia surveillance data showed MHZ maintaining 1,100 ft and JKL descending through 800 ft, with 1.3 NM lateral separation (Figure 2). At the same time, the pilot of MHZ determined that communications with ATC could not be established due to radio congestion and he elected to maintain his current heading and altitude. The aircraft subsequently entered the Bankstown control zone (CTR) without an ATC clearance.

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

Soon after, the pilot and passenger of JKL observed an unidentified aircraft in their 2 o'clock[2] position at about the same altitude. The pilot and passenger continued to monitor the aircraft.

At about 1028, ATC advised the pilot of JKL of an unidentified aircraft to the south, about 0.5 NM away. The pilot replied to ATC that he would descend and monitor the aircraft. The pilot reported descending 50-100 ft and conducting a slight right turn. As MHZ passed overhead JKL, vertical separation reduced to 200 ft and then increased to 400 ft as JKL descended (Figure 3). The pilot of MHZ did not sight JKL as it was obscured by the nose of the aircraft.

Figure 2: Aircraft positions at 1028

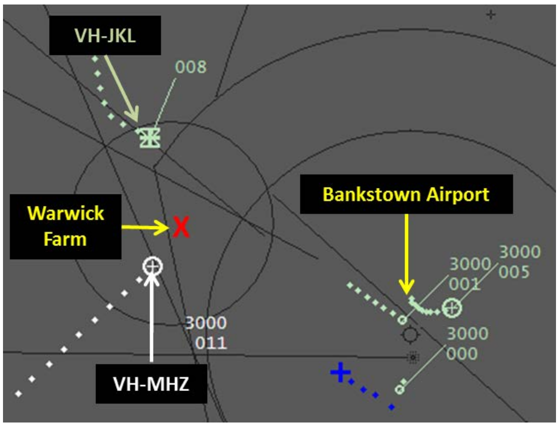
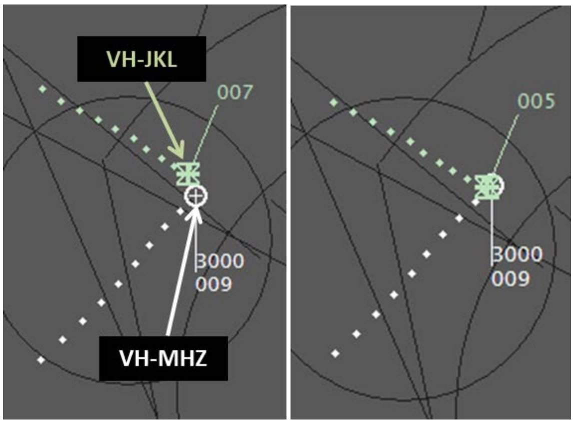


Figure 3: MHZ passing overhead JKL



Source: Airservices Australia

After passing JKL, the pilot of MHZ conducted a left turn and commenced tracking towards 2RN. Once outside the Bankstown CTR, the aircraft was climbed to 1,500 ft. When at 2RN, the pilot broadcast an inbound call to ATC and received circuit joining instructions. Both aircraft landed without further incident.

Pilot comments (VH-MHZ)

The pilot of VH-MHZ provided the following comments regarding the incident:

- There was a considerable amount of radio congestion at the time.[3]
- As MHZ was a twin-engine aircraft, it operated at a relatively higher cruise speed compared with other aircraft typically operating into Bankstown. Consequently, the time available to establish two-way communications on a congested radio frequency was limited.
- When communications with ATC could not be established as a result of radio congestion, he decided to maintain the aircraft's heading and altitude until past the extended runway centreline. He wanted to remain predictable and not conduct any random manoeuvres. The pilot believed that this would have allowed other pilots in the area to formulate a plan without having to second guess his intentions.
- The pilot contacted ATC via telephone after the incident. The controller indicated that the pilot should have turned around at 2RN instead of continuing. While the pilot recognised that this would have been the most appropriate course of action, he was cognisant that 2RN was a VFR approach point and that aircraft inbound to Bankstown may have been converging to that point. Consequently, he did not want to turn in front of aircraft within the vicinity.

2 The clock code is used to denote the direction of an aircraft or surface feature relative to the current heading of the observer's aircraft, expressed in terms of position on an analogue clock face. Twelve o'clock is ahead while an aircraft observed abeam to the left would be said to be at 9 o'clock.

3 The pilot of JKL believed that the traffic density at the time was light.

Safety message

In December 2009, the Civil Aviation Safety Authority (CASA) published a report on the *Utility of General Aviation Aerodrome Procedures [GAAP][4] to Australian-Administered Airspace* (Version 2)[5]. Feedback from hazard identification workshops and a safety perception survey, incorporated into the final report, indicated that frequency congestion was a major concern at GAAP aerodromes (including Bankstown) and that 90% of survey respondents reported experiencing congestion problems. It further determined that frequency congestion resulted in delayed inbound reports by pilots, and consequently, a failure to receive control zone entry instructions in a timely manner. This impacted the effectiveness of pilot see-and-avoid capabilities.

The CASA VFR guide recommends that pilots should consider initiating radio contact with ATC far enough away from the CTR boundary to preclude entering Class D[6] airspace before two-way communications are established. This is particularly important when operating into busy airports such as Bankstown. The following publications provide information on Class D operations:

- VFR guide www.casa.gov.au/wcmswr/_assets/main/pilots/download/vfr/vfrg-whole-low.pdf
- Class D airspace booklet www.casa.gov.au/wcmswr/_assets/main/pilots/download/classd_booklet.pdf

General details

Occurrence details

Occurrence category:	Serious incident	
Primary occurrence type:	Aircraft proximity event	
Location:	4 km WNW of Bankstown Airport, New South Wales	
	Latitude: 33° 54.67' S	Longitude: 150° 57.78' E

Piper PA-44, VH-MHZ

Manufacturer and model:	Piper Aircraft Corporation PA-44-180	
Registration:	VH-MHZ	
Type of operation:	Aerial work - ferry	
Persons on board:	Crew – 1	Passengers – Nil
Injuries:	Crew – Nil	Passengers – Nil
Damage:	Nil	

Hawker G36, VH-JKL

Manufacturer and model:	Hawker Beechcraft Corporation G36	
Registration:	VH-JKL	
Type of operation:	Private	
Persons on board:	Crew – 1	Passengers – 1
Injuries:	Crew – Nil	Passengers – Nil
Damage:	Nil	

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4 On 3 June 2010, Class D procedures replaced the Australian-specific GAAP. Changes to the procedures were considered relatively minor.

5 The study was conducted by The Ambidjii Group on behalf of CASA. http://www.casa.gov.au/wcmswr/_assets/main/oar/download/gaap_report_v2.pdf

6 Class D: all aircraft must obtain an airways clearance and communicate with ATC. Instrument flight rules (IFR) aircraft are positively separated from other IFR aircraft and are provided with traffic information on all VFR aircraft. VFR aircraft are provided with traffic information on all other aircraft.

Engine failure involving a Cessna 182R, VH-OWZ

What happened

On 22 January 2013, the pilot of a Cessna 182R aircraft, registered VH-OWZ (OWZ), was preparing to depart Kununurra Airport, Western Australia on a charter flight with one passenger. As the aircraft had been located on the flight line, had not been flown for 6 weeks and there had been heavy rain over the preceding days, the pilot conducted a thorough pre-flight inspection, with no irregularities found.

Accident site

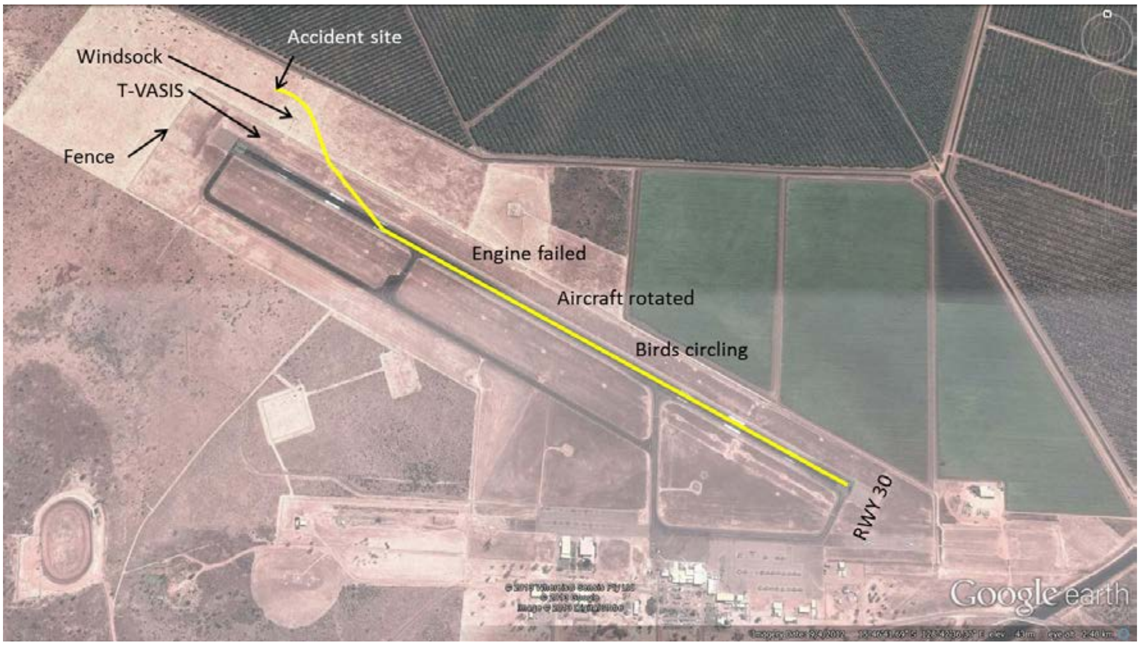
Source: Aircraft operator

After briefing the passenger, the aircraft was taxied to runway 30, with the engine performing as expected. During the takeoff, the pilot delayed the rotation[1] to remain clear of birds observed circling overhead the runway. The pilot reported that the aircraft and engine indications were normal and OWZ rotated about half way along the runway.

When at about 100 ft above ground level, with insufficient runway distance remaining to abort the take-off, the pilot retracted the landing gear. Immediately after, the engine abruptly failed. Witnesses on the ground reported hearing a bang and the engine splutter.

Due to the low altitude, the pilot confirmed that the engine controls were in the full forward position and that the fuel tank selector was on 'both'. The pilot then looked for a suitable place to land. The pilot observed obstructions at the end of the runway; a drainage ditch, a fence, the T-VASIS,[2] and the windsock, but saw a suitable field to the north (Figure1).

Figure 1: Aircraft track



Source: Google Earth

[1] Positive, nose-up, rotation of an aircraft about the lateral (pitch) axis immediately before becoming airborne.

[2] A 'T' shaped Visual Approach Slope Indicating System that uses high intensity lighting to assist pilots identify the correct glidepath to the runway.

The pilot then selected the auxiliary fuel pump on, but the engine did not respond. He lowered the landing gear and extended full flaps. The main landing gear touched down in long grass and the aircraft decelerated rapidly. When the nose gear touched down, it dug into boggy ground and the aircraft flipped over, coming to rest inverted (Figure 2). The pilot and passenger received minor injuries and the aircraft sustained substantial damage.

Figure 2: Aircraft at the accident site

Source: Aircraft operator

Pre-flight preparations

The pilot reported that his pre-flight preparations included the following:

- conducting fuel drains from both wings and the fuel strainer, with no contaminants observed (including water)
- refuelling the aircraft with 120-130 L of fuel, resulting in a total of 280 L on board
- completing engine run-ups[3] at 1,700, 2,000 and 2,200 revolutions per minute (RPM), with all indications reported as normal
- conducting a second fuel drain, with no contaminants found

The pilot also conducted a self-briefing prior to takeoff, which ensured that the emergency procedures were at the 'front of his mind'.

Weather

At the time of the takeoff, the temperature was reported to be 35.9°C with a relative humidity of 41%.

Aircraft information

Prior to the flight, the aircraft had 6,929.5 hours total time in service. The aircraft was powered by a Lycoming O-540-J3C5D engine, which had 236.8 flight hours since overhaul. The last 100-hourly inspection had been carried out on 30 August 2012 at 6,888.2 hours and there were no outstanding items on the maintenance release.

Post-accident examination

An examination of the aircraft was carried out by an independent Licensed Aircraft Maintenance Engineer (LAME). No contaminants, including water, were found in the fuel or filters. The

[3] To test a piston engine briefly at high power and to check dual ignition, before takeoff.

magnetos, engine driven fuel pump, throttle and mixture controls, and carburettor were examined with no problems found. The operator rotated the engine by hand and it was reported to rotate freely.

An engine tear down was not performed and the reason for the engine failure could not be determined.

Safety action

Whether or not the ATSB identifies safety issues in the course of an investigation, relevant organisations may proactively initiate safety action in order to reduce their safety risk. The ATSB has been advised of the following proactive safety action in response to this occurrence.

Aircraft operator

As a result of this occurrence, the aircraft operator has advised the ATSB that they are taking the following safety actions:

- *Fuel contamination procedures*: They will create a log for all company aircraft that will contain details of any water contamination found in fuel drains. In addition, after heavy rain is experienced, all aircraft fuel tanks will be tested for water contamination.
- *Emergency response equipment*: Equipping a vehicle with an ‘accident kit’, which includes fire extinguishers, a fire suit, and first aid kit for use in an on-airport emergency.

Safety message

This accident highlights the benefits of conducting a self-briefing before takeoff and ensuring that emergency procedures, particularly those related to critical phases of flight, are clear and familiar. This assists pilots with responding to an abnormal or emergency situation promptly and ensuring the best possible outcome can be achieved. Generally speaking, if you self-brief your plan of action just before flight, you have more chance of ‘staying ahead’ of the aircraft and being able to concentrate on flying.

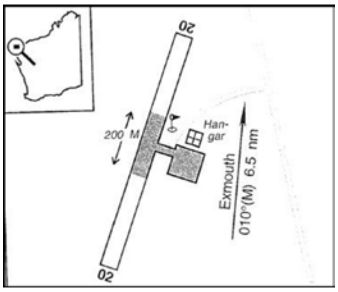
General details

Manufacturer and model:	Cessna Aircraft Company 182R	
Registration:	VH-OWZ	
Type of operation:	Charter - passenger	
Occurrence category:	Accident	
Primary occurrence type:	Total power loss	
Location:	Kununurra Airport, Western Australia	
	Latitude: 15° 46.68' S	Longitude: 128° 42.45' E
Persons on board:	Crew – 1	Passengers – 1
Injuries:	Crew – 1 (Minor)	Passengers – 1 (Minor)
Damage:	Substantial	

Wheels up landing involving a Cessna 337F, VH-JUP

What happened

Exmouth (ALA)



Source: FlightAce

On 25 February 2013, a Cessna 337F (337) aircraft, registered VH-JUP (JUP), was chartered to fly three passengers from the Exmouth aeroplane landing area (ALA) to Onslow, Western Australia in the morning and back to Exmouth in the late afternoon. The flight to Onslow was without incident.

At about 1730 Western Standard Time,[1] JUP departed Onslow for the 30 minute flight to Exmouth. The front seat passenger and the pilot conversed for most of the flight.

When on a 5 NM final for runway 20, the pilot of JUP commenced pre-landing actions by extending the first stage of flap. The pilot later reported that this was where she normally lowered the landing gear, but could not recall why this action was missed.

About 1 NM from landing, as the pilot was about to commence the final pre-landing checks, she asked the front seat passenger to assist by scanning the airstrip for animals that might pose a problem for the landing. Again, the pilot could not recall why she had not checked that the landing gear was down, as part of the final pre-landing checks.

At 1800, the pilot commenced the flare[2] about 3 ft above the runway and as the aircraft touched down, the pilot realised that the landing gear had not been selected down. The pilot reported that the landing gear warning horn did not sound until the aircraft had come to a stop, about 200 m from where JUP first made contact with the runway.

The passengers and pilot exited the aircraft without injury. The fiberglass cargo pod (Figure 1) fitted to the aircraft was damaged. The aircraft hull was undamaged; however, the rear propeller contacted the ground.

The pilot noted that she regularly flew a number of different aircraft types, some with fixed and some with retractable landing gear.

As a result of this occurrence, the pilot advised that when at least 5 NM on final, she will ask the passengers not to speak to her, except to alert her to the presence of animals on the runway.

1 Western Standard Time (WST) was Coordinated Universal Time (UTC) + 8 hours.
2 Flare: Final nose-up pitch of a landing aircraft to reduce the rate of descent close to zero at touch-down.

Figure 1: A Cessna 337 with cargo pod fitted

Source: Operator

Safety message

The sterile cockpit rule, where pilots refrain from performing non-essential activities and conversations during critical phases of flight, including taxiing, takeoff and landing, assists in ensuring that crucial information is not missed or misinterpreted. By explaining the sterile cockpit rule in their pre-flight brief, pilots can give passengers an awareness of the importance of minimising discussions, questions, and conversation during these phases of flight. The following websites provide additional information on sterile cockpits:

- www.aopa.org/asf/asfarticles/sp0006.html
- www.skybrary.aero/index.php/Sterile_Flight_Deck_(OGHFA_BN)

Civil Aviation Safety Authority (CASA) Civil Aviation Advisory Publication (CAAP) 215-1 (1) *Guide to the preparation of Operations Manuals* provides guidance on the preparation and contents of an Operations Manual for flight operations, including advice on where to include the company policy on the phases of flight that require a sterile cockpit. The CAAP is available at: www.casa.gov.au/scripts/nc.dll?WCMS:STANDARD::pc=PC_91054

General details

Manufacturer and model:	Cessna Aircraft Company 337F	
Registration:	VH-JUP	
Type of operation:	Charter	
Occurrence category:	Serious incident	
Primary occurrence type:	Wheels up landing	
Location:	Exmouth ALA, Western Australia	
	Latitude: 22° 02.48' S	Longitude: 114° 06.13' E
Persons on board:	Crew – 1	Passengers – 3
Injuries:	Crew – Nil	Passengers – Nil
Damage:	Minor	

Helicopters

Loss of control involving Robinson R22, VH-HGI

What happened

VH-HGI

Source: Aircraft Owner

On 19 January 2013, at about 1200 Central Standard Time[1] a Robinson R22 Beta II helicopter, registered VH-HGI (HGI), departed from a station homestead, located 10 km to the east of Manton Dam, Northern Territory. On board the helicopter were a pilot and a passenger.

At about 1220, HGI was returning to the homestead and approaching the landing area located nearby (Figure 1). As the helicopter approached the landing area and, prior to terminating in the hover[2], the pilot turned the helicopter to face a northerly direction.

The pilot reported that he had difficulty maintaining control of the helicopter in the hover and he elected to conduct a go-around. As the pilot had previously turned the helicopter to face the north, his departure path was not the usual one he used and required a steeper profile to clear trees located near the landing area.

At about 40 ft above ground level, and at an airspeed of between 25 to 30 knots, the helicopter suddenly yawed to the right and completed 3 to 4 revolutions before impacting trees. The helicopter came to rest inverted and was seriously damaged. The pilot was able to exit with minor injuries and assisted the passenger, who was seriously injured, to exit the helicopter.

Pilot information and comments

The pilot held a Private Helicopter Licence and had about 186.5 hours total time, all of which was in Robinson R22 Helicopters.

The pilot commented that he had returned earlier than planned, as he did not want to get caught in wind or rain. Also, during the final stages of the approach the ‘helicopter moved excessively and did not feel right’.

The pilot reported that if he was unsure of the wind, he would overfly the airstrip and confirm the direction of the wind via the windsock, as the windsock was not visible on approach to the homestead. The pilot commented that during the wet season the wind was always from the north-west and he did not overfly the airstrip windsock on the day of the accident.

Weather

Local observations were obtained from Batchelor Aerodrome. Batchelor Aerodrome was located approximately 17 NM to the south-west of the accident site.

The following conditions were observed:

- At 1200 - The wind was 280° at 7 kt
- At 1230 - The wind was 280° at 5 kt
- At 1300 - The wind was 280° at 3 kt

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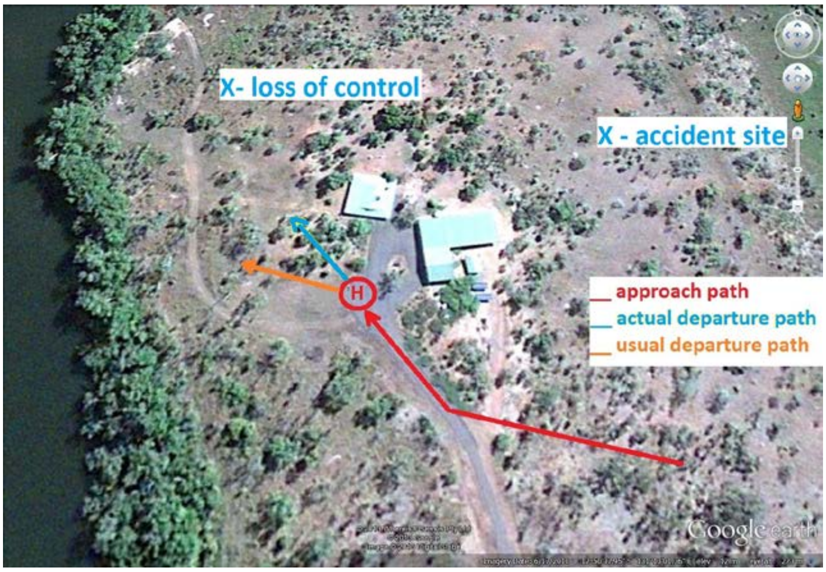
1 Central Standard Time (CST) was Coordinated Universal Time (UTC) + 10 hours.

2 Most takeoff and landings are carried out in a helicopter via the hover as the aircraft is in equilibrium, with the heading, position and height over the surface constant.

The Berrimah weather radar return at the time depicted a number of light to moderate showers in the area at the time of the accident.

Figure 1: Approach and departure paths



Source: Google Earth

Tail rotor anti-torque system

On United States designed single rotor helicopters such as the Robinson R22, the main rotor rotates counter clockwise as viewed from above. The torque to drive the main rotor causes the fuselage of the helicopter to rotate in the opposite direction (nose right). The anti-torque system (tail rotor) provides thrust, which counteracts this torque and provides directional control while hovering.

Loss of tail rotor effectiveness

Loss of tail rotor effectiveness (LTE) attributed solely to aerodynamic phenomena may occur in varying degrees in all single main rotor helicopters at airspeeds less than 30 kts. It affects the tail rotor's ability to provide directional control about the vertical axis.

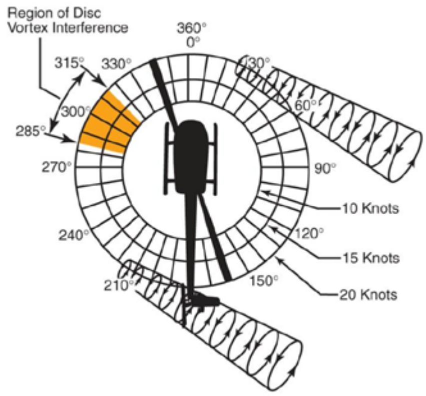
LTE is not necessarily the result of a deficiency in the control margins established during certification. These have been determined to adequately provide for the approved sideward and rearward flight velocities plus counteraction of gusts of a reasonable magnitude. The testing however is predicated on the assumption that the pilot is knowledgeable of the critical wind azimuths for the type of helicopter operated and maintains control of the helicopter by not allowing excessive yaw rates to develop.

The results of flight and wind tunnel testing identified three critical relative wind azimuths that either singularly, or in combination, can increase the risk of LTE by allowing the development of accelerating right yaw rates:

- wind from the left front of the helicopter at between 285° to 315° relative to the nose of the helicopter (Figure 2).
- left crosswind between 210° and 330° relative to the nose of the helicopter (Figure 3).
- tailwind from 120° to 240° relative to the nose of the helicopter (Figure 4)

It was also established that exposure to those relative winds did not result in aerodynamic stall of the tail rotor.

Figure 2: Main rotor disc vortex interference



Source: FAA AC 90-95

Figure 3: Tail rotor vortex ring state

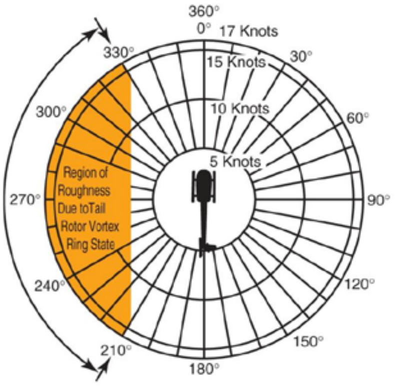
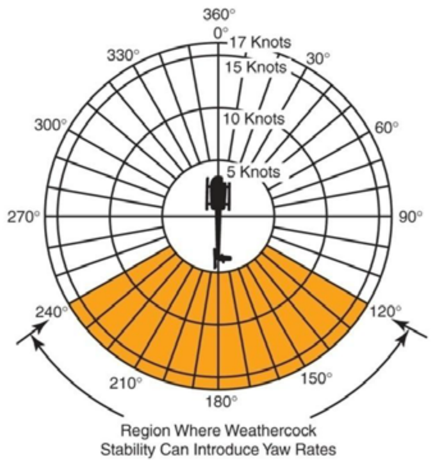


Figure 4: Weathercock stability



Source: FAA AC 90-95

ATSB comment

Any manoeuvre which requires the pilot to operate in a high-power, low-airspeed environment with a left crosswind or tailwind creates an environment where unanticipated right yaw may occur. During the go around, the pilot may have inadvertently placed the wind relative to the helicopter in the critical azimuth area, between 288° and 315°, where main rotor vortices may interact with the tail rotor, increasing the likelihood of LTE.

Safety message

In helicopters, wind will cause anti-torque system thrust variations to occur. Certain relative wind directions are more likely to cause tail rotor thrust variations than others. Knowing which direction the wind is coming from is critical – especially in light wind conditions. By maintaining an awareness of wind and its effect upon the helicopter, a pilot can significantly reduce the exposure to LTE.

Federal Aviation Administration (FAA) Advisory Circular AC 90-95 advises of conditions that may result in unanticipated right yaw on counter-clockwise single main rotor helicopters and the recommended recovery actions.

FAA AC 90-95 is available here:
www.rgl.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/0/aba9e26c4d43dfab862569e7007463bf/$FILE/ac90-95.pdf

The following reports provide further information of accidents involving LTE.

- ATSB Investigation – AO-2008-043
  www.atsb.gov.au/publications/investigation_reports/2008/aair/ao-2008-043.aspx
- NTSB Investigation - FTW03LA203
  www.dms.ntsb.gov/aviation/AccidentReports/fifkgt555wwis545b2ywfr551/X02212013120000.pdf
- AAIB Investigation - Robinson R44, G-SYTN
  www.aaib.gov.uk/cms_resources.cfm?file=/G-SYTN_11-05.pdf

General details

Manufacturer and model:	Robinson R22	
Registration:	VH-HGI	
Type of operation:	Private	
Primary occurrence type:	Loss of control	
Occurrence category:	Accident	
Location:	Adelaide River Station, Northern Territory	
	Latitude: S 12° 50.63	Longitude: E 131° 13.01
Persons on board:	Crew – 1	Passengers - 1
Injuries:	Crew – 1 (minor)	Passengers – 1 (serious)
Damage:	Substantial	

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.

About this Bulletin

The ATSB receives around 15,000 notifications of Aviation occurrences each year, 8,000 of which are accidents, serious incidents and incidents. It also receives a lesser number of similar occurrences in the Rail and Marine transport sectors. It is from the information provided in these notifications that the ATSB makes a decision on whether or not to investigate. While some further information is sought in some cases to assist in making those decisions, resource constraints dictate that a significant amount of professional judgement is needed to be exercised.

There are times when more detailed information about the circumstances of the occurrence allows the ATSB to make a more informed decision both about whether to investigate at all and, if so, what necessary resources are required (investigation level). In addition, further publically available information on accidents and serious incidents increases safety awareness in the industry and enables improved research activities and analysis of safety trends, leading to more targeted safety education.

The Short Investigation Team gathers additional factual information on aviation accidents and serious incidents (with the exception of 'high risk operations), and similar Rail and Marine occurrences, where the initial decision has been not to commence a 'full' (level 1 to 4) investigation.

The primary objective of the team is to undertake limited-scope, fact gathering investigations, which result in a short summary report. The summary report is a compilation of the information the ATSB has gathered, sourced from individuals or organisations involved in the occurrences, on the circumstances surrounding the occurrence and what safety action may have been taken or identified as a result of the occurrence.

These reports are released publically. In the aviation transport context, the reports are released periodically in a Bulletin format.

Conducting these Short investigations has a number of benefits:

- Publication of the circumstances surrounding a larger number of occurrences enables greater industry awareness of potential safety issues and possible safety action.
- The additional information gathered results in a richer source of information for research and statistical analysis purposes that can be used both by ATSB research staff as well as other stakeholders, including the portfolio agencies and research institutions.
- Reviewing the additional information serves as a screening process to allow decisions to be made about whether a full investigation is warranted. This addresses the issue of 'not knowing what we don't know' and ensures that the ATSB does not miss opportunities to identify safety issues and facilitate safety action.
- In cases where the initial decision was to conduct a full investigation, but which, after the preliminary evidence collection and review phase, later suggested that further resources are not warranted, the investigation may be finalised with a short factual report.
- It assists Australia to more fully comply with its obligations under ICAO Annex 13 to investigate all aviation accidents and serious incidents.
- Publicises ***Safety Messages*** aimed at improving awareness of issues and good safety practices to both the transport industries and the travelling public.

ATSB Transport Safety Report

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