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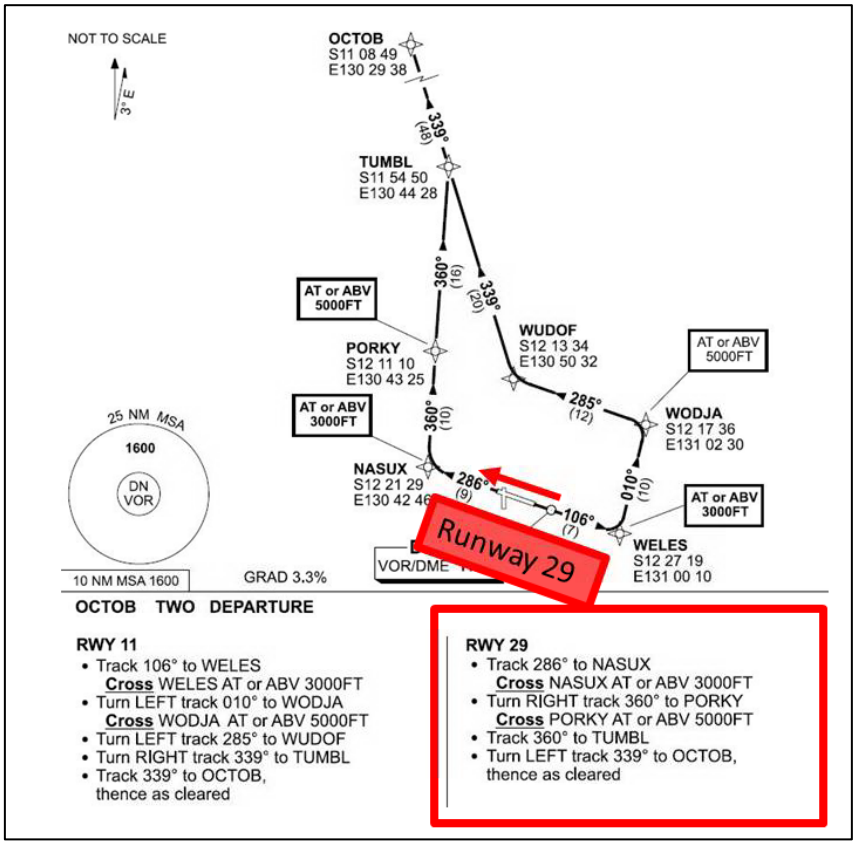
Loss of separation between a foreign military Boeing 737 and a Cessna 206, VH-RAP

What happened

On 12 March 2014, at about 1211 Central Standard Time (CST), the crew of a United States military Boeing 737 aircraft, callsign 'Convoy 7186', requested a clearance from the air traffic control (ATC) planner at Darwin Airport, Northern Territory, for a flight to Kadena Air Base, Japan via the 'A461' air route.[1]

The planner cleared Convoy 7186 to track to the destination via the 'OCTOB' waypoint at 5,000 ft above mean sea level (AMSL) and for an 'OCTOB TWO' standard instrument departure (SID)[2] from runway 29 (Figure 1). The crew read back that they were cleared via the OCTOB TWO departure up to 5,000 ft. The planner advised that a read back of OCTOB as the first waypoint was also required. The co-pilot looked up the departure plate for the OCTOB TWO departure and reported that this was an unusual clearance, with the first point being OCTOB rather than the intermediate waypoints as depicted in the procedure chart. The co-pilot then read back 'OCTOB as OCTOB TWO departure'.

Figure 1: Darwin OCTOB TWO SID



Source: Airservices Australia

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1 Waypoint OCTOB, at 80 NM from Darwin, was the first tracking point on the A461 air route.

2 When departing from runway 29, the SID required pilots to maintain runway heading for 9 NM prior to conducting a right turn to the north, with a requirement to reach 3,000 ft by 9 NM at waypoint NASUX.

Due to the perception that this clearance was non-standard, at about 1215, the co-pilot again contacted the planner and requested clarification that their first point was OCTOB. The planner reiterated the clearance and confirmed that the first cleared point on the flight planned route was OCTOB, maintain 5,000 ft, and that the original departure was an OCTOB TWO departure type. The crew acknowledged the clearance, but did not read back the information. The co-pilot reported that this verified that they were to track direct to OCTOB and not fly the actual departure procedure in its entirety.

At about 1245, the tower controller cleared the pilot of a Cessna 206 aircraft, registered VH-RAP (RAP), for take-off from runway 29 at Darwin, then to turn right onto a heading of 320° and climb to 3,000 ft AMSL.

During the taxi, the co-pilot of Convoy 7186 briefed the aircraft commander on the departure clearance. The commander was concerned that the clearance was unusual and attempted to verify the clearance with ATC. At about 1246, while approaching the holding point for runway 29, the commander of Convoy 7186 contacted the tower and requested an 'IFR release'.[3] The tower controller asked the crew to repeat the call. The commander then stated that they wanted to verify the clearance was 'direct OCTOB on the go, up to 5,000'. The tower controller replied 'Affirm', and directed the crew to contact the approach controller when airborne.

At about 1248, the approach controller identified RAP on radar, and instructed the pilot to maintain 2,000 ft. The approach controller reported that, having noted that the next aircraft was Convoy 7186 on an OCTOB TWO departure, he elected to keep RAP at 2,000 ft to guarantee separation; rather than the 3,000 ft altitude originally cleared.

Shortly after, and following take-off from runway 29, the crew of Convoy 7186 contacted the approach controller and advised they were passing 2,000 ft on climb to 5,000 ft and tracking direct to OCTOB (a heading of about 339°).

The approach controller immediately issued a safety alert[4] and advised the crew that there was a visual flight rules (VFR) aircraft at 2,000 ft about 1 NM ahead, and that Convoy 7186 was cleared on an OCTOB TWO SID. The crew replied, 'Negative, it's direct to OCTOB on the go' and advised that they had the VFR aircraft in sight. The approach controller advised the crew to maintain separation with the VFR aircraft and suggested that the best rate of climb be maintained. The crew then advised that they were on climb to 5,000 ft. The controller alerted RAP to the Boeing 737 overflying and advised that they were maintaining separation with RAP. The controller then cleared Convoy 7186 to continue tracking direct to OCTOB and to climb to flight level (FL)[5] 130.

The flight crew of Convoy 7186 reported that they did not receive a traffic collision avoidance system (TCAS) advisory or resolution at any stage and maintained visual separation with RAP at all times.

A subsequent review of the radar data indicated that, at about 1250, the Boeing 737 was about 1.9 NM horizontally from the Cessna 206 when both aircraft were at 2,000 ft AMSL, as Convoy 7186 passed behind RAP. Separation subsequently reduced to about 1 NM before vertical separation of 1,000 ft was achieved at about 1251, as Convoy 7186 passed abeam and to the right of RAP.

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[3] The term 'IFR release' and a number of other phrases that were used were not defined in the Aeronautical Information Publication (AIP).

[4] The provision of advice to an aircraft when an air traffic services officer becomes aware that an aircraft is in a position which is considered to place it in unsafe proximity to terrain, obstructions or another aircraft.

[5] 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 130 equates to 13,000 ft.

Department of Defence investigation

The Department of Defence conducted an internal investigation into the incident and identified the following issues:

- The controller in the planner position stated that the clearance issue process for Convoy 7186 was more laboured than normal as the crew did not read back the initial clearance and then queried the clearance. The planner reiterated the clearance in an attempt to alleviate any confusion. While the clearance was not read back by the crew a second time, the planner felt confident that the clearance had been understood as the crew had acknowledged the explanation with their callsign.
- The SID was not flown as per the ATC clearance issued by the planner. The clearance for the SID was not cancelled or changed at any time. The Manual of Air Traffic Services (MATS) and the Aeronautical Information Publication (AIP) specified the words that were required to effect a change of a clearance; 'cancel', 'recleared' and 'amended'. These words were not used by the tower controller.
- When the crew of Convoy 7186 questioned their initial tracking clearance, the use of 'Affirm' by the tower controller was deemed to be an ambiguous response. The tower controller believed that the crew were only querying their first tracking point and not the SID, and while the controller did not change the aircraft's clearance, the response provided may have led the crew to believe that the clearance had been altered. The pilot's professional and confident tone reassured the controller that the crew understood the remainder of the clearance.
- The approach controller immediately recognised the conflict and responded appropriately to the situation. These actions prevented the situation from developing further.

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.

Department of Defence

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

- In future, foreign military aircraft will be issued with departure instructions to maintain runway heading and then be provided with radar vectors to intercept track in order to avoid any potential for crews to misinterpret their departure tracking.
- A safety awareness poster was completed and displayed in prominent locations for Darwin based controllers to view, with the important facts and learning points from the incident.

US Military flight crew unit

The unit to which the pilots are attached will review current procedures and where necessary improve training and standardisation.

Safety message

This incident highlights the importance of both flight crew and ATC using standard phraseology in all radio communications. If there is any uncertainty about a clearance or instruction issued by ATC, or about a broadcast or request by flight crew, clarification should be sought to remove any ambiguity or misunderstanding.

General details

Occurrence details

Date and time:	12 March 2014 – 1250 CST	
Occurrence category:	Serious incident	
Primary occurrence type:	Loss of separation	
Location:	Darwin Airport, Northern Territory	
	Latitude: 12° 24.88' S	Longitude: 130° 52.60' E

Aircraft details: VH-RAP

Manufacturer and model:	Cessna Aircraft Company 206	
Registration:	VH-RAP	
Serial number:	U20602989	
Type of operation:	Charter – passenger	
Injuries:	Crew – Nil	Passengers – Nil
Damage:	Nil	

Aircraft details: Convoy 7186

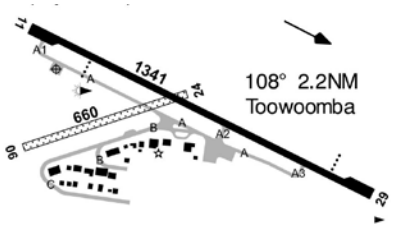
Manufacturer and model:	The Boeing Aircraft Company 737	
Callsign:	Convoy 7186	
Type of operation:	Military (foreign)	
Injuries:	Crew – Nil	Passengers – Nil
Damage:	Nil	

Turboprop aircraft

Runway incursion involving a Cessna 172, VH-WGL, and a de Havilland DHC-8, VH-QQD

What happened

Toowoomba Airport



Source: Airservices Australia

On 28 March 2014, the pilot of a Cessna 172, registered VH-WGL (WGL), conducted a private flight from Redcliffe aerodrome to Toowoomba Airport, Queensland. At about 1628 Eastern Standard Time (EST), the pilot broadcast on the common traffic advisory frequency (CTAF) that he was 10 NM to the north-east, inbound to Toowoomba, and intended to conduct a straight-in approach to runway 29.

At about the same time, a De Havilland DHC-8, registered VH-QQD (QQD), was parked on the itinerant apron at Toowoomba, adjacent to the A2 taxiway and about 50 m from the runway. The crew obtained a landing time in Brisbane of 1705 from Brisbane Air Traffic Control (ATC - flow control) and commenced start-up. While performing the start-up and associated checks, in accordance with standard company operating procedures, the crew did not have headsets on or the aircraft radio on speaker. During the after-start checks, the right stall warning illuminated. The crew actioned the appropriate checklist and assessed that the aircraft could be operated to Brisbane. This warning created a slight delay and the crew were conscious of the need to arrive in Brisbane at their allotted time.

At about 1631, the pilot of WGL broadcast on a 5 NM final and about 1 minute later, he broadcast on a 3 NM final for a full stop landing on runway 29. At about 1633, he broadcast on short final for runway 29. The aerodrome frequency response unit (AFRU) provided a beep-back for each of those calls, but no other response was heard on the CTAF.

About 20 seconds later, the first officer of QQD broadcast on the CTAF that QQD was taxying to runway 29, for a flight to Brisbane. The first officer reported that he heard the beep-back from the (AFRU), assumed it was due to an aircraft that had just completed circuits, and then contacted Brisbane Centre ATC and made a taxi call on that frequency as the aircraft approached the holding point. ATC replied with a transponder code for QQD. The first officer selected the transponder to standby prior to entering that code and checked the traffic collision avoidance system (TCAS) display for traffic.

As WGL flared to land, the pilot heard both taxi calls from QQD on the CTAF and Brisbane frequency and observed QQD taxi towards the runway. Approaching the holding point, the captain of QQD reported that he looked to the left and confirmed all clear, and the first officer looked to the right, did not sight any aircraft and confirmed clear to the right. The captain taxied QQD onto the runway and the first officer reported sighting the Cessna on the runway as QQD crossed the holding point.

At about 1634, WGL touched down about 5 m beyond the runway threshold, and the pilot observed QQD continue to taxi and turn onto the runway. He braked heavily and asked the crew of QQD whether they had heard his radio calls. The captain of QQD saw WGL on the runway and braked. He checked the TCAS, which he reported was selected to standby at that time, as no alert had been received. The pilot of WGL broadcast that he would backtrack and exit via taxiway A3. A brief communication between the crew of the two aircraft confirmed that they were both on the CTAF and that the crew of QQD had not heard any of the broadcasts from WGL. No further calls were heard from QQD on the CTAF.

Safety message

The ATSB SafetyWatch highlights the broad safety concerns that come out of our investigation findings and from the occurrence data reported to us by industry. One of the safety concerns is safety around non-controlled aerodromes www.atsb.gov.au/safetywatch/safety-around-aeros.aspx.

Research conducted by the ATSB found that, between 2003 and 2008, 32 runway incursions were recorded at non-towered aerodromes. Broadcasting on and monitoring of the CTAF is the key way for pilots to establish situational and traffic awareness. The ATSB *Limitations of the see-and-avoid principle* study found that the effectiveness of a search for other traffic is eight times greater when a radio is used effectively in combination with a visual lookout, than when no radio is used. *A pilot's guide to staying safe in the vicinity of non-towered aerodromes* is available at www.atsb.gov.au/publications/2008/avoidable-1-ar-2008-044(1).aspx.

General details

Occurrence details

Date and time:	28 March 2014 – 2039 EST	
Occurrence category:	Incident	
Primary occurrence type:	Runway incursion	
Location:	Toowoomba Airport, Queensland	
	Latitude: 27° 32.48' S	Longitude: 151° 54.75' E

Aircraft details: VH-WGL

Manufacturer and model:	Cessna Aircraft Company 172S	
Registration:	VH-WGL	
Serial number:	172S9271	
Type of operation:	Private	
Persons on board:	Crew – 1	Passengers – 1
Injuries:	Crew – Nil	Passengers – Nil
Damage:	Nil	

Aircraft details: VH-QQD

Manufacturer and model:	de Havilland Canada DHC-8	
Registration:	VH-QQD	
Operator:	Skytrans	
Serial number:	245	
Type of operation:	Air transport low capacity	
Persons on board:	Crew – 3	Passengers – 11
Injuries:	Crew – Nil	Passengers – Nil
Damage:	Nil	

Piston aircraft

VFR into IMC involving a Piper PA-28R, VH-TBB

What happened

On 21 February 2014, the pilot of a Piper PA-28R aircraft, registered VH-TBB, departed Scone, New South Wales on a private flight to Warwick, Queensland. The flight was planned under the visual flight rules (VFR). The planned route took the aircraft overhead Tamworth and Inverell, then on to Warwick (Figure 1). The pilot was familiar with the route, having flown it many times before.

Figure 1: VH-TBB planned route

Source: Google earth

The pilot checked the relevant weather forecasts earlier in the day while planning the flight, including a review of the area forecasts and the aerodrome forecasts (TAF)[1] for en-route aerodromes.[2] In broad terms, the area forecasts indicated that some cloud might affect the flight, and that isolated afternoon thunderstorms might be encountered over the northern half of the route. The Tamworth TAF indicated that CAVOK[3] conditions could be expected, but the TAF for

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1 Aerodrome forecasts are a statement of meteorological conditions expected for a specific period of time, in airspace within a radius of 5 NM (9 km) of the aerodrome.

2 No TAF was available for the destination aerodrome (Warwick).

3 CAVOK means ceiling and visibility OK – the visibility, cloud and weather are better than prescribed conditions. In the context of a TAF, this means that the visibility is forecast to be 10 km or more, no significant cloud is forecast below 5,000 ft, no cumulonimbus or towering cumulus cloud is forecast at any height, and no other significant weather is forecast within 9 km of the aerodrome.

Inverell included broken[4] cloud with a base at 2,000 ft above the airport. The TAF for Inverell also included a 30% probability of TEMPO[5] periods of thunderstorm activity, commencing at 1200 Eastern Daylight-saving Time (EDT). The pilot initially planned to depart Scone at 1400, but, noting the forecast possibility of afternoon thunderstorms near Inverell, he elected to depart Scone around midday.

The flight passed over Tamworth and Inverell in clear conditions, but en-route between Inverell and Warwick the pilot encountered an increasing amount of cloud and light rain showers. The pilot initially attempted to pass beneath the cloud, but had difficulty remaining in visual meteorological conditions (VMC).[6] Although the cloud appeared to be relatively light with ill-defined edges, the pilot soon found that, while the ground beneath was visible, forward visibility was restricted.

The pilot had established a flight-following service[7] with air traffic control (ATC), but radar coverage was intermittent as the flight proceeded north. At 1329, the aircraft was identified on radar north of Inverell, and at that time was maintaining 5,500 ft.

Soon after, at about 1333, ATC advised the pilot that the relevant grid lowest safe altitude[8] was 6,300 ft, lowering to 5,800 ft further north.[9] The pilot responded that he was aware of his position and that he was climbing back to 5,500 ft.

A few minutes later, the pilot advised ATC that he was in instrument meteorological conditions (IMC),[10] adding that he was 'OK' and that he was maintaining 5,500 ft. ATC advised the pilot that there was no reported instrument flight rules (IFR) traffic if he wished to climb further, but the pilot elected to remain at 5,500 ft, reporting that he was 'in and out of IMC' at that altitude.

At 1340, ATC asked the pilot if he wished to change from a VFR to an IFR flight, but the pilot replied that he was not qualified to conduct an IFR flight. ATC then offered the pilot assistance in finding an area suitable for continued VFR flight. The pilot did not respond to the offer of assistance, instead advising that he intended to descend to 5,000 ft in view of what appeared to be better conditions at that altitude. ATC advised the pilot that there was no reported IFR traffic affecting descent. Concerned about the circumstances surrounding the flight's progress, ATC initiated an alert phase (ALERFA).[11] At 1344, ATC asked the pilot about in-flight conditions. The pilot responded that he was continuing to intermittently encounter IMC and advised that he was now maintaining 5,000 ft.

Shortly after, ATC asked the pilot if he could see Tenterfield or Stanthorpe, to which the pilot responded that Tenterfield was to the east, and that he was 45 NM south of Warwick. ATC suggested that the pilot consider landing at Tenterfield, if he thought it was possible to reach Tenterfield in VMC, or that he climb above the lowest safe altitude (which at that point was 5,800 ft), if the pilot was 'comfortable to proceed IFR'. The pilot responded that he was

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4 Cloud cover is normally forecast using expressions that denote the forecast extent of the cover. The expression 'broken' indicates that more than half to almost all the sky was forecast to be covered.

5 TEMPO indicates a temporary deterioration in the forecast weather conditions, during which significant variation in the prevailing conditions is expected to last for periods of between 30 and 60 minutes in each instance.

6 VMC describes weather conditions in which flight under the VFR is permitted – that is, conditions in which the pilot has sufficient visibility to fly the aircraft maintaining visual separation from terrain and other aircraft.

7 Flight-following involves the provision of ongoing surveillance information to VFR flights in specific classes of airspace, and under specific conditions. The service is intended to assist pilot situation awareness.

8 The grid lowest safe altitude is published on some Airservices Australia charts. More information regarding grid lowest safe altitudes is provided in *Aeronautical Information Publication (AIP) Australia*.

9 The ATSB did not review Airservices Australia radar data during investigation into this incident. An analysis of other data indicated that the aircraft was about one-third of the way between Inverell and Warwick when ATC advised the pilot of the relevant grid lowest altitude. Radio transcripts obtained by the ATSB did not indicate what prompted ATC to advise to the pilot of the grid lowest safe altitude.

10 IMC describes weather conditions that require pilots to fly primarily by reference to instruments, and therefore under the instrument flight rules (IFR), rather than by outside visual references. Typically, this means flying in cloud or limited visibility.

11 ATC initiate an ALERFA when among other things, apprehension exists as to the safety of the aircraft and its occupants, or an aircraft is operating in IMC when it should not.

'comfortable to proceed IFR', that continued VFR flight 'towards Stanthorpe' did not appear possible, and that he was now climbing to 5,800 ft. The pilot then informed ATC that visual contact with terrain was possible '90% of the time', adding 'everything's OK'. Soon after, having lost radar identification, ATC asked the pilot about his current level and intentions, to which the pilot responded that he was passing 5,500 ft, climbing to 5,800 ft.

At 1349, ATC advised the pilot to remain in VMC if possible, to which the pilot responded that it would be necessary to descend again to maintain VMC. About 2 minutes later, the pilot reported that he was maintaining 5,200 ft in VMC. Soon after, when about 30 NM south of Warwick, the pilot reported that conditions ahead were clear. The aircraft continued to Warwick and landed without further incident.

Pilot comments

The pilot provided the following comments regarding the incident:

- With the benefit of hindsight, it would have been prudent to turn back when the extent of cloud north of Inverell became apparent.
- The weather did not initially appear to be particularly threatening – the cloud was relatively light with ill-defined edges and the conditions were smooth. This provided him with some confidence that descent beneath the cloud would allow him to continue safely towards Warwick. However, he soon found out that the aircraft was in a position where turning back may have been equally as difficult as continuing towards Warwick.
- During the encounter with marginal conditions, the total time in cloud was about a minute.
- He had undertaken some IFR training about 2 years prior to this incident. This training had provided a level of confidence with respect to maintaining aircraft control in less than VMC.
- The aircraft was equipped with a three-axis auto-pilot, which the pilot used during his encounter with marginal conditions.

ATSB comment – ATC support

While weather-related decision making was the responsibility of the pilot, he availed himself of ATC advice and support to help deal with the circumstances by requesting flight-following services and advising ATC of the prevailing conditions. During this incident, ATC was able to relay information regarding lowest safe altitudes and possible diversion aerodromes, and keep the pilot informed with respect to any known and possibly conflicting air traffic. Under some circumstances, ATC may also be able to assist pilot situation awareness by providing advice with respect to weather conditions in the area and on the planned route.

Safety message

Pilots are encouraged to make conservative decisions when considering how forecast weather may affect their flight. If poor weather is encountered en-route, timely and conservative decision making may be critical to a safe outcome. VFR pilots are also encouraged to familiarise themselves with VMC criteria detailed in *Aeronautical Information Publication (AIP) Australia*, and carefully consider available options where forecast or actual conditions are such that continued flight in VMC cannot be assured.

The ATSB SafetyWatch highlights the broad safety concerns identified in investigation findings and from the occurrence data reported to the ATSB by industry. One safety concern relates to general aviation pilots who fly into conditions of reduced visibility, without the appropriate training, skills and qualifications. The two main risks associated with flight into conditions of reduced visibility are: a loss of orientation, leading to loss of control and uncontrolled flight into terrain; and if the pilot is able to maintain control, the pilot may be unable to see and avoid obstacles,

leading to controlled flight into terrain. Refer to the ATSB website at www.atsb.gov.au/safetywatch/ga-pilots.aspx.

The ATSB recently published *Avoidable Accidents No. 4 – Accidents involving Visual Flight Rules pilots in Instrument Meteorological Conditions* (www.atsb.gov.au/publications/2011/avoidable-4-ar-2011-050.aspx). A key message outlined in the report is:

> *Pressing on in to IMC conditions with no instrument rating carries a significant risk of severe spatial disorientation due to powerful and misleading orientation sensations in the absence of visual cues. Disorientation can affect any pilot, no matter what their level of experience.*

Numerous ATSB accident investigations and research data clearly illustrates the hazardous nature of continued VFR flight in conditions of reduced visibility. A 2005 ATSB investigation research report compared different general aviation pilot weather-related decision making behaviours. This report reinforces the significant dangers associated with VFR flight into IMC. A copy of the report is available on the ATSB website at www.atsb.gov.au/publications/2005/pilot_behaviours_adverse_weather.aspx.

General details

Occurrence details

Date and time:	21 February 2014 – 1342 EDT	
Occurrence category:	Incident	
Primary occurrence type:	VFR into IMC	
Location:	100 km S of Warwick, Queensland	
	Latitude: 28° 59.52’ S	Longitude: 151° 34.62’ E

Aircraft details

Manufacturer and model:	Piper Aircraft Corporation PA-28R-201	
Registration:	VH-TBB	
Serial number:	28R-7737153	
Type of operation:	Private	
Persons on board:	Crew – 1	Passengers – Nil
Injuries:	Crew – Nil	Passengers – Nil
Damage:	None	

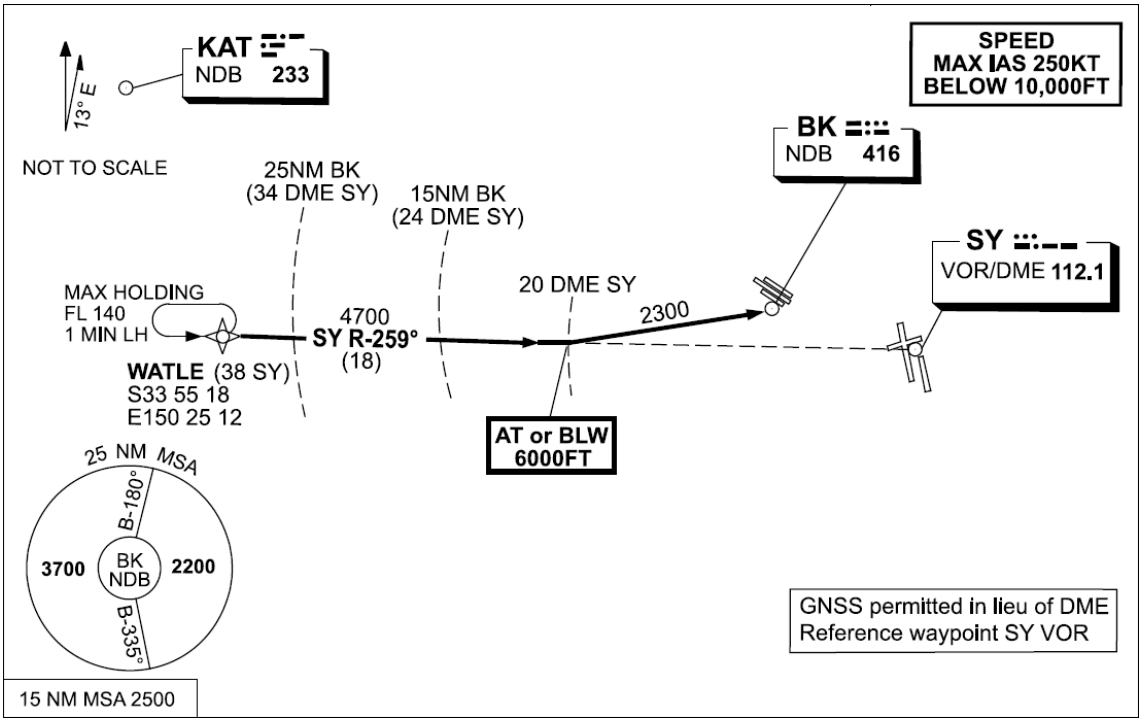
Near collision involving a Piper PA-31, VH-XGW, and a Piper PA-28, VH-IBX

What happened

On 1 April 2014, a Piper PA-31 aircraft, registered VH-XGW (XGW), departed Canberra, Australian Capital Territory, on an aeromedical flight to Bankstown, New South Wales, under the instrument flight rules (IFR), with a pilot, check pilot, flight nurse and patient on board.

The pilot conducted a WATLE Five Arrival (Figure 1) to Bankstown, tracking on the Sydney 259 radial[1] until 20 NM from Sydney, and then turning to track direct to Bankstown.

Figure 1: STAR WATLE Five Arrival



Source: Airservices Australia

At about 1940 Australian Eastern Daylight Time (AEDT), a Piper PA-28 aircraft, registered VH-IBX (IBX) departed Bankstown on a training flight to Orange, New South Wales, under the night visual flight rules (NVFR), with a pilot-under-instruction and a flight instructor on board. IBX took off from runway 11 and climbed to 1,500 ft AMSL before departing the Bankstown zone at 3 NM, on climb to 2,300 ft AMSL. The instructor reported that this provided a height above the lowest safe altitude (LSALT) of 1,900 ft AMSL based on clearance above the radio tower 2RN and below controlled airspace at 2,500 ft AMSL. The pilot took up a heading to intercept the 275 radial from Sydney.

Prior to being transferred to Bankstown Tower, Sydney ATC advised the pilot of XGW that a VFR aircraft had departed Bankstown and was about 5 NM away and at 1,600 ft AMSL. The pilot responded that he had the aircraft in sight. At about 1944, the pilot of XGW contacted the Bankstown Tower controller when about 11 NM west of Bankstown and on descent to 2,300 ft

[1] Magnetic bearing extending from a point-source navaid such as a VOR (VHF Omni Directional Radio Range)

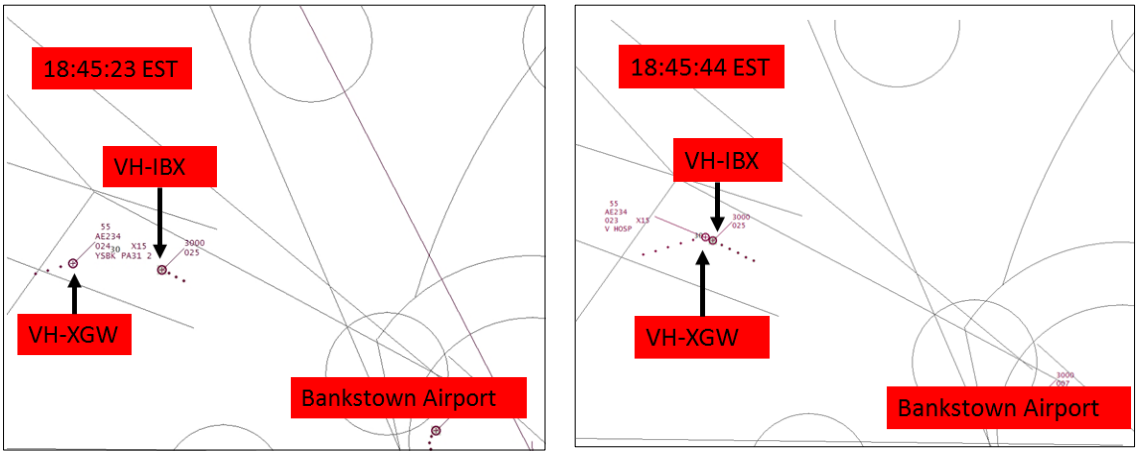
above mean sea level (AMSL). The tower controller instructed the pilot to join final for a straight in approach to runway 11.

The controller then advised the pilot of XGW that departing traffic was a Cherokee in his '1 o'clock,[2] becoming 12 o'clock' about 2 NM away, and at 2,300 ft AMSL (Figure 2). The pilot of XGW replied that he had the traffic sighted.

When at 2,300 ft AMSL and about 6 NM from Bankstown, the instructor of IBX heard the controller give XGW the traffic and sighted XGW. He observed that the aircraft lights did not appear to be moving in the windscreen and monitored the aircraft to see if it would deviate from what appeared to be a converging track with IBX. The check pilot of XGW sighted IBX and did not expect the two aircraft to come into conflict and returned his focus to ensuring the pilot in command intercepted the glide slope and lined the aircraft up on the runway precision approach path indicator (PAPI).[3]

The instructor of IBX then observed the landing light of XGW come on, immediately took control of IBX from the pilot-under-instruction, and conducted a climbing turn to the left. He sighted XGW pass about 200 ft below IBX. Radar data provided to the ATSB by Airservices Australia showed that the aircraft came within 200 ft vertically of each other and that IBX passed over XGW.

Figure 2: Radar plots of IBX and XGW



Source: Airservices Australia

Pilot comments: VH-IBX

The instructor of IBX provided the following comments:

- When the pilot of XGW reported that they had IBX visual, he thought that XGW would turn and track behind IBX, or descend.
- As IBX was crossing the path of XGW from the right, he maintained the heading of IBX in accordance with CAR 161 (2),[4] as the aircraft with the right of way, until he determined that XGW was not taking any avoiding action and that there was a risk of collision with XGW.
- The En-Route Supplement Australia (ERSA) for Bankstown advises pilots of aircraft departing Bankstown to change from tower frequency to monitor Sydney centre frequency when 3 NM from Bankstown. If he had done that and not stayed on Bankstown tower frequency, and thus been alerted to XGW, he may not have sighted the aircraft and been able to take avoiding action.

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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 Precision Approach Path Indicator (PAPI) is a ground based, visual approach indicating system that uses a colour discriminating system used by pilots to identify the correct glidepath to the runway.

4 The visual flight rules guide: www.casa.gov.au/wcmswr/_assets/main/pilots/download/vfr/vfrg1-high.pdf

- Due to noise abatement procedures, aircraft depart Bankstown at night from runway 11 on a right downwind.

Pilot comments: VH-XGW

The check pilot of XGW provided the following comments:

- The sector LSALT for a WATLE arrival is 2,300 ft AMSL and once established on final for runway 11 and established on the PAPI, the aircraft can descend and arrive outside controlled airspace into Bankstown.
- Aircraft operating under night visual flight rules arriving and departing Bankstown outside controlled airspace (Class G), are below the LSALT when entering or leaving the zone at 1,500 ft AMSL (Figure 3).
- Creation of a specific VFR departure track from Bankstown at night would ensure separation with inbound IFR aircraft tracking to align with the PAPI.

Airservices Australia comment

In response to the above comment regarding the frequency published in ERSA, Airservices Australia advised that if the pilot had been on Sydney frequency, he would also have heard the traffic information as it was provided by the radar controller to XGW immediately prior to the tower controller.

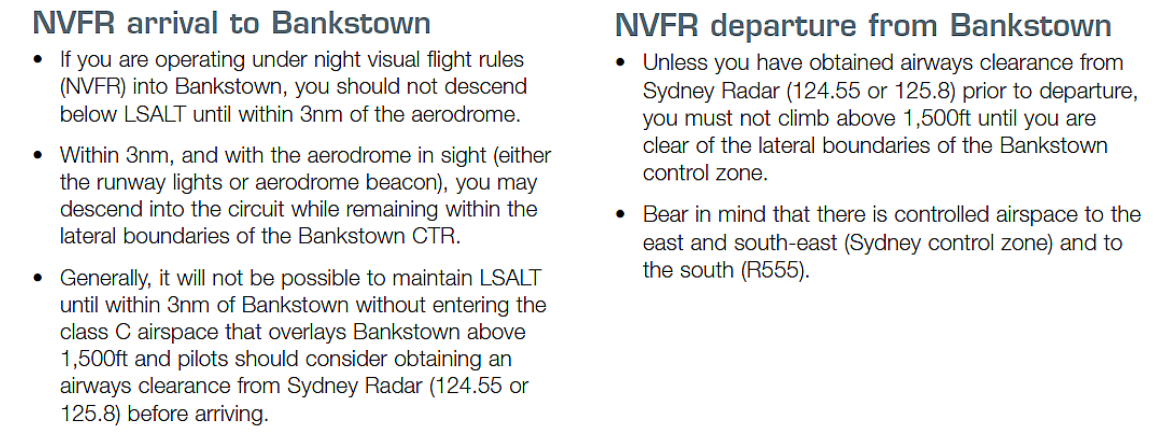
Civil Aviation Safety Authority (CASA) comment

In a response provided to the ATSB, CASA has advised that there is a conflict between the requirements of CAR 174B (1) and the ERSA requirement to arrive and depart the Bankstown control zone at 1,500 ft under the NVFR. In order to comply with the altitude requirements, a pilot may be required to obtain an ATC clearance to enter Class C airspace.

When Bankstown control zone is active, a departing aircraft is required to change from Bankstown Tower to Sydney Centre frequency after passing the control zone boundary when about 3 NM from Bankstown Airport. An aircraft inbound to Bankstown from the west, and on the Tower frequency, may cross the path of the outbound aircraft with the pilot of each aircraft monitoring a different frequency. Where an aircraft is only fitted with one radio, this may pose a significant safety concern.

CASA recognises that a safety issue exists, and is in the process of addressing the concerns.

Figure 3: Extract from the Sydney Basin Visual Pilot Guide



Source: CASA

Safety message

This incident highlights the need for pilots operating under the visual flight rules (VFR) to maintain adequate separation from other aircraft. Even with alerted communication, being able to see and avoid other aircraft at night can be inherently difficult due to the limitations of night vision and distractions of other man-made lighting.

The Sydney Basin Visual Pilot guide is available from the CASA website at: www.casa.gov.au/scripts/nc.dll?WCMS:STANDARD::pc=PC_90007

General details

Occurrence details

Date and time:	1 April 2014 – 1945 EDT	
Occurrence category:	Serious incident	
Primary occurrence type:	Near collision	
Location:	13 km W Bankstown Airport, New South Wales	
	Latitude: 33° 53.95' S	Longitude: 150° 51.08' E

Aircraft details: VH-XGW

Manufacturer and model:	Piper Aircraft Corporation PA-31P-350/A1	
Registration:	VH-XGW	
Serial number:	31P-8414001	
Type of operation:	Aerial work – EMS	
Persons on board:	Crew – 3	Passengers – 1
Injuries:	Crew – Nil	Passengers – Nil
Damage:	Nil	

Aircraft details: VH-IBX

Manufacturer and model:	Piper Aircraft Corporation PA-28-151	
Registration:	VH-IBX	
Serial number:	28-7615098	
Type of operation:	Flying training – dual	
Persons on board:	Crew – 2	Passengers – Nil
Injuries:	Crew – Nil	Passengers – Nil
Damage:	Nil	

Flight instrument issue in IMC involving a Piper PA 27, VH-DTL

What happened

On 18 April 2014, the pilot of a Piper PA-27 aircraft, registered VH-DTL, was preparing for a private flight from Moorabbin, Victoria to Flinders Island, Tasmania, under the instrument flight rules (IFR), with five passengers. The pilot performed a weight and balance calculation based on accurate passenger weights and estimated baggage weights, and assessed that the aircraft would be within the operating limits, but the centre of gravity would be towards the forward limit. He then directed the passengers to load the majority of the baggage in the rear cargo locker to move the centre of gravity further aft.

Flinders Island, Tasmania

Source: Google earth

The pilot obtained the appropriate weather forecasts and noted that a front would pass through at about the proposed time of the flight. The cloud tops were forecast at 8,000 ft above mean sea level (AMSL) and the pilot planned to conduct the flight at 9,000 ft AMSL to remain above the cloud. Prior to departure, the front passed over Moorabbin Airport, producing a moderate amount of rain and wind.

At about 1200 Eastern Standard Time (EST), the aircraft departed Moorabbin. When at about 2,000 ft above ground level (AGL), the aircraft entered cloud. The aircraft momentarily exited cloud and the pilot observed that, although the primary artificial horizon (AH) indicated level flight, the aircraft was in a descending turn. He then cross-checked the secondary AH, which was consistent with the descending turn. The pilot disconnected the autopilot as it was directed by the primary AH and operated the aircraft with reference to the secondary AH. He reported that he had considered turning back to Moorabbin at that time, however, the primary AH appeared to settle and accurately reflect the aircraft state and he re-engaged the autopilot.

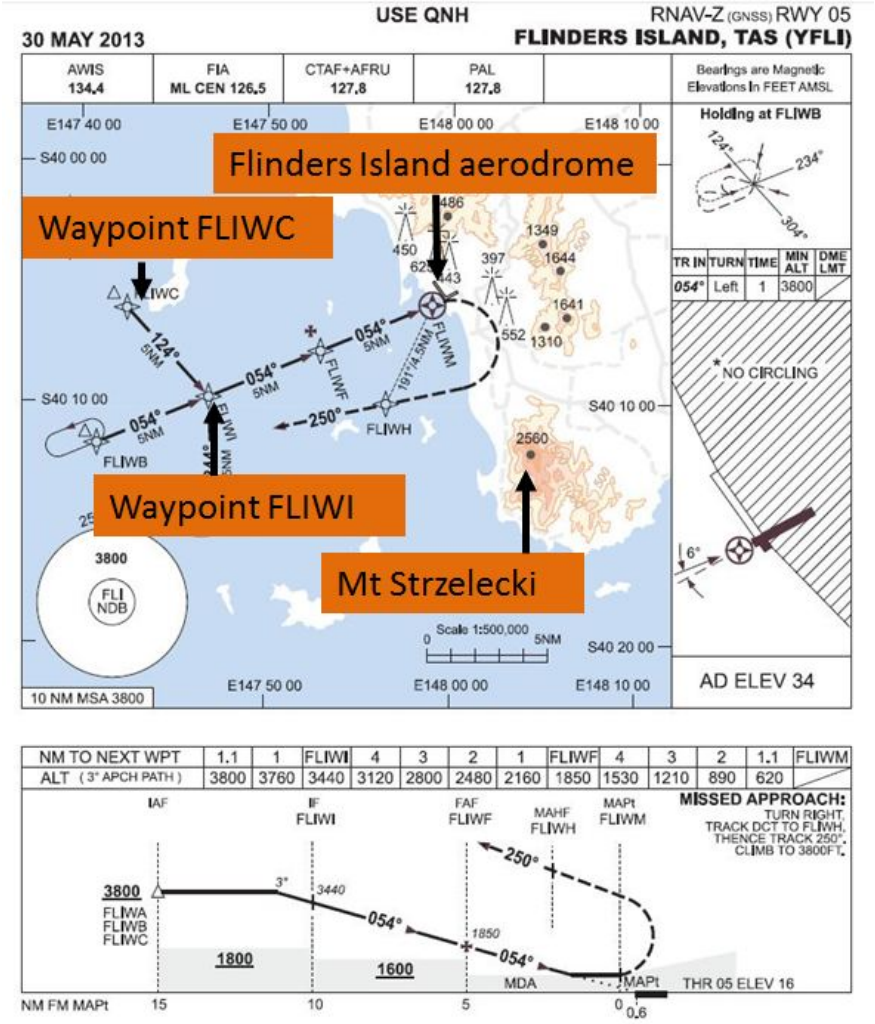
The pilot reported that the aircraft appeared to travel with the weather front en-route to Flinders Island and encountered some light hail and moderate to severe turbulence. He was advised by air traffic control (ATC) that thunderstorms were observed to be forming in Bass Strait. The aircraft was in cloud throughout the cruise and the pilot reported that severe turbulence intermittently caused both AHs to provide unstable indications.

The pilot set up the global positioning system (GPS) to track for the runway 05 area navigation global navigation satellite system (RNAV (GNSS)) approach to Flinders Island, via waypoint 'FLIWC', abeam Prime Seal Island (Figure 1). As the aircraft passed overhead the waypoint, the aircraft was clear of cloud and the pilot cancelled his SARTIME[1] with ATC. He was advised by ATC that there was no relevant IFR traffic. Shortly after, the pilot heard an aircraft departing Flinders Island and he broadcast an inbound call on the common traffic advisory frequency (CTAF).

[1] Time nominated by a pilot for the initiation of Search and Rescue action if a report from the pilot has not been received by the nominated unit.

After passing overhead the waypoint, the pilot reported that the GPS did not sequence to the next waypoint, 'FLIWI', for the approach. He had AvPlan[2] on an iPad and continued to fly the approach using AvPlan. After passing the subsequent approach points and when at about 1,000 ft AGL on approach to runway 05, the aircraft encountered heavy rain. Although clear of cloud and visual with the ground, the pilot was unable to maintain forward visibility and therefore unable to sight the runway. Aware of rising terrain to the south of the aerodrome (Mt Strzelecki), the pilot commenced a left turn in an attempt to circle back to approach the runway, using the iPad to indicate the runway location.

Figure 1: Flinders Island RNAV-Z (GNSS) approach



Source: Airservices Australia

When at about 500 ft AGL, the aircraft encountered severe turbulence, which resulted in a high angle of bank and the stall warning horn activating. The pilot regained control of the aircraft. With both AHs not providing accurate information, the aircraft entered cloud. As the aircraft was below the lowest safe altitude and the pilot was uncertain of the aircraft's position, he elected to turn to the west, toward the ocean, and climb. During the encounter with turbulence, the iPad screen went blank and the pilot was unable to restore it.

[2] AvPlan is a flight planning application approved by the Civil Aviation Safety Authority (CASA) under Civil Aviation Regulation (CAR) 233-1(h).

Once clear of the area, the pilot attempted to select the frequency on the automatic direction finder (ADF), to conduct a non-directional (radio) beacon (NDB)[3] approach to Flinders Island. The ADF did not identify and the pilot was unable to commence the approach.

The pilot then contacted ATC and reported that the aircraft was in cloud with unreliable AHs, GPS and ADF. The controller advised the pilot to keep the aircraft's wings level, and after communicating with other aircraft in the vicinity, advised the pilot to turn onto a heading of 150° and climb to 8,000 ft AMSL to fly clear of the cloud. After about 20 minutes, the pilot observed the coastline, and with assistance from ATC, identified the aircraft's position as over the north-east coast of Tasmania. ATC advised that both Flinders Island and Moorabbin had low cloud in the area and the pilot elected to divert to Saint Helens aerodrome, Tasmania.

Pilot comments

The pilot provided the following comments regarding the incident:

- Loading the baggage in the rear cargo locker moved the centre of gravity aft. However, this may have resulted in the centre of gravity being beyond the rear limit for the aircraft resulting in difficulties controlling the aircraft in turbulence.
- At about 0700, he contacted a boat operator in Flinders Island to obtain local expertise on the forecast weather. The boat operator did not think 'there was much in it'.
- He had not previously conducted an approach using the AvPlan software on the iPad, and this, combined with the deteriorating weather conditions increased his workload during the approach.
- He did not activate the runway lighting prior to the approach as it was daylight, and he had intended to conduct a visual approach as the aircraft was below cloud when at waypoint 'FLIWC'.
- He did not conduct the published missed approach procedure as he was uncertain of the aircraft position and cognisant of avoiding the high terrain to the south; he elected to turn left towards the coast.
- There were no thunderstorms forecast for the area or the destination. The weather conditions encountered were more severe than what was forecast.
- Engineers advised that, after the incident, the GPS was determined to be unserviceable, the primary AH was repaired and the vacuum gauge and hoses were replaced. The ADF may have failed due to static build up from the thunderstorm.

Safety message

This incident highlights the need for accurate weight and balance calculations, to ensure the aircraft is operated within its limits; and how unreliable or unserviceable instruments can increase pilot workload, particularly when in instrument meteorological conditions (IMC).

Furthermore, it demonstrates the importance of decision-making, prior to, and throughout a flight. Pilot decision making, particularly weather-related decision making, is complex. The ATSB report *Improving the odds: Trends in fatal and non-fatal accidents in private flying operations*, found that problems with pilots' assessing and planning were contributing factors in about half of all fatal accidents in private operations. The report encourages pilots to consider strategies such as: make decisions prior to the flight; continually assess the flight and particularly the weather conditions; set personal minimums; and seek local knowledge of the route and destination as part of the pre-flight planning. Becoming familiar with the aircraft's systems, controls and limitations may alleviate poor aircraft handling during non-normal flight conditions. The report is available from the ATSB's website at: www.atsb.gov.au/publications/2008/ar2008045.aspx

[3] A non-directional (radio) beacon (NDB) is a radio transmitter at a known location, used as a navigational aid. The signal transmitted does not include inherent directional information.

General details

Occurrence details

Date and time:	18 April 2014 – 1235 EST	
Occurrence category:	Serious incident	
Primary occurrence type:	Flight instrument issue	
Location:	near Flinders Island aerodrome, Tasmania	
	Latitude: 40° 05.48' S	Longitude: 147° 59.57' E

Aircraft details

Manufacturer and model:	Piper Aircraft Corporation PA-27	
Registration:	VH-DTL	
Serial number:	27-4033	
Type of operation:	Private	
Persons on board:	Crew – 1	Passengers – 5
Injuries:	Crew – Nil	Passengers – Nil
Damage:	Nil	

Wheels up landing involving a Beech BE58, VH-AKG

What happened

On 28 April 2014, at about 0800 Central Standard Time (CST), a Beech BE58 aircraft, registered VH-AKG (AKG), departed Gove, for a charter flight to Ramingining, Northern Territory, with a pilot and two passengers on board.

At about 0845, when in the circuit at Ramingining, the pilot selected the landing gear down and the first stage of flap. Two green lights illuminated for the landing gear, however the right main landing gear light did not. The pilot then relocated the aircraft to hold to the north of the aerodrome, and attempted to determine the cause of the abnormal indication. He changed the light bulb and the right landing gear light still did not illuminate, and a test of the indicator function showed it to be working correctly. He then operated the landing gear lever to retract and extend the landing gear twice, and the same indications appeared.

Another aircraft then landed at Ramingining and the pilot of AKG asked the pilot of that aircraft to determine during a fly-by whether the landing gear was extended normally. The pilot on the ground advised that the right main landing gear remained retracted in the gear well. The pilot of AKG then used the emergency gear handle in an attempt to extend the landing gear, however it was in the fully extended position and the right main landing gear light remained off.

The pilot advised the passengers that the status of the landing gear was uncertain and he initially elected to return to Gove. The flaps remained extended at the first stage (10°) and the circuit breaker popped when the pilot attempted to retract them. He then contacted the chief pilot via telephone and advised him of the situation and his intention to return to Gove. The chief pilot asked the pilot to confirm there was sufficient fuel on board and requested the aircraft divert to Darwin, where emergency services and engineering personnel were available.

The pilot retracted the landing gear and then retracted the flaps by repeatedly resetting the circuit breaker. During the 90 minute flight to Darwin, the pilot rehearsed the emergency procedures for a wheels-up landing. The chief pilot contacted Darwin air traffic control (ATC) and advised of the situation. When about 70 NM from Darwin Airport, the pilot contacted Darwin ATC. On approach, he requested holding at Hope Inlet and selected the landing gear down, with the same result. He briefed the passengers regarding the landing gear status and advised that they would conduct a fly-by of the tower to allow an inspection of the landing gear. He conducted a fly-by inspection at Darwin tower, and the controller, engineer and chief pilot all verified that that right main landing gear had not extended and was still up in the wheel well. The pilot then retracted the landing gear, which was confirmed by the personnel in the tower, and did not attempt to extend it again.

The tower controller cleared AKG to land on runway 36, however the pilot requested holding at Lee Point to brief the passengers for a wheels-up landing and subsequent exit from the aircraft. He then fully extended the flaps, which took some time, with repeated resetting of the circuit breaker. At about 1145, the pilot was cleared to land on runway 36. He reported that the workload on the final approach was high, as the aircraft was more responsive without the landing gear extended. He kept some power on during the approach in case a go-around was required. When over the runway threshold, the pilot selected the mixture levers to idle cut-off. The rear step scraped on the runway, the flaps then contacted it, followed by the aircraft fuselage, and the left propeller, which caused the aircraft to yaw to the left. The pilot used right rudder to keep the aircraft straight and then the right propeller contacted the runway and the pilot again corrected the yaw. The aircraft came to rest about half way along the runway and the pilot switched all the electrics and fuel off. The pilot exited the aircraft and assisted the passengers to disembark. No injuries were sustained and the aircraft was substantially damaged (Figure 1).

Figure 1: Damage to VH-AKG

Source: Operator

Engineering inspection

An engineering inspection found that the up-lock assembly on the right main landing gear was binding and prevented extension of the right main landing gear. The up-lock mechanism pivots on a bolt, which was not listed in the lubrication chart for the aircraft. The binding of the assembly damaged the retract-extend rod and prevented any further movement of the retraction mechanism on the right main landing gear.

The damaged retract-extend rod placed load on the flap actuating cable, causing the flap circuit breaker to trip. This prevented the flaps from extending and retracting normally.

Safety message

This incident provides a positive example of how well a pilot copes with a distraction or equipment failure. Having planned to carry more than adequate fuel for the flight, the pilot was able to divert to an alternate aerodrome with better facilities. The pilot briefed the passengers thoroughly and ensured they were aware of the situation and what to expect. The pilot was then able to concentrate of configuring the aircraft without undue distraction. Prior to landing, the pilot took extra time to hold and ensure the aircraft was appropriately configured, for the best possible outcome for landing with the wheels up.

Research conducted by the ATSB found that distractions were a normal part of everyday flying and that pilots generally responded to distractions quickly and efficiently. The report is available at www.atsb.gov.au/publications/2005/distraction_report.aspx.

General details

Occurrence details

Date and time:	28 April 2014 – 1145 CST	
Occurrence category:	Accident	
Primary occurrence type:	Landing gear / Indication	
Location:	Darwin Airport, Northern Territory	
	Latitude: 12° 24.88' S	Longitude: 130° 52.60' E

Aircraft details

Manufacturer and model:	Beech Aircraft Corporation 58/A1	
Registration:	VH-AKG	
Serial number:	TH-1011	
Type of operation:	Charter	
Persons on board:	Crew – 1	Passengers – 2
Injuries:	Crew – Nil	Passengers – Nil
Damage:	Substantial	

Runway excursion involving a Cessna 172, VH-MKQ

What happened

On 30 April 2014, the pilot of a Cessna 172 aircraft, registered VH-MKQ, was conducting a private flight from Launceston to a landing site about 13 km south-west of Launceston, Tasmania. Prior to departing Launceston, the pilot completed two circuits with stop-and-go landings, and confirmed the brakes were operating normally.

After a flight of about 6 minutes, the aircraft arrived overhead the landing site and the pilot overflew the site four times to assess the field. The pilot then conducted the approach as planned, however, when on final, he determined that the aircraft was too high and too fast to land so he conducted a go-around.

On the second approach, the pilot established the aircraft on final, with full flap selected, and slightly lower and slower than the previous approach. The wheels touched down at the pilot's selected point, and the aircraft bounced slightly. The pilot applied the brakes and the aircraft began to decelerate, however, as he increased the pressure on the brakes, the brakes locked up and the aircraft continued towards a fence.

The pilot selected the fuel mixture to idle cut-off and the engine stopped. The aircraft collided with the fence and the nose landing gear entered a ditch. The aircraft nosed over and came to rest inverted. The aircraft was substantially damaged (Figure 1) and the pilot was uninjured.

Figure 1: Damage to VH-MKQ

Source: Owen Woolley

Pilot comments

The pilot provided the following comments:

- He had calculated the landing distance available to be 440 m, and taken into consideration the approach path, including some trees. This was sufficient for the aircraft, however, the surface condition did not provide the deceleration he had expected. It had rained the previous day, however the surface was dry.

- Prior to flying to the site, he had walked, and driven up and down the nominated landing area many times to assess the surface and overall suitability. The ground was not soft or boggy. The landing strip inclined slightly uphill, to assist in slowing the aircraft down after landing.
- He had marked out the landing area the day before the incident and had ground crew providing support and radio communications for the landing.
- The landing strip was facing north-west into the prevailing wind, and the wind on the day was calm.

Safety message

This incident highlights the importance of considering all of the factors when assessing a landing area. The stopping distance required by an aircraft may vary considerably depending on whether the surface conditions are wet or dry and soft or firm. The Civil Aviation Safety Authority (CASA) Civil Aviation Advisory Publication (CAAP) 92-1(1) provides guidelines for aeroplane landing areas and is available at www.casa.gov.au/wcmswr/_assets/main/download/caaps/ops/92_1.pdf.

General details

Occurrence details

Date and time:	30 April 2014 – 1400 EST	
Occurrence category:	Accident	
Primary occurrence type:	Runway excursion	
Location:	13 km SW Launceston, Tasmania	
	Latitude: 41° 39.40' S	Longitude: 147° 04.80' E

Aircraft details

Manufacturer and model:	Cessna Aircraft Company 172N	
Registration:	VH-MKQ	
Serial number:	17272167	
Type of operation:	Private	
Persons on board:	Crew – 1	Passengers – Nil
Injuries:	Crew – Nil	Passengers – Nil
Damage:	Substantial	

Helicopters

Total power loss involving a Bell 206B, VH-NDL

What happened

On 12 November 2013, a Bell 206B helicopter, registered VH-NDL, departed a camp site located 51 NM SE of Alice Springs, Northern Territory, on a charter flight with a pilot and three passengers on board. The flight was conducted in visual meteorological conditions. About an hour into the flight and 2 NM from the landing area, the pilot commenced a slow descent from 2,000 feet above the ground (AGL). When lowering the collective, the pilot heard an intermittent grinding noise above the cockpit. The pilot checked the gauges, with nothing unusual noted. The noise continued to develop and the pilot elected to land. As the helicopter descended through 400 feet, a clunking noise was heard and power was lost to the main rotor. The pilot initiated an auto rotation and briefed the passengers for an emergency landing. During the touch down at about 0705, the main rotor blade severed the tail boom (Figure 1). The pilot secured the helicopter, waited for the main rotor to slow and assisted the passengers to exit. The helicopter sustained substantial damage; the occupants were not injured.

Figure 1: VH-NDL

Source: Aircraft operator

Pilot comment

The pilot reported that as part of the pre-flight inspection that day, the main driveshaft was checked and everything appeared normal with no evidence of grease leakage and the Temp-Plate indicators (which change colour to indicate when there has been excess temperature) showing no sign of a colour change.

Operator investigation

The operator determined that the engine-transmission main drive shaft[1] had failed due to the failure of the forward drive shaft boot. They reported that, during the week prior to the accident, the helicopter had operated short flights to landing areas with extended ground running, in high temperatures and with the helicopter loaded to near its maximum all up weight.

The operator reported that the main drive shaft was inspected and lubricated and the forward and rear boots replaced every 300 hours (time in service) or 3-monthly calendar time intervals and that the manufacturer's requirement was 600 hours (time in service) or 6-monthly calendar time intervals.

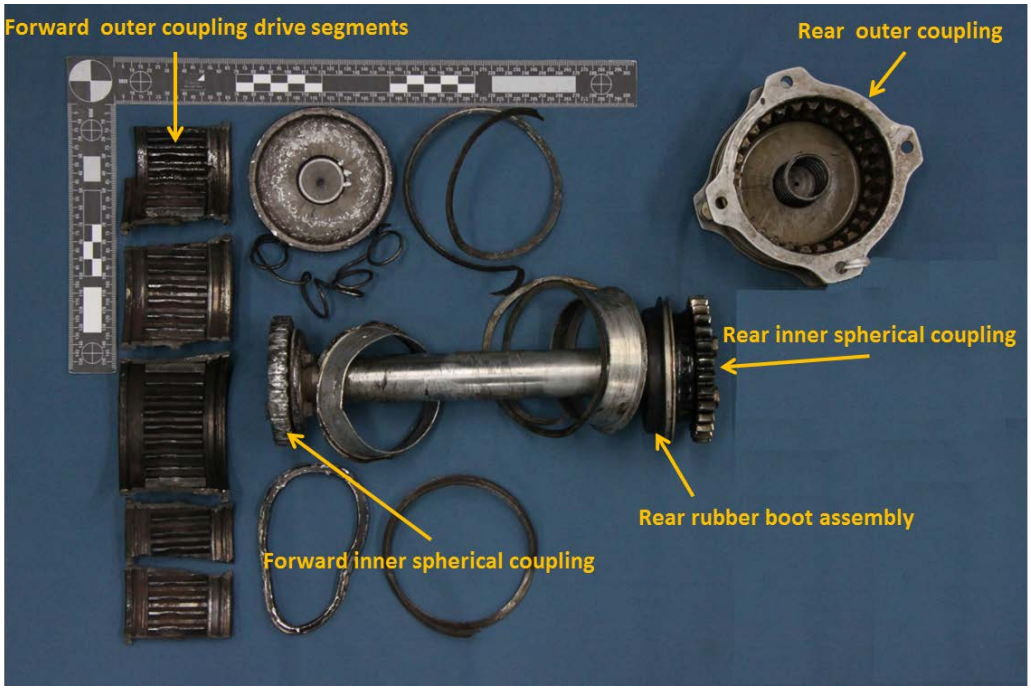
The main drive shaft installed on NDL failed about 603.4 hours after it was overhauled. It had been inspected and lubricated and the forward and rear boots were replaced about 132.7 hours prior to the accident.

ATSB examination of main drive shaft

The following are the results of ATSB examination of the main drive shaft, which was supplied by the Civil Aviation Safety Authority (Figure 2).

The forward outer coupling had failed, in overload, into five segments. The surfaces of the segments had evidence of discolouration due to over-temperature and most of the surfaces had turned into red oxide (which forms in air at high temperatures, estimated to be over 500 °C). There was no detected grease that is needed for lubrication to reduce friction (heat) between the rotating parts. Without the grease, the gear teeth on the forward inner spherical coupling softened, deformed, fractured and became jammed, resulting in the forward outer coupling shattering into the five segments. The four Temp-Plate indicators (which indicate when there has been excess temperature) were not present on the forward outer coupling exterior. There were no detected remnants of the forward rubber boot that is part of the seal assembly for containment of the grease.

Figure 2: Main drive shaft VH-NDL



Source: ATSB

[1] The main drive shaft forms a means of transmitting power from the engine to the main rotor transmission assembly.

The rear outer coupling and rear inner spherical coupling were well lubricated and exhibited normal condition. All four Temp–Plate indicators were attached to the rear outer coupling exterior, with no apparent indication of an over-temperature. The rear rubber boot, which is part of the seal assembly for containment of the grease, was flexible and undamaged.

Transport Canada service history review

Transport Canada conducted a service history review for main drive shaft failures and defects covering the last 10 years on Bell 206 series helicopters. Transport Canada did not identify any sudden uncontained main drive shaft failures with subsequent power loss.

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.

Helicopter operator

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

- Replace the main drive shaft assembly with a KAflex drive shaft system to all operator effected helicopters.

General details

Occurrence details

Date and time:	12 November 2013 – 0705 CST	
Occurrence category:	Accident	
Primary occurrence type:	Total power loss	
Location:	179 km SE of Alice Springs Airport, Northern Territory	
	Latitude: 24° 56.50' S	Longitude: 135° 09.35' E

Aircraft details

Manufacturer and model:	Bell 206B (III)	
Registration:	VH-NDL	
Serial number:	2710	
Type of operation:	Charter	
Persons on board:	Crew – 1	Passengers – 3
Injuries:	Crew – Nil	Passengers – Nil
Damage:	Substantial	

Fuel starvation event involving an Osborne Aviation OH-58A helicopter, VH-OSQ

What happened

Damage to VH-OSQ

On 17 April 2014, the pilot of an Osborne Aviation OH-58A helicopter, registered VH-OSQ, conducted a pre-flight inspection for a planned private ferry flight from Coffs Harbour to Port Macquarie, New South Wales, with one passenger.

The previous day, the pilot, who was also a licenced aircraft maintenance engineer, completed a 50-hourly inspection on the helicopter and replaced the battery. During the inspection, the pilot noted that the engine oil level indicated slightly below full. However, to obtain an accurate oil quantity, the level needed to be checked within 45 minutes of shutting down the engine, so he planned to run the engine the next morning and recheck the oil level prior to departure.

At about 0700, the pilot and passenger boarded the helicopter and the pilot conducted the pre-start checks and started the engine. He carried out the after-start checks and confirmed all engine indications were normal, and ran the engine for about 10 minutes to recharge the new battery following start-up. He then shut the helicopter down, conducted the shut-down checks and the pilot and passenger exited. The pilot then rechecked the oil quantity, which still indicated about 0.5 L low, and he added that quantity of oil. After a brief return to the terminal building, the pilot and passenger reboarded the helicopter.

The pilot selected the master switch on, confirmed all indications were normal and started the engine. However, he had omitted to complete the pre-start checklist, in particular to select the fuel valve to 'ON'. The pilot lifted the helicopter off into the hover and obtained a clearance from air traffic control. The pilot commenced the transition to forward flight and, at about 35 ft above ground level, heard the turbine engine wind down, the red ENGINE OUT warning light illuminated and the helicopter descended in an autorotation.

The pilot attempted to run the helicopter onto the ground, however, the helicopter touched down on soft grass and the landing skids detached. The helicopter then pitched forwards and the pilot pulled the cyclic[1] control back, resulting in the main rotor blades severing the tail boom and the helicopter landed heavily. The pilot immediately exited the helicopter to confirm that the fuel bladder was intact and that there was no fire, then re-entered the cockpit and shut off the switches. He then observed that the fuel valve was selected to 'OFF'.

The helicopter was substantially damaged (Figure 1), the pilot sustained serious injury and the passenger was uninjured.

[1] The cyclic pitch control, or cyclic, is a primary flight control that allows the pilot to fly the helicopter in any direction of travel: forward, rearward, left and right.

Figure 1: Damage to VH-OSQ

Source: Owner

Safety message

The pilot reported that this incident provided a reminder of the effect a change in routine can have, particularly on completing checklists. Research conducted by the ATSB found that distractions, or a change in routine, were an everyday part of flying and that pilots generally responded quickly and efficiently. The report, *Dangerous Distraction: An examination of accidents and incidents involving pilot distraction in Australia between 1997 and 2004* is available at: www.atsb.gov.au/publications/2005/distraction_report.aspx.

General details

Occurrence details

Date and time:	17 April 2014 – 0655 EST	
Occurrence category:	Accident	
Primary occurrence type:	Fuel starvation	
Location:	Coffs Harbour Airport, New South Wales	
	Latitude: 30° 19.23' S	Longitude: 153° 06.98' E

Helicopter details

Manufacturer and model:	Osborne Aviation Services OH-58A	
Registration:	VH-OSQ	
Serial number:	44070	
Type of operation:	Private	
Persons on board:	Crew – 1	Passengers – 1
Injuries:	Crew – 1 (Serious)	Passengers – 1 (Nil)
Damage:	Substantial	

Balloons

Wirestrike involving a Kavanagh Balloons B-350, VH-JDI

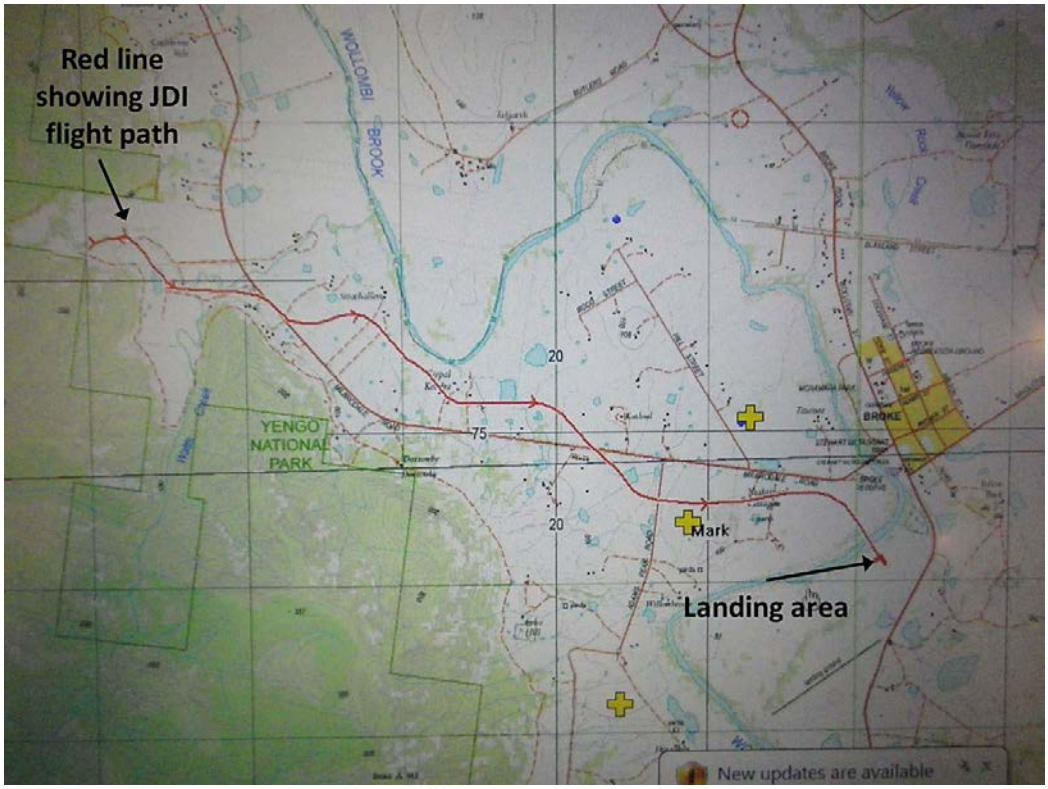
What happened

Kavanagh Balloons B-350

Source: Kavanagh Balloons

On 6 December 2013, a Kavanagh Balloons B-350 balloon, registered VH-JDI, was on final approach to land near Broke, New South Wales. At a height of about 50 ft, as the balloon flew over a river and a line of trees (Figure 1), the pilot observed the sun glistening off a power line on the left of the landing area and looked for the poles associated with that power line. The pilot did not observe any other power lines coming off the poles. The pilot instructed the passengers to get into the landing position. The landing area looked to be clear of obstacles. As the balloon came over the end of the tree line the pilot slowly vented the hot air in the envelope to descend to the landing area. The pilot then noticed that there was a pole to the right that had been in the shadows and that a power line stretched horizontally in front of the balloon flight path. The pilot opened the envelope ventilation system so the balloon would descend quicker. The basket touched the ground gently and came to rest just under the power line at about 0630 Eastern Daylight-saving time (EDT). The envelope folded over the three power lines, resulting in them contacting each other and sparking. The pilot instructed the passengers to remain in the basket and, when he considered that it was safe, he exited the basket. The pilot telephoned the electrical company who confirmed that the system was isolated and that a technician would be dispatched. The passengers then disembarked the basket. The pilot and 15 passengers were not injured. The balloon envelope had a small area of heat damage to the fabric where it had contacted the power lines.

Figure 1: Map showing flight path and landing area of VH-JDI



Source: Balloon operator

Pilot comment

The pilot reported that this was the first time that he had landed in this paddock.

The pilot reported that, during the landing, he was focused on the power line on the left that was glistening in the sun, although looking for wires coming off that power line. The power line that stretched across the flight path was hidden by the tree line. The balloon was also flying at a similar height of the power line, making the wires more difficult to see as only one wire was visible. The pilot also reported that the sun was not high above the horizon and he was looking directly into the sun for the landing.

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 was not advised of any safety action in response to this occurrence.

Safety message

The Australian Ballooning Federation notes in its safety advisory notice pilot circular number 18 (dated February 2012) that avoidance is the key. The safety advisory notice contains the following points:

- Pre-flight planning: Critical for ballooning, maps, charts and information must definitely be current. Consult council staff, locals and farmers, topo map in hand, for precise location of power lines and those not on the maps.
- Complacency: Familiarity and repetition regarding operation and location can lead to complacency. Be aware of this and hence be vigilant. Data shows the worst accidents are often made by the most experienced and skilled operators.
- Crew/passenger briefing: Stress to crew and passengers pre-takeoff and before approach: (1) you are only human and may not see threatening power lines, and (2) to feel free to point them out to you.
- Reduced visibility: Sun, mist, haze, contrast. Be vigilant and conservative under these conditions.
- See and Avoid scanning technique: Avoid focusing too long on close objects or scanning quickly left and right. Focus at a distance and move attention slowly over small arcs pausing briefly for a few seconds each time to closely examine the area.
- Country flying: Expect lines to be along roads with feed offs to farm houses. Often, single wires can be identified only by first locating their poles, so look for them first and assume lines run between them. They also cross paddocks to connect to other facilities. In this case be aware poles are often placed among trees making them difficult to see.
- Minimum safety altitude: Most power line strikes involve wires which are usually no more than 15 metres (50 feet) above ground level. Except for take-off and landing, staying above this height when flying in unfamiliar or risky areas is great insurance against hitting a wire.
- Distraction on approach: Checks, fuel, pilot lights, passengers, stock, obstacles, stress, tunnelling. All are Human Factors aspects that must be recognised and managed early such that full attention is then available for approach and landing.

The Australian Ballooning Federation *Pilot Circular No 18* is available at www.abf.net.au.

General details

Occurrence details

Date and time:	6 December 2013 – 0630 EDT	
Occurrence category:	Serious incident	
Primary occurrence type:	Wirestrike	
Location:	Broke, New South Wales	
	Latitude: 32° 45.40' S	Longitude: 151° 06.04' E

Aircraft details

Manufacturer and model:	Kavanagh Balloon B-350	
Registration:	VH-JDI	
Serial number:	B350-378	
Type of operation:	Charter - passenger	
Persons on board:	Crew – 1	Passengers – 15
Injuries:	Crew – Nil	Passengers – Nil
Damage:	Minor	

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.

Australian Transport Safety Bureau

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Investigation

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