Australian Government

Australian Transport Safety Bureau

ATSB TRANSPORT SAFETY BULLETIN
Aviation Level 5 Investigations
AB-2010-103
Final

Level 5 Factual Investigations:

1 October 2010 to 31 December 2010

Issue 4

Australian Government

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INTRODUCTION

About the ATSB

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; and 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.

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.

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 is from the information provided in these notifications that the ATSB makes a decision on whether or not to investigate. While further information is sought in some cases to assist in making those decisions, resource constraints dictate that a significant amount of professional judgement needs to be exercised.

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

To enable this, the Chief Commissioner has established a small team to manage and process these factual investigations, the Level 5 Investigation Team. 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. In addition, the ATSB may include an ***ATSB Comment*** that is a safety message directed to the broader aviation community.

The summary reports detailed herein were compiled from information provided to the ATSB by individuals or organisations involved in an accident or serious incident between the period 1 October 2010 and 31 December 2010.

AO-2010-064: VH-VBR, Windshear event

Date and time:	24 August 2010, 1818 EST
Location:	Melbourne aerodrome, Victoria
Occurrence category:	Incident
Occurrence type:	Windshear event
Aircraft registration:	VH-VBR
Aircraft manufacturer and model:	Boeing Aircraft Company 737-700
Type of operation:	Air transport – high capacity
Persons on board:	Crew – 6 Passengers – 131
Injuries:	Crew – Nil Passengers – Nil
Damage to aircraft:	Nil

FACTUAL INFORMATION

On 24 August 2010, a Boeing Aircraft Company 737-700 aircraft, registered VH-VBR, was being operated on a scheduled passenger flight from Sydney, New South Wales to Melbourne, Victoria, with six crew and 131 passengers onboard. The training captain (the pilot in command (PIC)) was the pilot flying, while the copilot was the pilot monitoring. The copilot was undergoing line training and had about two weeks of training left prior to his line check.

During the descent into Melbourne, the aircraft was held for about 10 minutes, due to a squall line[1] within the vicinity of the Melbourne VOR[2].

At about 1813 Eastern Standard Time[3], Melbourne automatic terminal information service 'Yankee' was issued, indicating the following significant weather conditions:

- probable vertical windshear[4] between 1810 and 2010
- forecast surface wind from 280 degrees at 20 kts gusting to 38 kts
- forecast wind at 2,000 ft above ground level from 350 degrees at 40 kts.

The crew were advised by air traffic control (ATC) of these conditions.

While conducting the VOR approach for runway 34, the PIC reported that the aircraft encountered rain, but the runway remained in sight. At that time, the aircraft's calibrated airspeed (CAS) was about 152 kts, the landing gear was in the down position and 30 degrees of flap was selected.

At about 900 ft, he stated that the aircraft's airspeed increased by about 20 kts, but the flap load relief did not activate. Shortly after, the crew received a windshear alert from the ground proximity warning system (GPWS). The crew immediately initiated a missed approach in accordance with operator's windshear escape manoeuvre and applied take-off/go-around engine thrust. During the manoeuvre, the PIC observed the 'PULL UP' alert activate for about 1 second on the primary flight display (PFD).

As the crew was visual and a positive rate of climb established, the copilot believed that the windshear escape manoeuvre had been completed and the normal go-around procedure had been commenced. Consequently, the copilot selected 15 degrees of flap, the setting used when conducting a go-around, and queried whether the aircraft's landing gear should be retracted.

1 Line of established or developing thunderstorms.

2 VOR: VHF (very high frequency) omnidirectional radio range – a system that provides bearing information to an aircraft.

3 The 24-hour clock is used in this report to describe the local time of day, Eastern Standard Time, as particular events occurred. Eastern Standard Time was Coordinated Universal Time (UTC) +10 hours.

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

The aircraft was climbed to 5,000 ft and an approach and landing on runway 27 was conducted without further incident. After landing, the PIC reported the windshear occurrence and possible flap overspeed to the maintenance engineers. An inspection of the leading and trailing edge flaps was carried out with nil defects found.

Recorded data

The flight data recorder (FDR) was removed from the aircraft and sent to the Australian Transport Safety Bureau (ATSB) for download and analysis. The recorded data indicated that:

Time	***Details***
1816:41	At 2,000 ft radio altitude, the CAS was 151 kts; the wind was 50 kts from 261 degrees.
1817:56	At 1,000 ft, the CAS was 152 kts; the wind was 28 kts from 246 degrees.
1817:58 to 1818:10	At 900 ft, the CAS increased by 26 kts (from 154 to 180 kts); wind speed increased from 26 to 36 kts and direction changed from 250 to 295 degrees.
1818:13	A GPWS predictive windshear warning activated.
1818:14	Take-off/go-around thrust was applied.
1818:15 to 1818:16	At 825 ft, a GPWS 'sink rate' warning activated due to an excessive rate of descent.
1818:17	A GPWS windshear warning activated; flaps retracted from 30 to 15 degrees.
1818:19	Wind speed was 40 kts from 258 degrees.
1818:22	At 592 ft, a GPWS 'sink rate' alert activated, for 1 second.

Flap overspeed

The limit speed for 30 degrees of flap was 165 kts. If the speed exceeded 176 kts, the flap load relief system would activate and automatically retract the flaps to 25 degrees. If the aircraft's airspeed was reduced to below 171 kts, the flaps would re-extend to 30 degrees.

For the incident flight, the flaps were extended to 30 degrees and the airspeed was greater than 165 kts for a period of about 12 seconds. The flap load relief system activated, with minimal retraction of the flaps, when the airspeed exceeded 176 kts before reducing to below 171 kts.

Windshear recovery procedure

The operator's flight crew operations manual stated that crews should search for clues to detect the presence of windshear along the intended flight path and if identified, delay the takeoff or discontinue the approach. If windshear was suspected during an approach and landing, the manual recommended a number of precautionary actions, these included the application of 30 degrees of flap.

If the crew encountered windshear in flight, they were to perform the 'windshear escape manoeuvre'. That included maintaining the current flap or landing gear configuration until windshear was no longer a factor.

Pilot information

The copilot had a total of about 5,350 hours, of which 2,480 hours was on multi-engine aircraft, in command. He had about 108 hours on the Boeing 737 aircraft and prior to this, he had been a second officer on the Boeing 777.

ATSB COMMENT

The Flight Safety Foundation (FSF) Approach-and-landing Accident Reduction (ALAR) tool kit provides guidance on avoiding, recognising and recovering from windshear.

The tool kit states that crew awareness and alertness are key factors in the successful application of windshear avoidance and recovery techniques and provides the following advice:

Avoidance

- assess the conditions for a safe approach and landing, based on available meteorological data, visual observations and on-board equipment
- as warranted, consider delaying the approach or consider diverting to a more suitable airport
- be prepared and committed to respond immediately to a windshear warning

Recognition

- be alert for windshear conditions, based on all available weather data, onboard equipment and aircraft flight parameters and flight path.
- monitor instruments for evidence of impending windshear.

Recovery

- avoid large engine thrust or trim variations in response to sudden airspeed changes.
- if a windshear warning occurs, follow the flight director (FD) windshear recovery pitch guidance or apply the recommended escape procedure
- make maximum use of aircraft equipment, such as the flight-path vector (if available).

More information on the Foundation's ALAR tool kit (Briefing Note 5.4 – Wind Shear) is available at http://flightsafety.org/files/alar_bn5-4-windshear.pdf

AO-2010-070: VH-JQX, Avionic / Flight Instruments

Date and time:	20 September 2010, 1141 EST
Location:	Near Mackay aerodrome, Queensland
Occurrence category:	Incident
Occurrence type:	Avionics / Flight Instruments
Aircraft registration:	VH-JQX
Aircraft manufacturer and model:	Airbus A320-232
Type of operation:	Air transport – high capacity
Persons on board:	Crew – 6 Passengers – 137
Injuries:	Crew – Nil Passengers – Nil
Damage to aircraft:	Nil

FACTUAL INFORMATION

On 20 September 2010, an Airbus A320-232 aircraft registered VH-JQX departed Brisbane, Queensland on a scheduled passenger flight to Mackay. Onboard were six crew and 131 passengers.

At about 1141 Eastern Standard Time[1], the aircraft was on decent into Mackay at FL300[2] when the crew received multiple Electronic Centralized Aircraft Monitoring (ECAM)[3] messages. These included autoflight autothrust function (AUTO FLT A/THR OFF), flight control alternate law mode (F/CTL ALTN LAW), engines 1 and 2 engine pressure ratio (EPR) mode fault (ENG 1 / 2 EPR MODE FAULT).

At the same time, the autopilot and engine autothrust disengaged, and the pilot in command (PIC) and co-pilots primary flight displays (PFD) lost airspeed, altitude and descent data. Both engines were selected to N1 mode[4] and airspeed became available from the integrated standby instrument system (ISIS).

The aircraft was in instrument meteorological conditions (IMC) when the ECAM messages appeared, with no ice indication and light rain. The outside air temperature was about -30ºC, and engine anti ice systems were on.

After about two minutes, the aircraft airspeed returned to the PFD's, the remainder of the data returned and the engines were selected to EPR mode. Engine autothrust and the autopilot were then re-engaged and the aircraft continued without further incident. After the aircraft landed, engine 1 and engine 2 sensor faults were displayed.

Post-flight engineering action

A post flight report (PFR) from the aircraft's central maintenance computer contained fault information received from other aircraft systems' built-in test equipment (BITE). PFR messages were of two main types.

- Cockpit effect messages, which reflected indications presented to the flight crew on the ECAM or other displays.

1 The 24 hour clock is used in this report to describe the local time of day, Eastern Standard Time, as particular events occurred. Eastern Standard Time was Coordinated Universal Time (UTC) + 10 hours.

2 Flight level (FL) is a level of constant atmospheric pressure related to a datum of 1013.25 hectopascals, expressed in hundreds of feet. Therefore, FL300 indicates 30,000 ft.

3 The ECAM provides information on the status of the aircraft and its systems, including warning and caution messages and relevant actions required by the crew.

4 When the EPR mode signal is lost on the display, N1 mode can be manually selected to maintain an equivalent thrust to that achieved when the EPR mode is functional. In this mode the autothrust is not available.

- Maintenance fault messages, which provided information to maintenance personnel on the status or functioning of aircraft systems.

Having obtained the PFR and other recorded information, the aircraft operator completed various precautionary actions to ensure air data system integrity. Those actions included the completion of a number of trouble shooting procedures on the aircraft flight computers and sensors. No apparent faults were evident.

Further technical procedures were also completed. These included the flushing of the crew and standby pitot total pressure lines, the static systems and cleaning of the pitot probe drain holes and testing the principal static and total air data systems. There were no defects found during these activities.

A review of recent maintenance records determined that no preconditions existed that would have lead to a sensor failure or blockage, prior to the event flight.

Recorded information

The Australian Transport Safety Bureau (ATSB) obtained the digital flight data recorder (FDR) data and quick access recorder (QAR) data from the aircraft. The following observations were made:

- The airspeed from the PIC's pitot tube was invalid for a period of 1 minute and 13 seconds.
- The angle of attack (AOA) from the PIC's AOA sensor was invalid for a period of 1 minute and 9 seconds.
- The angle of attack from the copilot's AOA sensor was invalid for a period of 1 minute and 20 seconds.
- The alternate flight control law was engaged for 1 minute and 20 seconds.
- The master caution and master warnings were triggered.
- Autopilot 1 was disengaged for 1 minute and 51 seconds.
- The engine autothrust system (ATS) was disengaged for 3 minutes and 20 seconds.
- The total air temperature (TAT) remained at -8.2ºC for 40 seconds and then remained at 0ºC for 2 minutes and 5 seconds.
- The FDR data (sampled once per second) showed that the standby airspeed appeared to remain valid throughout the entire flight. However the PFR suggested that standby airspeed was also invalid for a brief period (less than 1 second as an air data reference unit (ADR) 3 fault message was logged.

The FDR and QAR data showed there was incorrect data recorded temporarily for the PIC's airspeed (sourced from (ADR) 1), the copilot's airspeed (from ADR 2) and the PIC's TAT probe. The integrated standby instrument system airspeed (from ADR 3) appeared to be valid throughout the event except for a very brief period of less than 1 second. There was no data to show whether the copilot's TAT probe was affected or not.

Air data

The Airbus A320 flight control system operates under 3 laws: normal law, alternate law, and direct law (in descending order of protection). Normal law provides the greatest level of protection to the airframe by placing limitations on pilot commands. If the flight control system detects failures within certain systems it will reduce the level of protection on the aircraft and thus operate on an alternate law. The flight control system will only revert to alternate law when at least two ADR units fail.

The Airbus A320 has multiple air data sensors (Figure 1) that feed measurements into the ADR units. Each unit receives data from a different set of dynamic pressure, static pressure, total air temperature and angle of attack sensors. Valid EPR data is sourced from the engine inlet air pressure and air inlet total temperature (P2/T2) sensors. Any restriction or blockage will prohibit those sensors from accurately measuring air data measurements.

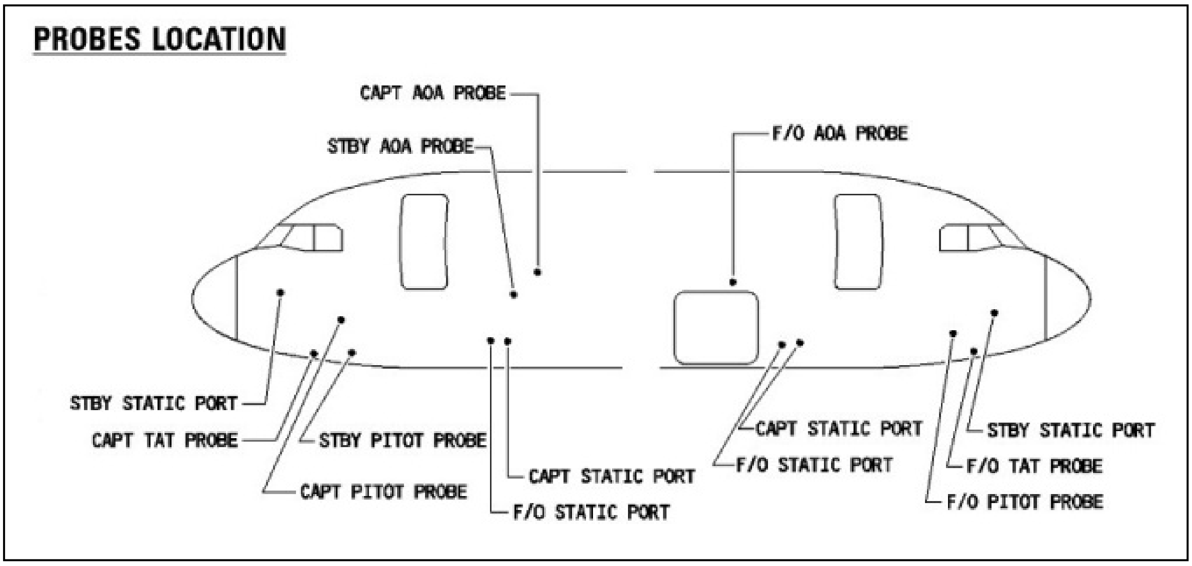
Multiple failures in air data measurements are generally the result of environmental conditions such as atmospheric icing. These conditions can prohibit the sensors from accurately measuring air data, which can result in multiple ECAM messages.

ATSB COMMENT

The following ATSB report referencing similar occurrences can be found on the ATSB website www.atsb.gov.au

- AO-2009-065 Unreliable airspeed indication, 710 km south of Guam, 28 October 2009. Appendix A.

Figure 1: Airframe probe (sensor) locations.



Courtesy of Airbus

AO-2010-077: VH-VUR, Ground Handling Event

Date and time:	5 October 2010, 2115 EST
Location:	Brisbane aerodrome, Queensland
Occurrence category:	Incident
Occurrence type:	Ground handling event
Aircraft registration:	VH-VUR
Aircraft manufacturer and model:	Boeing 737-8FE
Type of operation:	Air transport – high capacity
Persons on board:	Crew – 6 Passengers – 174
Injuries:	Crew – Nil Passengers – Nil
Damage to aircraft:	Nil

FACTUAL INFORMATION

On 5 October 2010 at 2115 Eastern Standard Time[1], a Boeing Company 737-8FE aircraft, registered VH-VUR, had completed push back from parking bay 47 at Brisbane aerodrome, Queensland. The ground handling engineer disconnected the remotely controlled power push unit (PPU) from the aircraft left main wheels and moved the unit to the rear of the aircraft. The pilot in command (PIC) then received clearance from air traffic control (ATC) to taxi via the C6 taxiway.

As the aircraft moved away from the disconnect point on the apron adjacent to bay 47, the PIC inadvertently turned the aircraft left instead of right (Figure 1).

As a result of the incorrect turn, it was then necessary for the PIC to make a tight 270º turn, so the aircraft could continue along the apron to taxiway C6. It was reported that the aircraft had just enough room to complete the turn without taxiing onto the grass at the edge of the taxiway.

With the aircraft departing from the normal taxi path, the dispatch engineer had to quickly manoeuvre the remotely controlled PPU to avoid a collision with the aircraft. While manoeuvring the PPU, he also had to run under the tail of the aircraft to avoid the majority of the hot exhaust emissions from the aircraft turbine engines. The operator reported that it was likely that the aircraft engines were being operated at breakaway power[2], to enable the turn to be completed.

Boeing 737 pushback and engine hazard areas.

Significant hazards exist to ground personnel working around and near the aircraft during pushback and engine operation. During the pushback operation, ground engineers are required to maintain a 3 m minimum separation clearance from the nose and main wheels. Jet engines also create a low-pressure area around the engine inlet during operation and ingest large quantities of air. This low-pressure area can pull loose objects in the immediate vicinity, including debris and people into the engine.

When the engine is at ground idle, as may be experienced during the pushback operation, the low pressure hazard area extends to a distance of 3.1 m from the mouth of the inlet. When breakaway power is applied to move the aircraft, this hazard area increases to 4.2 m. A hazard area also exists when hot air exits the engine exhaust at a very high temperature and speed. When the engines are operating at forward breakaway power, the exhaust hazard area extends 155 m to the rear of the aircraft tail (Figure 2).

1 The 24 hour clock is used in this report to describe the local time of day, Eastern Standard Time, as particular events occurred. Easter Standard Time was Coordinated Universal Time (UTC) + 10 hours.

2 Breakaway power means the minimum power necessary for the aircraft to be able to start moving.

SAFETY ACTION

While there is the possibility for safety issues to be identified throughout the course of an investigation, relevant organisations may proactively initiate safety action in order to reduce their safety risk. The following proactive safety action in response to this incident has been submitted by those organisations.

Aircraft operator

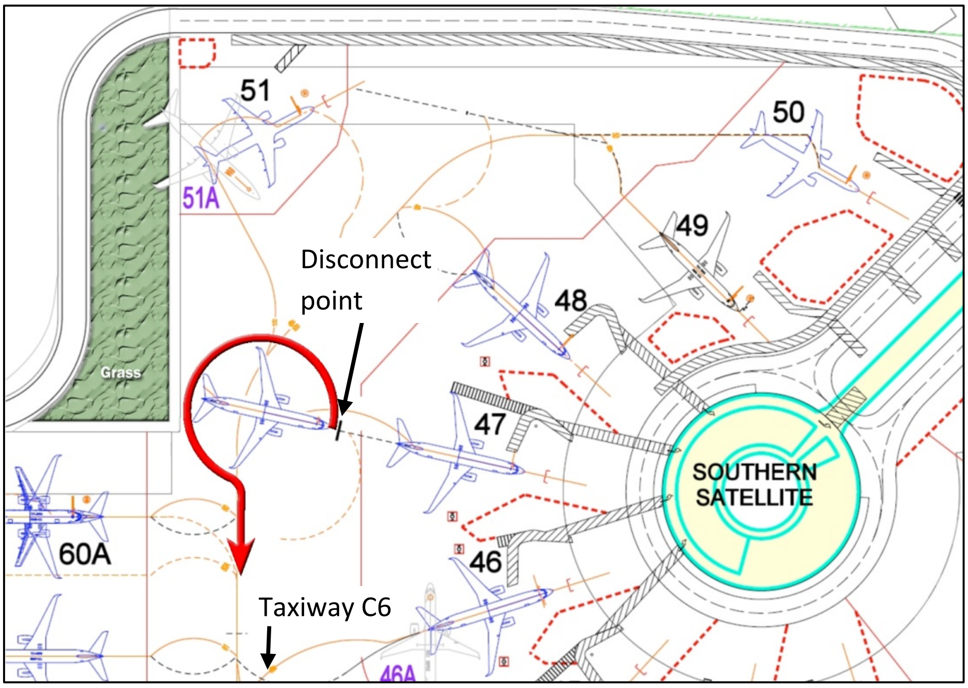
As a result of this occurrence, the aircraft operator notified their flight crew through a Flight Operations Safety and Compliance meeting and issued a flight crew operational notice.

ATSB COMMENT

This incident highlights the dangers associated with ground operations around jet aircraft and reinforces the importance of the flight crew maintaining situational awareness when manoeuvring aircraft.

The ATSB has published a research report into Ground operation occurrences at Australian airports. A copy of the report is available on the ATSB website here www.atsb.gov.au/publications/2009/ar2009042.aspx

Figure 1: Brisbane aerodrome domestic parking bays



© The Operator

Figure 2: B737 inlet and exhaust hazard areas at breakaway power

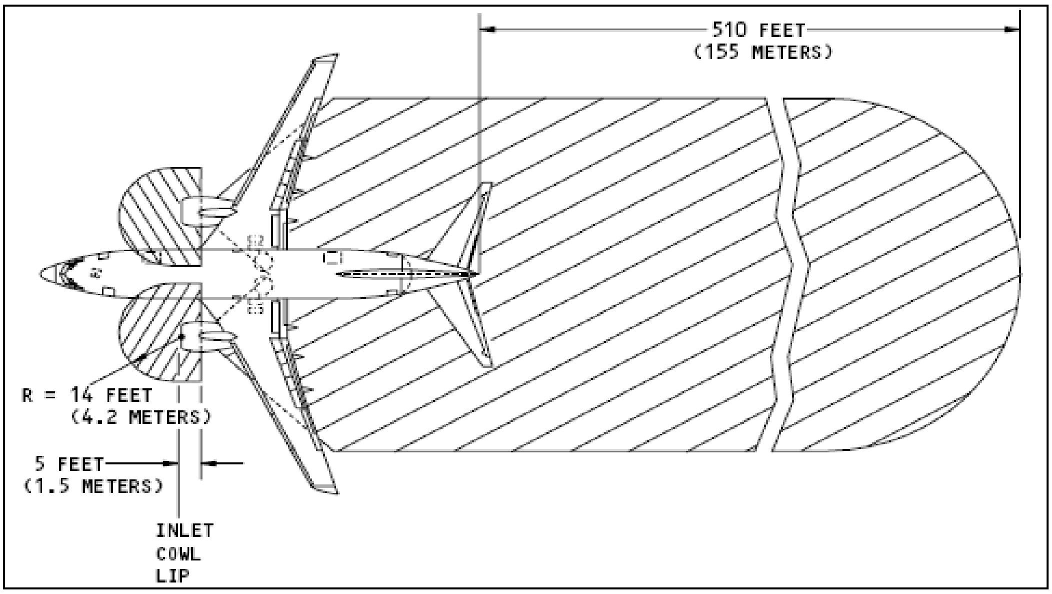


Diagram courtesy of The Boeing Aircraft Company

AO-2010-048: VH-FDK and VH-ELI, Aircraft proximity event

Date and time:	1 July 2010, 1429 CST		
Location:	50 km NW of Mount Gambier aerodrome, South Australia		
Occurrence category:	Serious incident		
Occurrence type:	Airprox		
Aircraft registration:	VH-FDK and VH-ELI		
Aircraft manufacturer and model:	VH-FDK:	Pilatus Aircraft PC-12/45	
	VH-ELI:	Aeronautica Macchi S.P.A. AL60/A1	
Type of operation:	VH-FDK:	Aerial work – aerial ambulance	
	VH-ELI:	Private - ferry	
Persons on board:	VH-FDK:	Crew – 1	Passengers – 3
	VH-ELI:	Crew – 2	Passengers – Nil
Injuries:	Crew – Nil	Passengers –Nil	
Damage to aircraft:	Nil		

FACTUAL INFORMATION

Sequence of events

Aeronautica Macchi AL60, VH-ELI

On 1 July 2010, the crew of an Aeronautica Macchi S.P.A. AL60 aircraft, registered VH-ELI (ELI), departed Devonport, Tasmania, for Portee Station, South Australia (SA), with intermediate stops planned for King Island, Tasmania. and Hamilton, Victoria (Vic.), under visual flight rules (VFR) (Figure 1). The aircraft had recently been purchased and was being ferried to Portee Station.

Figure 1: VH-ELI

Photo courtesy of aircraft owner

The day before the flight, the copilot received conversion training on the aircraft from the pilot in command (PIC). During the training, the crew noticed that the aircraft's fuel flow appeared higher than expected. Aircraft maintenance engineers determined that the fuel flow was excessive and subsequently corrected the engine mixture settings prior to the aircraft departing Devonport. The crew initially relied on the aircraft's fuel flow gauge until the next refuelling stop, where the actual fuel flow figures could be calculated.

After arriving at King Island, the aircraft was refuelled and the crew believed that there was sufficient fuel onboard for the flight to Hamilton.

While en route, passing Cape Otway, Vic., the crew observed low cloud along the track to Hamilton. The crew elected to divert to Mount Gambier, SA to refuel the aircraft.

The crew reported that the weather at Mount Gambier was as forecast and the visibility was good. At about 1346, the aircraft landed at Mount Gambier aerodrome and, about 10 minutes later, a Pilatus PC-12 aerial ambulance aircraft also arrived.

The aircraft was refuelled and taxied for departure. The copilot was reported to make the required broadcast on the Mount Gambier common traffic advisory frequency (CTAF). After takeoff, the PIC broadcast a departure call on the CTAF, advising of their departure time, heading and altitude.

During the departure, the crew noticed that the left fuel tank gauge tank was indicating half full. The crew discussed the fuel gauge and whether to return to Mount Gambier or continue the flight. Due to the age of the aircraft (about 50 years), the crew believed that the gauge was stuck and that it would fix itself during the flight. The copilot also confirmed that he had filled the tanks to the top and put the fuel cap on.

When about 28-33 km from Mount Gambier, the PIC reported hearing a broadcast on the CTAF from the pilot of a PC-12 aircraft, but could not recall the contents of the broadcast. At the time, he believed that it was the PC-12 earlier observed on the ground at Mount Gambier. As the crew of ELI believed they were far enough away from the aerodrome, they changed from the CTAF to the area frequency.

While outbound, the crew were required to re-align the directional gyro on two occasions due to gyroscopic precession. This resulted in the aircraft diverting left of the planned track of 334 degrees by 2-4 km. The crew commenced correcting the aircraft's track. At the time, the aircraft was maintaining about 2,400-2,500 ft, and the crew reported that visibility was greater than 10 km, with scattered[1] cloud at 3,000 ft.

Pilatus PC-12/45, VH-FDK

At 1340 CST[2], a Pilatus Aircraft Ltd. PC-12/45 aircraft, registered VH-FDK (FDK), departed Adelaide, SA for Mount Gambier, to retrieve a medical patient, under instrument flight rules (IFR). On board the aircraft were the pilot and three medical staff.

At about 139 km from Mount Gambier, the pilot of FDK requested a clearance from air traffic control (ATC) to track direct to Mount Gambier in preparation for a runway 18 area navigation global navigation satellite system (RNAV (GNSS)) approach, which was approved.

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

2 The 24-hour clock is used in this report to describe the local time of day, Central Standard Time, as particular events occurred. Central Standard Time was Coordinated Universal Time (UTC) + 9.5 hours.

Figure 2: VH-FDK

Photo courtesy of Andrei Bezmylov

Incident

When about 56 km from the aerodrome, the pilot of FDK reported broadcasting an inbound call on the Mount Gambier CTAF advising that he was intending to track for a 10 NM (19 km) final for runway 18. Shortly after, the pilot sighted another aircraft (ELI) pass to the left from the opposite direction. The pilot reported that the aircraft was in such close proximity that the aircraft 'rocked' as it passed. At the time, FDK was on descent, approaching 2,400 ft.

The pilot stated that he did not observe ELI until very late as he was operating at or above the cloud base just prior to the incident and had insufficient time to conduct an avoidance manoeuvre. Furthermore, there was no return on the aircraft's traffic collision avoidance system (TCAS)[3] indicating that another aircraft was operating in close proximity.

The crew of ELI also sighted the PC-12 on the left side of their aircraft. The PIC attempted to initiate a right turn; however, as the copilot, who was flying at the time, elected to maintain the current heading, no avoidance action resulted.

The distance between the two aircraft was estimated to be between 5 and 15 m horizontally and about 20 ft vertically.

Both aircraft continued to their intended destinations and landed without further incident.

3 The TCAS equipment interrogates the transponder of other aircraft to determine their range, bearing and altitude.

Communications

Aerodrome frequency response unit (AFRU) [4]

Some non-towered aerodromes[5] have a facility known as an aerodrome frequency response unit (AFRU) installed. The purpose of an AFRU is to provide an automatic response to pilots when transmitting on the CTAF. This indicates to the pilot that the correct radio frequency has been selected and confirms the operation of the aircraft's transmitter and receiver, and volume setting.

If a broadcast has not been made on the CTAF in the last 5 minutes, the next transmission over 2 seconds in length will receive a voice identification in response, for example, 'Goulburn CTAF'. If a broadcast has been made in the previous 5 minutes, a 300 millisecond tone or 'beep' will be heard.

CTAF recordings

The ATSB examined recordings of the transmissions broadcast on the Mount Gambier CTAF. That examination revealed that between 1328 and 1346, a number of transmissions were made by the crew of ELI, including: 20 NM (37 km) inbound; 10 NM (19 km) inbound; approaching the circuit to join downwind; on base; and landed and clear of all runways.

Two broadcasts were made at about 1411 and 1415 transmitting carrier wave only, no voice was heard. The AFRU transmitted a voice identification of the aerodrome's name after the first broadcast ('Mount Gambier aerodrome') and transmitted a 'beep' following the second broadcast.

The PIC of ELI reported that when the taxi call at Mount Gambier was made by the copilot, he could not hear the call through his headset, but as they received a 'beep' in response to the broadcast, he was confident that the call was made.

At 1420, the CTAF recordings indicated that the crew of ELI made a departure call stating that they had departed at time '49' (1419), tracking 334 degrees and were remaining below 5,000 ft.

At 1429, the pilot of FDK commenced an inbound broadcast, which was partially over-transmitted by a carrier wave only followed by the AFRU voice identification. The remainder of the inbound call was heard, indicating that the aircraft was for a 10 NM (19 km) final to runway 18 and estimating the circuit at time '06' (1436).

Outbound track

The PIC of ELI reported that when re-calculating the flight details for the leg from Mount Gambier to Portee Station, he did not have a full appreciation of the proximity of his planned outbound track of 334 degrees with the Adelaide-Mount Gambier inbound track. The crew also planned to fly at 2,500 ft, in accordance with the VFR cruising levels[6].

At the time of the incident, the PIC of ELI reported that they were maintaining an altitude between 2,400 and 2,500 ft. At the same time, FDK was on descent approaching 2,400 ft, which was the minimum sector altitude for the runway 18 RNAV GNSS approach.

Visibility

The crew of ELI reported that while visibility was greater than 10 km, their outbound track of 334 degrees was directly into the sun. While this affected their visual scan for traffic and consequently, their ability to sight FDK, the crew believed that this was not a factor in the occurrence.

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 incident.

4 Aeronautical Information Publication GEN 3.4 paragraph 3.4.

5 A non-towered aerodrome is an aerodrome at which ATC is not operating, this includes: an aerodrome that is always in Class G airspace; an aerodrome with a control tower, but no ATC service is currently provided, or an aerodrome that would normally have ATC services, but is presently unavailable.

6 The VFR cruising levels are specified in the Aeronautical Information Publication ENR 1.7 paragraph 5, Table B.

Organisation

Operator of VH-FDK

While the operator determined that the pilot of FDK had complied with the required procedures, they advised the ATSB that they will be conducting internal education to remind pilots that maintaining a lookout and the use of radio telephony procedures are the primary tools used for traffic separation, supported by the TCAS. This emphasis will be communicated to the pilot group at the next base pilot meeting, during proficiency checks over the next six months, and will be incorporated into the pilot operations manual as a check item on the proficiency checklist.

ATSB COMMENT

Aircraft operating into non-towered aerodromes at any one time can be quite diverse, with a mix of passenger carrying aircraft; IFR and VFR aircraft; and aircraft ranging from gliders to turboprop and jet engine aircraft.

A recent Civil Aviation Advisory Publication (CAAP 166-1(0)), effective 3 June 2010, recognises the increased collision risk that exists for both IFR and VFR traffic when an instrument approach is conducted at non-towered aerodromes where there is cloud, or visibility is reduced, but VFR conditions still exist below the low visibility layer. In this case, it is possible for a pilot flying an instrument approach in cloud to become visual and unexpectedly encounter a VFR aircraft.

The CAAP reinforces the need for diligent radio broadcasts and a continual visual scan in order to minimise the risk of aircraft proximity events.

AO-2010-058: VH-TAG and F/A-18 Hornets, Breakdown of separation

Date and time:	5 August 2010, 1821 EST		
Location:	Williamtown aerodrome, New South Wales		
Occurrence category:	Serious incident		
Occurrence type:	Breakdown of separation		
Aircraft registration:	VH-TAG and F/A-18 Hornets		
Aircraft manufacturer and model:	VH-TAG:	Fairchild Industries Inc. SA227-AC	
	Two Boeing F/A-18 Hornets (Hornets)		
Type of operation:	VH-TAG:	Air transport – low capacity	
	Hornets:	Military	
Persons on board:	VH-TAG:	Crew – 2	Passengers – 18
	Hornets:	Crew – 2	Passengers – Nil
Injuries:	Crew – Nil	Passengers –Nil	
Damage to aircraft:	Nil		

FACTUAL INFORMATION

On 5 August 2010, a Fairchild Industries Inc. SA227-AC aircraft, registered VH-TAG (TAG), was being operated on a scheduled passenger service from Canberra, Australian Capital Territory to Williamtown, New South Wales. On board the aircraft were two crew and 18 passengers. The copilot was designated as the pilot flying for the flight.

On arrival at Williamtown, the crew were cleared by the aerodrome controller (ADC) for a visual approach to runway 30 and advised that the Operational Readiness Platform (ORP)[1] was in use, which the crew acknowledged.

The aircraft landed at about 1817 Eastern Standard Time[2] and vacated the runway at taxiway Charlie (Figure 1). The pilot in command (PIC) assumed the role of the pilot flying[3], while the copilot monitored the radio. The copilot contacted the surface movement controller (SMC) and was instructed to taxi to holding point Alpha, runway 30. The copilot read back the clearance and wrote the instructions on the take-off and landing data (TOLD) card.

At about the same time, the ADC instructed the pilots of two Boeing F/A-18 Hornets (Hornets) positioned on the ORP to line-up on runway 30 behind a Pacific Aerospace Corporation 750XL aircraft that was on final approach.

During the taxi, the crew of TAG completed their after landing checks. The copilot momentarily handed the radio duties over to the PIC, so that he could make a passenger announcement. Once the brief was completed, the copilot advised the PIC that he was 'back' and at the same time the crew received an amended clearance from the SMC to taxi to holding point Bravo, runway 30. The copilot read back the clearance. After this, the PIC advised the copilot that there were no other changes received. The PIC reported that he did not hear the entire clearance as he was focusing on taxiing the aircraft and maintaining a lookout for other traffic.

1 The ORP is an area located adjacent to the runway where military aircraft are positioned in preparation for takeoff.

2 The 24-hour clock is used in this report to describe the local time of day, Eastern Standard Time as particular events occurred. Eastern Standard Time was Coordinated Universal Time (UTC) + 10 hours.

3 The PIC assumes the role of pilot flying while on the ground as the nose wheel steering button is located on the left side of the number one (left) power lever.

The copilot updated the TOLD card to reflect the clearance change to holding point Bravo.

About 20 seconds later, the ADC issued the two Hornets with departure instructions and a take-off clearance.

Shortly after, the pilot of the 750XL advised the SMC that he was clear of runway 30. The aircraft was observed by the crew of TAG to vacate the runway at taxiway Hotel.

The PIC of TAG taxied the aircraft onto taxiway Bravo. On approaching the holding point, the PIC checked the runway for traffic to the left and stated that they were clear left and centre. In response, the copilot looked for aircraft to the right and stated that they were clear centre and right.

At about 1819, the aircraft was taxied past the holding point, resulting in a runway incursion[4]. Immediately after, the crew was instructed by the SMC to hold short, runway 30. The PIC immediately stopped the aircraft. The copilot advised the SMC that the aircraft had crossed the holding point, but was short of the runway. The crew estimate the aircraft was stopped about 5 m away from the edge of the runway.

At the same time, the crew reported that they heard the sound of jet engines. The crew looked to the left and observed a Hornet taking off. About 10 seconds later, the crew observed a second Hornet takeoff.

The ADC assessed the situation and determined that issuing a stop instruction to the already rolling Hornets would have presented a greater risk to the involved aircraft, so the Hornets takeoff was allowed to continue. Following the runway incursion by TAG, a breakdown in runway separation occurred. At about 1820, the SMC instructed the crew of TAG to cross runway 30. The crew confirmed the runway was clear and crossed the runway.

The crew discussed the incident and determined that they had not received a clearance to cross runway 30; they were only cleared to taxi to holding point Bravo. A review of the air traffic control (ATC) recordings at the time of the incident confirmed that no clearance was provided to the crew.

The crew reported that they were expecting a clearance to cross runway 30 as they believed they were the only aircraft operating in the area, with the 750XL having landed and vacated the runway. While the crew were aware that the ORP was active, they did not hear any broadcasts relating to the two Hornets and were unsure if the aircraft had departed.

Furthermore, when the PIC initially checked the runway for other aircraft, he did not see the Hornets. At the last moment, just prior to crossing the holding point, the PIC observed lights that he believed were that of the Hornets previously positioned on the ORP. The PIC had assumed that the Hornets were lining up on the runway and were waiting for TAG to cross, which had been the case on previous occasions.

TOLD card

The take-off and landing data (TOLD) card is a tool used by crews to record important information required for the takeoff and landing phases of flight. This may include aircraft weights and speeds, runway distances, weather information, and ATC clearances.

The crew reported that their normal procedure was to record all ATC clearances on the TOLD card. After the incident, the crew checked the TOLD card and noticed that they had only received a clearance to taxi to holding Bravo and not to cross the runway.

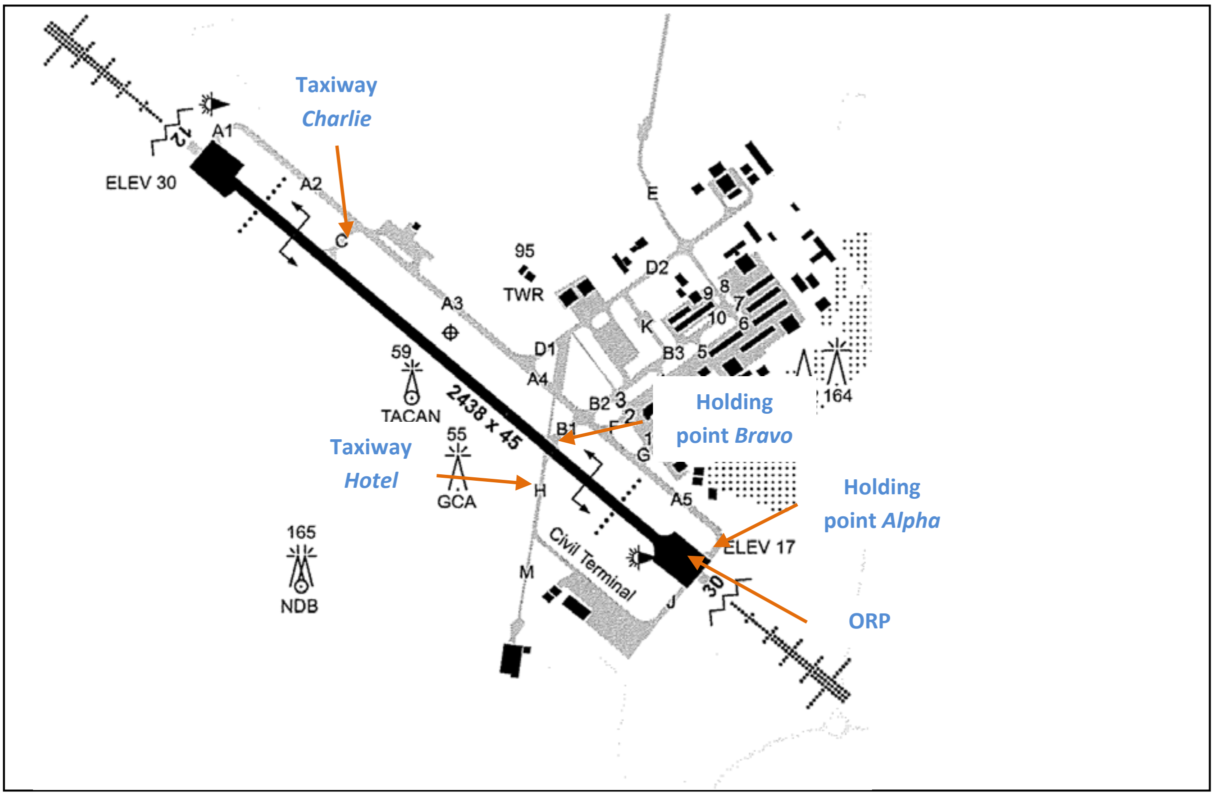
Crossing a runway

In multi-crew operations, checklists are typically applied by employing the challenge-and-response method, where one pilot reads out the task and another pilot responds with the appropriate reply.

The crew stated that prior to crossing the runway in use they normally confirm that the appropriate clearance has been received from ATC by either referencing the TOLD card and/or verifying with the other crew member. However, there was no challenge-and-response action for this task. Consequently, there was no established procedure for ensuring that a clearance to cross the runway was received.

4 Runway incursion: the incorrect presence of an aircraft, vehicle or person on the protected area of a surface designed for the landing and take-off of an aircraft.

Figure 1: Williamtown aerodrome, NSW



AIRSERVICES AUSTRALIA TRIAL

The International Civil Aviation Organization recommends that communications for all operations on a runway should take place on the radio frequency assigned for that runway.

In June 2010, Airservices Australia initiated a trial of 'Runway Crossing in Tower Frequency' procedures at certain aerodromes around the country. The purpose of the trial is to test the viability of the procedures, with the aim of enhancing pilot, vehicle driver and the ADC's situational awareness of other traffic when crossing the runway in use.

In essence, if an aircraft is required to cross the runway in use, the pilot will be issued with an instruction by the SMC to taxi to the holding point and to hold short of the runway. When approaching the holding point, the pilot will be instructed to change radio frequency to the ADC. The ADC will issue the pilot with a clearance to cross the runway. After crossing the runway, the pilot will be instructed to change back to the SMC frequency.

Additional information regarding the trial is available from the Airservices Australia website at www.airservicesaustralia.com – Aeronautical Information Publication, Aeronautical Information Circular H05/10 'Runway crossing on tower frequency trial procedures'.

ATSB Update: On 7 July 2011, Airservices Australian advised the ATSB that they had concluded the trial and elected not to implement the procedures.

ATSB COMMENT

When operating on the ground, it is important that crews not only maintain an awareness of their own location in relation to active runways, but also that of the other aircraft and vehicles relative to active runways.

In July 2010, the United States Federal Aviation Administration (FAA) launched an initiative to reduce runway incursions and enhance runway safety. Titled 'If You Cross the Line, You've Crossed the Line', the aim of the program is to increase pilot and vehicle operator awareness on the effects of entering a runway without the appropriate clearance by highlighting the dangers of crossing the line and by urging pilots to remain attentive to taxi instructions and aerodrome signage. For additional information on the FAA's runway safety program, visit www.faa.gov/airports/runway_safety.

In Australia, Airservices has also recognised that runway safety is a major concern for the aviation industry and that a reduction in runway incursions represents an opportunity to enhance runway safety. Subsequently, Airservices has published a range of information on the subject of runway safety and established the 'Runway Incursion Group'. Information regarding these initiatives can be found at www.airservicesaustralia.com/flying/runwaysafety/default.asp.

This incident highlights the importance of pilots utilising all of their available resources such as other crew members or a TOLD card to confirm if the appropriate clearance has been received from ATC. Furthermore, if there is some doubt as to the location of other aircraft operating in the area, contact ATC or the pilot of the other aircraft to establish their position.

AO-2010-047: VH- RZV, Loss of control

Date and time:	30 June 2010 approx 1515
Location:	21 km NNW of Cunnamulla, Queensland
Occurrence category:	Accident
Occurrence type:	Loss of control
Aircraft registration:	VH-RZV
Aircraft manufacturer and model:	Cessna 172H
Type of operation:	Private
Persons on board:	Crew – 1 Passengers – Nil
Injuries:	Crew – Serious Passengers – Nil
Damage to aircraft:	Serious

FACTUAL INFORMATION

On 30 June 2010, at about 1515 Eastern Standard Time[1], a C172 aircraft, registered VH-RZV (RZV), was engaged in cattle spotting on Baroona Station, about 21 km NNW of Cunnamulla, Queensland. On board the aircraft was one pilot.

While orbiting a water trough at about 500 ft, the pilot lost control of the aircraft. The aircraft impacted the ground and sustained serious damage.

A police officer who attended the scene observed that a large tree in the vicinity of the accident site had several freshly broken branches about 10 m above the ground. Severed branches and part of the aircraft's right wing tip were found between the tree and the aircraft.

The damage to RZV was consistent with the right wing colliding with a tree branch followed by the aircraft impacting the ground inverted, with a steep nose-down attitude (Figure 1).

The pilot sustained serious injuries as a result of the impact and was unable to clearly recall the accident. The pilot reported that although he does not recall hearing the aircraft's stall warning system, the most likely reason for the accident was an inadvertent stall. This probably occurred while the pilot was performing a steep turn with his attention divided between flying the aircraft and looking for cattle.

Figure 1: Cessna 172 VH-RZV

Photograph courtesy Sean Relf

The pilot stated that RZV was well maintained and there were no faults with the aircraft prior to the accident. He further reported that he regularly checked the aircraft's stall warning system and had found it serviceable on recent tests.

Personnel who attended the accident site advised that there was a strong smell of fuel, consistent with there being a significant quantity of fuel on board at the time of the accident.

The weather at the time of the accident was reported to be still with scattered upper level cloud.

Pilot information

The pilot held a low flying endorsement and had learnt to fly in RZV in 1988. Since that time, he had accumulated about 2,200 hours, mostly in RZV. He reported that he was healthy and well rested on the day of the accident.

1 The 24-hour clock is used in this report to describe the local time of day, Eastern Standard Time, as particular events occurred. Eastern Standard Time was Coordinated Universal Time (UTC) + 10 hours.

Distraction

The US Federal Aviation Administration (FAA) Advisory Circular AC 61-67C states that stalls resulting from improper airspeed management are most likely to occur when the pilot is distracted by one or more other tasks, such as locating a checklist or attempting a restart after an engine failure; flying a traffic pattern on a windy day; reading a chart or making fuel and/or distance calculations; or attempting to retrieve items from the floor, back seat, or glove compartment.

Pilots at all skill levels should be aware of the increased risk of entering into an inadvertent stall or spin while performing tasks that are secondary to controlling the aircraft.[2]

ATSB COMMENT

Most stall/spin accidents occur when a pilot is momentarily distracted from the primary task of flying the aircraft. This accident highlights that even an experienced pilot performing a familiar task can be momentarily distracted, resulting in the pilot losing control of the aircraft.

The following publications provide some additional information:

- ATSB research report – Dangerous distraction: An examination of accidents and incidents involving pilot distraction in Australia between 1997 and 2004 (2006). www.atsb.gov.au/publications/2005/distraction_report.aspx
- ATSB Transport Safety Investigation - Cessna Aircraft Company 150G, VH-KPQ (200506306). www.atsb.gov.au/publications/investigation_reports/2005/aair/aair200506306.aspx
- US FAA Advisory Circular – Stall and spin awareness training (AC 61-67C). http://rgl.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/0/a2fdf912342e575786256ca20061e343/$FILE/AC61-67C.pdf

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2 US Federal Aviation Administration. (2000). *Stall and spin awareness training* (AC 61-67C).

AO-2010-052: VH-FTM, Total power loss

Date and time:	10 July 2010, 1645 CST
Location:	Casuarina Beach, Darwin, Northern Territory
Occurrence category:	Serious incident
Occurrence type:	Total power loss
Aircraft registration:	VH-FTM
Aircraft manufacturer and model:	Cessna Aircraft Company 210L
Type of operation:	Charter – passenger
Persons on board:	Crew – 1 Passengers – 5
Injuries:	Crew – Nil Passengers – Nil
Damage to aircraft:	Minor

FACTUAL INFORMATION

On 10 July 2010, a Cessna Aircraft Company 210L aircraft, registered VH-FTM, was being operated on a scenic charter flight around the Katherine and Kakadu, Northern Territory areas, with planned stops at Maud Creek and Cooinda. On board the aircraft were the pilot and five passengers.

After departing Cooinda, the aircraft was tracked in a north-easterly direction towards Jabiru and Oenpelli and then towards the west for the return flight to Darwin; overflying the Shady Camp area at a height of 1,000 ft.

When about 46 km to the east of Darwin, the pilot made the appropriate broadcast and entered controlled airspace. The pilot was initially instructed by air traffic control (ATC) to track towards Hope Inlet and then further instructed to track direct to Lee Point[1]. At that stage, the pilot reported that operations were normal.

The pilot received another instruction from ATC stating that she was cleared for runway 11 via Lee Point and to contact the Darwin tower controller at Lee Point. As the aircraft approached Lee Point, over the water, the pilot prepared the aircraft for landing and contacted the Darwin tower controller.

Shortly after, the pilot reported that the aircraft went quiet and the engine revolutions per minute (RPM) decreased. In response, the pilot changed the fuel tank selection, turned the auxiliary fuel pump on and placed the throttle, pitch and mixture controls in the full forward position. The pilot noticed that the airspeed was also decreasing and that the engine did not respond.

The pilot notified the Darwin tower controller that the aircraft was experiencing engine problems and was subsequently advised that the runways at Darwin were clear. The pilot considered landing at the aerodrome, but as the aircraft was descending too fast, she determined that it was outside the gliding distance of the aircraft and elected to land on Casuarina Beach. On landing, the nose wheel dug into the sand and separated from the aircraft. The pilot and passengers exited the aircraft uninjured.

Engine examination

After the incident, the aircraft was transported to a maintenance facility where an engineering inspection was conducted. An examination and operational test of the engine and fuel system was unable to determine what led to the sudden loss in power.

A total of 100 L of fuel was removed from the aircraft's fuel tanks.

1 Hope Inlet and Lee Point are designated ATC check points.

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 incident.

Aircraft operator

In-flight engine restart procedure

The operator advised the ATSB that the sudden loss of engine power could have been the result of fuel vaporisation, but this could not be confirmed. As a precaution, all of the operator's pilots will be briefed on the in-flight restart procedure for fuel vaporisation as recommended by the Cessna Aircraft Company.

ATSB COMMENT

When learning to respond to an in-flight engine failure in a single-engine aircraft, pilots are taught to adopt and maintain the best glide speed[2] and select a suitable landing area within the gliding distance of the aircraft. Attempting to extend the glide by raising the nose of the aircraft in order to reach a landing area positioned beyond the aircraft's capabilities will have an adverse effect, by decreasing the glide distance.

This incident highlights the importance of resisting the temptation to extend the glide, despite the fact that an ideal landing area was within sight (Darwin aerodrome), but outside the glide distance of the aircraft.

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2 Best glide speed: the speed at which the aircraft will glide the maximum distance from a given altitude.

AO-2010-062: VH-TZV, Engine failure

Date and time:	12 August 2010, 1000 EST	
Location:	4.5 km N Gladstone Aerodrome, Queensland	
Occurrence category:	Accident	
Occurrence type:	Engine failure	
Aircraft registration:	VH-TZV	
Aircraft manufacturer and model:	Cessna Aircraft Company U206F	
Type of operation:	Aerial work - Parachute operations	
Persons on board:	Crew – 1	Passengers – 6
Injuries:	Crew – 1 (minor)	Passengers – 3 (2 serious and 1 minor)
Damage to aircraft:	Serious	

FACTUAL INFORMATION

On the 12 August 2010, the pilot of a Cessna Aircraft Company U206F aircraft, registered VH-TZV (TZV), was conducting parachuting operations near Gladstone, Queensland.

At about 0900 Eastern Standard Time,[1] the pilot had successfully completed the first parachute flight of the day in TZV. The pilot reported that he had not experienced any difficulties with the aircraft as it was flown to the drop height of 10,000 ft (AMSL)[2].

After completion of the flight, the pilot conducted a fuel quantity check using the aircraft fuel tank dipstick. The pilot stated that an additional fuel quantity of 10 L was added to the left fuel tank, giving it a total fuel quantity of 65 L. The right fuel tank was reported to have contained about 45 L of fuel. After refuelling, the pilot obtained a sample of fuel from the aircraft's fuel drain ports and observed that the fuel was free of contaminants.

The pilot then commenced the second parachuting flight. That flight had six parachutists on board and was intended to be flown to an altitude of 12,000 ft, where the parachutists would exit the aircraft.

The parachutists were required to position themselves on the cabin floor close to the aircraft's passenger attachment points. Because of this, two parachutists were required to sit on the cabin floor beside the pilot seat while the other four were positioned near the second row passenger attachment points. It was reported that each parachutist was tethered by a restraint to a passenger attachment point. This was typical of parachuting operations when the aircraft was at low altitude.

Before commencing take-off, the aircraft was taxied to a run-up area where the pilot conducted checks of the aircraft's magnetos, engine, and propeller. A fuel system check that included switching the fuel selector to the right tank and then back to the left tank was also reported to have been completed. The run-up checks and the cockpit instrument indications were within the aircraft's normal operating parameters.

After take-off, the pilot reported that he reduced power to the climb power settings and retracted the flap after passing 300 ft. The aircraft climbed normally until, at about 1,000 ft, the aircraft's engine lost power.

Seconds after losing power, the engine momentarily surged before again losing power. The pilot noted that the aircraft's propeller was 'windmilling'[3], which

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1 The 24-hour clock is used in this report to describe the local time of day, Eastern Standard Time (EST), as particular events occurred. Eastern Standard Time was Coordinated Universal Time + 10 hours.

2 All altitudes are expressed as height above mean sea level (AMSL).

3 Term used to describe a propeller that is driven by the airflow passing through it.

indicated to him that the engine had not seized and a restart was then attempted.

In an attempt to restart the engine, various cockpit tasks were completed; these included, moving the fuel selector from the left tank to the right tank, ensuring the fuel mixture was rich, and cycling the throttle lever. These actions were unsuccessful in restarting the aircraft engine. The aircraft was trimmed by the pilot for a glide of 70 kts, the passengers were briefed and the pilot broadcast a Mayday[4], as he configured the aircraft for an emergency landing.

The options available to the pilot for a suitable emergency landing area were reduced because of the aircraft altitude, but the pilot was able to turn the aircraft away from a water course in an attempt to land on a small gravel road.

The aircraft landed heavily on the gravel road and sustained serious damage (Figure 1). Two of the occupants sustained serious injuries, while another two sustained minor injuries.

Figure 1: Aircraft accident site

Photograph used with permission

Aircraft examination

The aircraft wreckage was recovered from the accident site and examined by an independent maintenance organisation nominated by the aircraft insurer.

The fuselage of the aircraft sustained significant damage as a result of the landing. The right wing had partly detached from the main fuselage structure and the right wing fuel tank was compromised.

Despite this, the initial onsite examination showed fuel quantities of 50 L from the left wing fuel tank and 21 L from the right wing fuel tank. The fuel drained from the aircraft was reported to have been free of contaminants.

Fuel system examination

An inspection of the fuel system found a small amount of orange coloured debris in the fuel manifold valve, before the fuel filter screen (Figure 2).

Figure 2: Fuel manifold valve with debris

Photograph used with permission

The fuel filter screen prevented fuel contaminants from progressing downstream into the fuel injector lines. The fuel injector lines were reported to have been free of contaminants.

The maintenance company that examined the fuel system components reported no abnormalities that would have prevented the operation of the engine.

The Australian Transport Safety Bureau (ATSB) obtained a sample of the debris for identification and found that the debris appeared to be an agglomeration of fine particulate matter. The composition of the debris was primarily iron and oxygen with traces of cadmium, manganese and zinc. The investigation could not determine the exact origin of the debris.

Engine information and examination

The aircraft was fitted with a Teledyne Continental IO-520F reciprocating engine that had a total time in service of 3,107.6 hours and had accumulated 1,540.5 hours since the last overhaul, 10 years ago.

The aircraft's engine was removed from the airframe for examination and testing by the insurer's

4 International call for urgent assistance.

nominated maintenance facility. No mechanical abnormalities were noted and the engine exhibited normal wear indications. The engine examination could not identify anything that would have prevented the engine from operating.

ATSB COMMENT

It was unlikely that the small quantity of debris found in the fuel system lead to the total power loss of the engine.

Pilots should consider the effect an in-flight engine failure at low altitude has on the time available to manage that failure and identify a suitable forced landing area. In this instance, the pilot was able complete some emergency checks and turn the aircraft away from a water course in an attempt to conduct a forced landing on a gravel road. It is likely that this action positively influenced the outcome for the occupants of the aircraft.

AO-2010-071: VH-CSH, Wirestrike

Date and time:	25 September 2010, 1110 EST	
Location:	Geelong (ALA), Victoria	
Occurrence category:	Accident	
Occurrence type:	Wirestrike	
Aircraft registration:	VH-CSH	
Aircraft manufacturer and model:	Rockwell International 114	
Type of operation:	Private	
Persons on board:	Crew – 1	Passengers – 1
Injuries:	Crew – 1 (Serious)	Passengers – 1 (Minor)
Damage to aircraft:	Serious	

FACTUAL INFORMATION

On 25 September 2010, a Rockwell International 114 aircraft, registered VH-CSH (CSH), was being operated on a private flight from Moorabbin, along the coast via Barwon Heads, Anglesea and Lorne, and then returning to the Geelong aircraft landing area (ALA), Victoria, under the visual flight rules. On board the aircraft were the pilot and one passenger.

In preparation for the flight, the pilot contacted the operator of the Geelong airfield. The operator provided the pilot with landing permission and discussed the condition of the runways. As part of the discussion, the operator advised that runway 27 was 1,200 m long and asked the pilot if he had previously landed at Geelong. The pilot stated that he had landed at the airfield about 10 years ago, but could not recall having used runway 09/27.

After departing Moorabbin, the pilot flew along the coast, past Barwon Heads, Anglesea and onto Lorne. Overhead Lorne, the pilot elected to turn back towards Geelong due to turbulence. The pilot reported that about halfway between Anglesea and Torquay, he left the coast and tracked towards Geelong. At this point, the pilot made an inbound broadcast on the common traffic advisory frequency (CTAF), indicating his intention to land on runway 36.

As the aircraft approached Geelong, the pilot referenced the En Route Supplement Australia (ERSA) to obtain the airstrip's elevation. The pilot also reported that he had referred to the ERSA the night before and was aware that right circuits were required when using runway 36 and that there was a displaced threshold on runway 27 due to powerlines under the final approach path.

At about 1100 Eastern Standard Time[1], on joining the circuit, the pilot observed that the wind direction was more conducive to a landing on runway 27. At that time, he did not observe the markings for the displaced threshold on runway 27.

The pilot reported that he did not want to rush the approach and extended the downwind leg by about 1 NM (1.8 km) beyond the Surf Coast Highway, which ran parallel to runway 36 and adjacent to the start of runway 27. The aircraft was turned onto final at a height of about 800 ft. At that stage, the aircraft was performing as expected.

When at a distance of 500-600 m from the airfield, the pilot sighted the markers on the powerlines that ran parallel to the eastern side of the highway. The pilot reported that the markers were not highly visible due to their reasonably small shape. The pilot was aware that runway 27 had a displaced threshold due to the powerlines, but was unsure of the threshold position on the runway. The pilot recalled the conversation he had with the airstrip operator that morning, where he was informed that runway 27 was 1,200 m in length. The pilot was unclear as to whether or not this distance included or excluded the displaced threshold. As a

1 The 24-hour clock is used in this report to describe the local time of day, Eastern Standard Time, as particular events occurred. Eastern Standard Time was Coordinated Universal Time (UTC) +10 hours.

precaution, the pilot elected to touch down just beyond the intersection of runway 09/27 and 18/36.

During the final approach, the pilot reported that mild turbulence was experienced, but he did not see a need to discontinue the approach. At about 500 m from the airfield the pilot observed the runway 27 marker cones, which indicated the start of the runway and the location of the displaced threshold.

As the aircraft approached the Surf Coast Highway, the pilot stated that he did not have the powerlines in sight as they were obscured by the aircraft's nose. At that stage of the approach, he was focussing on the intended touchdown point and trying to identify the exact location of the displaced threshold. Based on the aircraft's approach trajectory, the pilot expected to be about 50 ft above the powerlines when the aircraft passed overhead.

Shortly after, the pilot recalled feeling a 'jolt', with his next recollection being the impact with the ground. The aircraft came to rest on the western side of the Surf Coast Highway, just outside the boundary of the airfield (Figure 1). The aircraft had collided with the high voltage powerlines, before impacting the ground.

With assistance, the pilot and passenger exited the aircraft through the windscreen. The pilot sustained serious injuries, including a fractured ankle, while the passenger sustained minor injuries. After the occupants egressed, the aircraft caught alight, resulting in serious damage[2].

Figure 1: VH-CSH immediately after the impact

Photograph courtesy of Peter Kingston

2 The Transport Safety Investigation Regulations 2003 definition of 'serious damage' includes the destruction of the transport vehicle.

Witness information

A witness, who was another pilot, located near the fuel bowser (Figure 2) noted that the aircraft appeared to be wide and low when it turned onto final. As the aircraft approached the runway, he believed it was a bit low and that the intended touchdown point was prior to the displaced threshold. He observed the aircraft ascend and descend, and then strike the powerlines. The witness had landed on runway 27 about 10 minutes prior to the accident and stated that the wind was from 290° at about 15 kts. He did not experience any mechanical turbulence or windshear during his approach.

A second witness also located at the fuel bowser observed the aircraft join the circuit. He stated that on the downwind leg, the aircraft appeared closer than normal and estimated it was at a height of about 800-900 ft above ground level. On final, he stated that the aircraft appeared to be too low and slow, and then struck the powerlines.

Another witness, located near runway 27, stated that the aircraft appeared to be a bit low on the approach and that he saw the aircraft lift up and then drop down onto the powerlines. He believed that the wind had picked the aircraft up.

Airfield information

The Geelong airfield was an uncertified, unregistered aircraft landing area, located about 6 km to the south of the city of Geelong. The airfield consisted of two runways aligned 180/360 degrees and 090/270 degrees. The ERSA stated that runway 27 had a displaced threshold due to powerlines on the approach, however, a diagram of the airfield or information regarding runway distances was not provided. According to the Aircraft Owners and Pilots Association of Australia (AOPA) Airfield Directory, runway 27 is 950 m in length. Prior approval from the airfield operator was also required for all flights into Geelong.

The Geelong airfield was scheduled to close in June 2011. After the accident, the operator restricted operations at Geelong and closed the airfield to visiting aircraft.

Figure 2: Geelong (ALA)

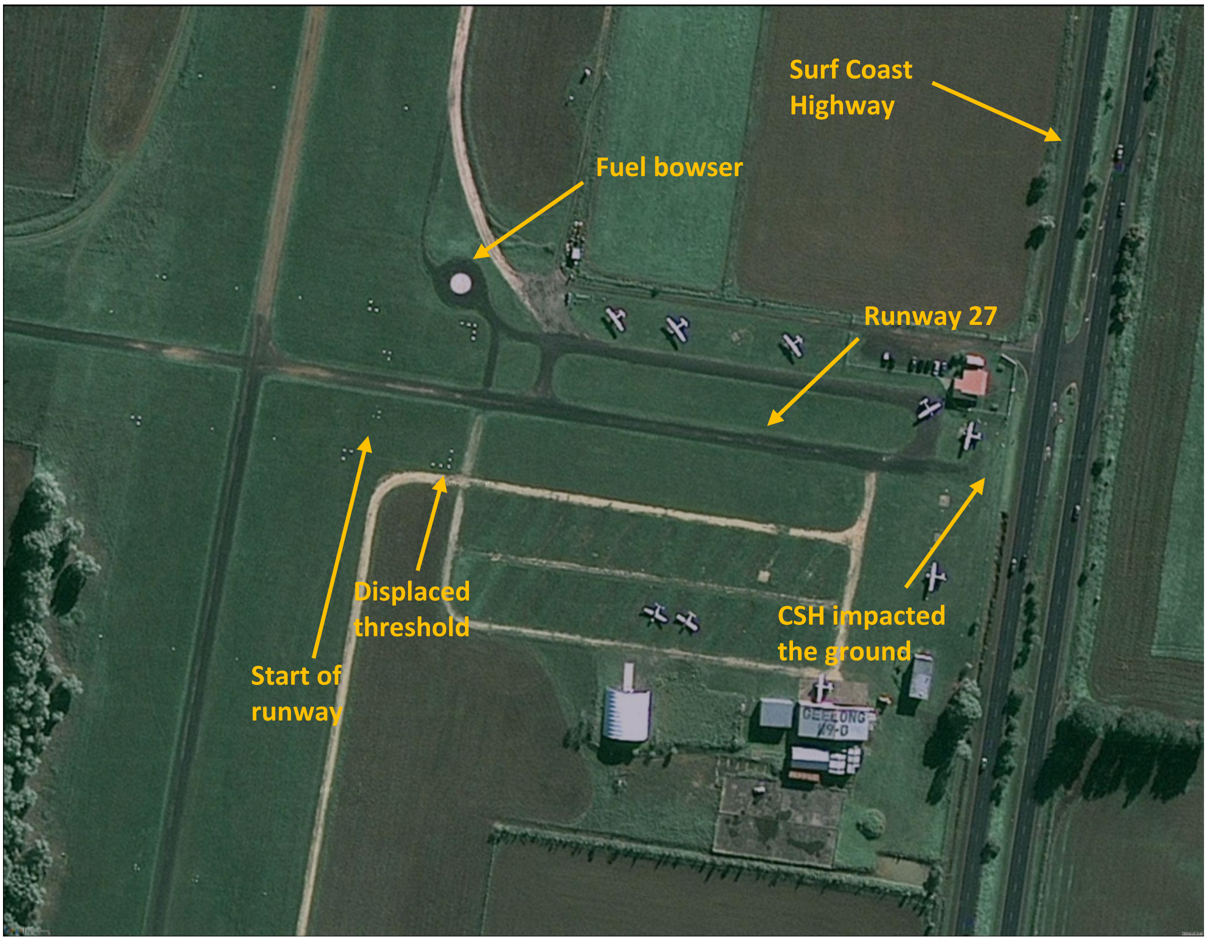

Image courtesy of GoogleEarth

Meteorological information

Prior to departing Moorabbin, the pilot obtained aviation meteorological forecasts from the Bureau of Meteorology (BoM) for the Melbourne and Geelong areas. The Area forecast[1] was valid from 0900 to 2100 on 25 September 2010. The forecast included:

- a trough reaching a line Robinvale, Victoria to Flinders Island, Tasmania by 1500
- isolated showers and drizzle within 220 km of the trough, mainly around the ranges and in the south
- forecast winds at 2,000 ft from 310° at 25 kts to the east of the trough.

The aerodrome forecast for Avalon aerodrome, located about 24 km to north-north-east of Geelong, forecast moderate turbulence below 5,000 ft until 1200.

Pilot information

The pilot held a current Private Pilot (Aeroplane) Licence. The pilot's logbook was onboard the aircraft at the time of the accident and was subsequently destroyed by the post-impact fire. He estimated he had a total of about 600 hours, with about 4.2 hours on the Rockwell International 114 prior to the accident flight.

ATSB COMMENT

Research published by the Australian Transport Safety Bureau (ATSB) found that between the period 1994 and 2004, 15 per cent of wirestrike accidents occurred within the private/business flying category.

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1 In order to facilitate the provision of aviation weather forecasts by the BoM, Australia is divided into a number of forecast areas. The Area 30/32 forecast covered the flight path of the aircraft.

Of this, 61 per cent involved operations within the vicinity of the landing area.

Surprisingly, the study also established that in 82 of the 119 wirestrike accidents identified, 63 per cent of pilots were aware of the wire before it was struck.

The report suggested that pilots intending to operate into an unfamiliar landing area should ensure that they take all the necessary precautions to reduce the likelihood of a wirestrike incident or accident from occurring. This may involve identifying the hazards within that area prior to the operation by contacting the owner or operator of the landing area, reviewing the relevant maps and publications, and conducting an aerial inspection of the landing area at a suitable height prior to landing.

The following ATSB publication provides further information on wirestrike accidents:

- Wire-strike accidents in General Aviation: Data Analysis 1994 to 2004 (2006)

A copy of the report is available on the ATSB website here:

www.atsb.gov.au/publications/2006/wirestrikes_20050055.aspx

AO-2010-074: VH-RUA and VH-UCW, Aircraft proximity event

Date and time:	6 October 2010, 1200 EDT
Location:	Ballina/Byron Gateway aerodrome, New South Wales
Occurrence category:	Serious incident
Occurrence type:	Airprox
Aircraft registration:	VH-RUA and VH-UCW
Aircraft manufacturer and model:	VH-RUA: Beech Aircraft Corp 76 VH-UCW: Cessna Aircraft Company 182
Type of operation:	VH-RUA: Flying training - dual VH-UCW: Flying training - dual
Persons on board:	VH-RUA: Crew – 2 Passengers – Nil VH-UCW: Crew – 2 Passengers – Nil
Injuries:	Crew – Nil Passengers – Nil
Damage to aircraft:	Nil

FACTUAL INFORMATION

Sequence of events

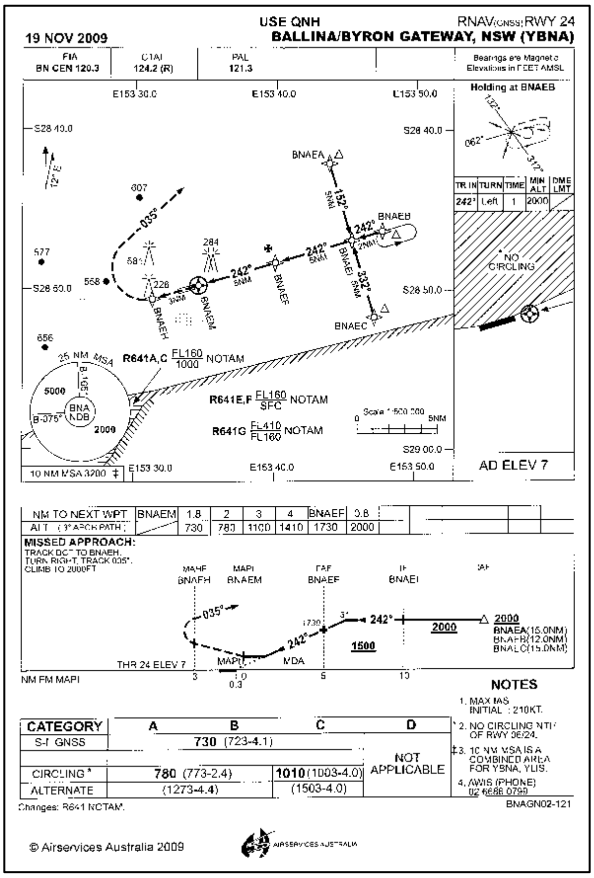
Beech Aircraft Corp 76, VH - RUA

On 6 October 2010, at about 1000 Eastern Daylight Time[1], a flight instructor and pilot under instruction in a Beech Aircraft Corp 76 (Duchess), registered VH-RUA (RUA), departed Gold Coast aerodrome, Qld. on a training flight conducted under the instrument flight rules (IFR).

After being vectored by ATC through the Brisbane approach sector, the aircraft tracked to Ballina/Byron Gateway Aerodrome (YBNA), NSW to conduct an area navigation global navigation satellite system (RNAV (GNSS)) approach to runway 24 (Figure 1). While flying the approach, the aircraft became clear of cloud at approximately 1,500 ft above mean sea level (AMSL).

The instructor reported that all required radio broadcasts where made and both the Ballina common traffic advisory frequency (CTAF) and Brisbane centre frequency were monitored during the approach. The instructor also reported that all external aircraft lights were turned on for the approach.

Figure 1: Chart - RNAV (GNSS) RWY 24



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

Cessna Aircraft Company 182

At about 1140, two pilots in a Cessna Aircraft Company 182L (C182) registered VH-UCW (UCW), took off from runway 24 at Ballina aerodrome to conduct jump pilot authorisation training for parachute operations. The flight was planned to include a number of circuits prior to more detailed instruction on parachute dropping operations.

The pilots from both aircraft reported that all required radio broadcasts where made, however neither could recall if any aerodrome frequency response unit (AFRU) read/beep backs were heard. They also reported that the only external aircraft lighting turned on were the navigation lights and rotating beacon.

The incident

The weather at the time of the incident was reported to be overcast with a cloud base of 1,500 to 2,000 ft AMSL.

Shortly after becoming visual and at approximately 1,000 ft AMSL, the instructor in RUA reported seeing an aircraft, later identified as UCW, in his 10 o'clock position, about 50 m to the left of the aircraft's nose, 50 ft higher, and with an estimated 40 kt closing speed.

The instructor took control of the aircraft from the student and performed an evasive manoeuvre involving a steep right turn followed by a missed approach. The instructor did not report hearing any radio broadcasts from UCW.

The pilots of UCW reported seeing RUA at a higher altitude and about 200 to 300 metres away. The pilot flying initiated a left turn but resumed the approach to runway 24 when it was determined that the pilot of RUA had seen them and was conducting a missed approach.

The pilots in UCW elected to land following the incident. Following the incident, the pilots of both aircraft tried to contact each other on the Ballina CTAF frequency without success.

Once UCW was parked, the pilots were approached by airport ground staff and informed that other aircraft in the circuit were not receiving radio transmissions from them. Using a portable very high frequency (VHF) transceiver it was confirmed that UCW's VHF radio was neither transmitting nor receiving. The fault was traced to an incorrectly selected audio panel setting. Once the setting was corrected, the radio was tested and performed satisfactorily. There were no further radio system faults reported in the days following the incident.

Aerodrome Frequency Response Unit

To assist pilots' awareness of inadvertent selection of an incorrect VHF frequency when operating into non-towered aerodromes, a device known as an Aerodrome Frequency Response Unit (AFRU) may be installed. Ballina / Byron Gateway aerodrome has an ARFU installed. An AFRU will provide an automatic response when pilots transmit on the CTAF for the aerodrome at which it is installed.

The features of the AFRU are as follows:

- When the aerodrome traffic frequency has not been used for the past 5 minutes, the next transmission over 2 seconds long will cause a voice identification to be transmitted in response, e.g. "Ballina Byron airport one two four decimal two"
- When the aerodrome traffic frequency has been used within the previous 5 minutes, a 300 millisecond tone (beep back) will be generated after each transmission over 2 seconds long

The operation of the AFRU provides additional safety enhancements by confirming the operation of the aircraft's transmitter and receiver, the volume setting, and that the pilot has selected the correct frequency for use at that aerodrome[2].

Aircraft anti-collision lighting

The Australian Transport Safety Bureau (ATSB) report, Limitations of the See-and-Avoid Principle (1991), discusses the effectiveness of anti-collision lighting in daylight conditions. The report concludes that 'although strobes cannot increase the visibility of an aircraft against a bright sky, it is likely that high intensity white strobes would increase the conspicuity of an aircraft against a dark sky or ground.'

2 Text extracted from Aeronautical Information Package – General 3.4 Aerodrome Frequency Response Unit http://www.airservicesaustralia.com.au/flying/

ATSB COMMENT

Flights conducted at non-towered aerodromes are not provided with a traffic separation service from air traffic control. Consequently, maintaining separation is the pilot's responsibility.

To maintain separation, it is imperative that pilots utilise alerted and unalerted see-and-avoid principles to enhance situational awareness. The effective use of aerodrome frequency response units (AFRU) and anti collision lighting can contribute to pilot's situational awareness at non-towered aerodromes.

The following publications provide some useful information on see-and-avoid principles:

- Limitations of the See-and-Avoid Principle (1991), available from the ATSB's website at www.atsb.gov.au
- Pilot's responsibility for collision avoidance in the vicinity of non-towered (non-controlled) aerodromes using 'see-and-avoid' (Civil Aviation Advisory Publication CAAP 166-2(0), available from the Civil Aviation Safety Authority's website at www.casa.gov.au

AO-2010-078: VH-TAS and VH-XBC, Airspace related event

Date and time:	12 October 2010, 1712 EDT		
Location:	Narrandera aerodrome, New South Wales		
Occurrence category:	Incident		
Occurrence type:	Airspace related event		
Aircraft registration:	VH-TAS and VH-XBC		
Aircraft manufacturer and model:	VH-TAS:	Piper Aircraft Corporation PA-31-350	
	VH-XBC:	Cessna Aircraft Company 441	
Type of operation:	VH-TAS:	Air transport – freight	
	VH-XBC:	Charter - passenger	
Persons on board:	VH-TAS:	Crew – 1	Passengers – Nil
	VH-XBC:	Crew – 1	Passengers – 3
Injuries:	Crew – Nil	Passengers –Nil	
Damage to aircraft:	Nil		

FACTUAL INFORMATION

Sequence of events

Piper PA-31-350, VH-TAS

On 12 October 2010, the pilot of a Piper Aircraft Corporation PA-31-350 aircraft, registered VH-TAS (TAS), departed Griffith, New South Wales, on scheduled freight service to Narrandera, under the visual flight rules.

When about 37 km from Narrandera, the pilot broadcast an inbound call on the common traffic advisory frequency (CTAF) advising that he intended to join the circuit on a 5 NM (9 km) final for runway 14. The pilot reported that he received the voice identification from the Narrandera aerodrome frequency response unit (AFRU)[1].

About 2-3 minutes later, the pilot heard a broadcast from the pilot of a Cessna Aircraft Company 441 aircraft, registered VH-XBC (XBC), advising he was taxiing for Renmark in South Australia, on runway 32. At that time, the pilot of TAS attempted to contact the pilot of XBC, but received no reply. The pilot of TAS could not determine if the broadcast was made on the CTAF or area frequency.

When about 19 km from Narrandera, the pilot of TAS broadcast his intentions to manoeuvre for a 5 NM (9 km) final for runway 14. The pilot reported that he attempted to contact the pilot of XBC on two more occasions, but no response was received. The pilot assumed that XBC was still on the ground being prepared for departure.

Soon after, the pilot made a broadcast indicating that he was established on a 5 NM (9 km) final. At that time, the pilot reported that the wind was 3 kts from 040 degrees.

Cessna 441, VH-XBC

At about 0600 Central Standard Time[2], a Cessna Aircraft Company 441 aircraft, registered VH-XBC, departed Adelaide, South Australia, on a charter

1 AFRU: A facility installed at certain non-towered aerodromes that provides an automatic response to pilots when transmitting on the CTAF. The AFRU indicates to the pilot that the correct radio frequency has been selected and confirms the operation of the aircraft's transmitter and receiver, and volume setting. The pilot will receive either a voice identification, for example 'Narrandera CTAF', or a 300 millisecond tone or 'beep'.

2 The 24-hour clock is used in this report to describe the local time of day, Central Daylight-saving Time and Eastern Daylight-saving Time, as particular events occurred. Central Daylight-saving Time was Coordinated Universal Time (UTC) + 10.5 hours and Eastern Daylight-saving Time was UTC + 11 hours.

passenger flight, with planned landings at Renmark, Narrandera, and Hillston, New South Wales, before returning to Adelaide via the same route, under instrument flight rules.

After departing Adelaide, the aircraft landed at Renmark and then Narrandera. On arrival at Narrandera, the pilot reported receiving confirmation from the AFRU when making the appropriate broadcast. While on the ground, the pilot turned the 'squelch'[3] function on the aircraft's radio up momentarily in order to gain an indication of the volume setting for receiving broadcasts. The pilot stated that while he generally did not have to adjust the volume setting on the radio, he routinely checked the 'squelch'.

The aircraft departed Narrandera for Hillston, where the pilot received the AFRU voice identification. On departing Hillston, the pilot checked the aircraft's radios and reported hearing broadcasts on the Hillston CTAF.

When about 56 km from Narrandera, the pilot broadcast an inbound call on the CTAF. The pilot believed he received a 'beep back' from the AFRU. The pilot also stated that the inbound call was usually made when descending through about 10,000 ft and at this height, you may hear a broadcast from one area, but receive a 'beep back' from another area.

The aircraft landed at Narrandera, where it remained for several hours.

In preparation for the departure, the pilot checked the function of the aircraft's radios and broadcast a taxi call on the CTAF advising that he was taxiing for runway 32. The pilot reported that he received a 'beep back' from the AFRU, but did not receive a reply from any other aircraft operating in the area.

The pilot taxied the aircraft onto the runway, while maintaining a lookout for other aircraft. The pilot reported that as far as he could see, there was no other traffic.

At the time, the pilot stated that the wind was about 16 kts from a north-easterly direction. The Bureau of Meteorology's daily weather observations for Narrandera, recorded about 2 hours prior, indicated that the wind was about 13 kts from the north-north-east.

The incident

At about 1712 Eastern Daylight-saving Time, when 6-7 km on final for runway 14, the pilot of TAS observed the landing lights of an aircraft taking off on runway 32. The pilot realised that the aircraft was XBC and in response, turned the aircraft to the right.

The pilot of XBC also observed TAS during his take-off run. His immediate response was to conduct a right turn, but he noticed TAS turning and elected to continue the climb straight ahead. At about the same time, the pilot received a 'traffic' alert from the aircraft's traffic and collision alert device (TCAD).

Shortly after, the pilot of XBC heard a faint broadcast on the CTAF. The pilot turned the volume setting on the radio up further and made a broadcast requesting traffic at Narrandera. The pilot of TAS replied, stating that he had attempted to contact XBC on numerous occasions, but received no reply. The pilot of XBC advised that he did not hear any broadcasts made by the pilot of TAS.

It was estimated that the aircraft passed at a height of about 500 ft above ground level (AGL), with a horizontal distance between 1-2 km. The pilot of XBC reported that at no time was there any risk of a collision.

The pilot of TAS reported that he did not hear any broadcasts by XBC indicating that the aircraft had entered the runway or commenced the takeoff. He also reported that he had asked the pilot of XBC if his radio had been turned down, to which the pilot of XBC reportedly replied that it was. The pilot of XBC reported that at the time of the incident his radio volume was positioned at the normal setting used for flight.

Any broadcasts made by both pilots on the CTAF could not be verified as transmissions at Narrandera were not recorded.

3 'Squelch' referred to a circuit function that suppressed audio output from a receiver in the absence of a sufficiently strong signal. That function eliminated background noise (i.e. static) associated with the selected frequency.

ATSB COMMENT

A recent research report published by the ATSB identified that the most common type of occurrence (accident and incident) recorded in the vicinity of non-towered aerodromes[4] between the period 2003 and 2008 related to conflicts between aircraft, or between aircraft and ground vehicles.

A large number of these involved separation issues, ineffective communication between pilots operating in close proximity, the incorrect assessment of other aircraft's positions and intentions, relying on the radio as a substitute for an effective visual lookout, or a failure to follow published procedures.

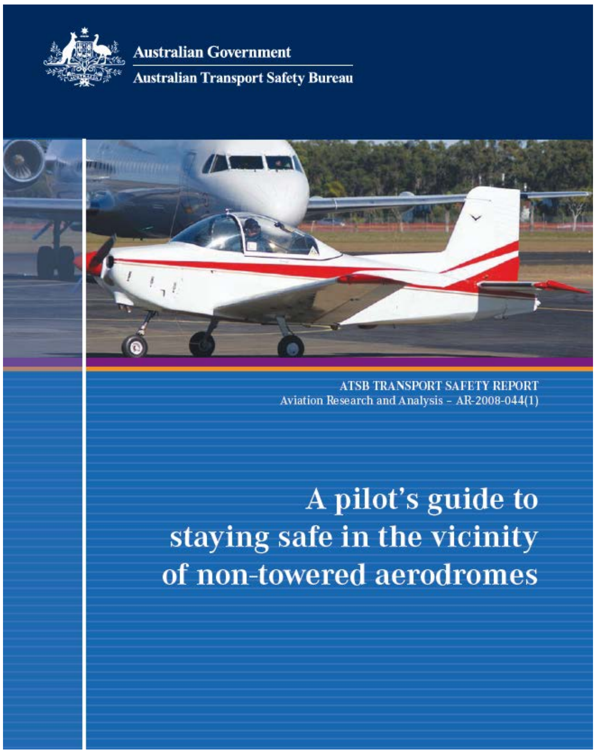
Operations at non-towered aerodromes are generally considered safe, but this relies on all pilots:

- maintaining an awareness of their surroundings and of other aircraft
- flying in compliance with the procedures
- being observant, courteous and cooperative.

The ATSB has published a safety report titled:

A pilot's guide to staying safe in the vicinity of non-towered aerodromes (2010). A copy of that report is available on the ATSB website at:

www.atsb.gov.au/publications/2008/ar-2008-044(1).aspx



[4] A non-towered aerodrome is an aerodrome at which air traffic control (ATC) is not operating, this includes: an aerodrome that is always in Class G airspace; an aerodrome with a control tower, but no ATC service is currently provided, or an aerodrome that would normally have ATC services, but is presently unavailable.

AO-2010-082: VH-PCF, Aircraft loss of control

Date and time:	23 October 2010, 1620 EST
Location:	Green Island, Cairns, Queensland
Occurrence category:	Accident
Occurrence type:	Aircraft loss of control
Aircraft registration:	VH-PCF
Aircraft manufacturer and model:	De Havilland Canada DHC-2 MK 1 (floatplane)
Type of operation:	Charter – passenger
Persons on board:	Crew – 1 Passengers – 6
Injuries:	Crew – Nil Passengers –Nil
Damage to aircraft:	Serious

FACTUAL INFORMATION

On 23 October 2010, the pilot of a De Havilland Canada DHC-2 MK 1 floatplane, registered VH-PCF, departed Cairns for Green Island, Queensland to operate a charter passenger flight back to Cairns with six passengers onboard.

Prior to boarding the aircraft at Green Island, the pilot conducted a passenger safety briefing and provided the passengers with life jackets, which they donned.[1]

At about 1614 Eastern Standard Time[2], the pilot started the engine and taxied the aircraft to the designated takeoff location, north of Green Island. The pilot completed the pre-takeoff checklist and made a broadcast on the common traffic advisory frequency (CTAF). At that time, the pilot reported that the wind was 150 degrees at 22 kts gusting to 25 kts, the sea state was 'choppy', and the tide was 1.2 m.

[1] It was a requirement of the aircraft operator that all passengers wear life jackets when on board the aircraft. Wearing a life jacket in-flight was optional for the pilot, but a jacket was supplied, stowed under the pilot's seat.

[2] The 24-hour clock is used in this report to describe the local time of day, Eastern Standard Time, as particular events occurred. Eastern Standard Time was Coordinated Universal Time (UTC) + 10 hours.

The take-off run to the south-east was commenced. The pilot applied full right rudder to counteract the aircraft's engine torque component[3] and applied right aileron to compensate for the drift caused by the crosswind.

Due to the choppy water conditions, the pilot manoeuvred the aircraft so that the floats were 'on the step'[4] as soon as possible in order to minimise the amount of spray being picked up by the propeller.

Immediately after becoming airborne, the pilot lowered the nose of the aircraft to allow it to accelerate in ground affect. At the same time, the aircraft began to turn to the left. As right aileron and full right rudder were already being applied, the pilot elected to reject the takeoff. The pilot attempted to

[3] When the propeller rotates, it creates an equal and opposite reaction, in the opposite direction. If the propeller turns in a clockwise direction, as seen from the cockpit, the aircraft will have a tendency to yaw to the left. This reaction is more pronounced when the aircraft is at a low airspeed, but with a high amount of engine horsepower, indicative of take-off conditions.

[4] As the aircraft's forward speed increases, the hydrodynamic pressure under the floats will increase until the weight of the aircraft is supported by the pressure of the water against the bottom of the floats. The aircraft will pitch forward to a near level attitude and begin to skim or plane across the surface of the water. When the aircraft is in the correct planning attitude, only a small portion of the float, forward of the float steps, will be touching the water. At this point, the aircraft is referred to as being 'on the step'.

place the aircraft in a level attitude prior to the touchdown, but the aircraft landed heavily on the left float. The aircraft touched down perpendicular to the wind and waves, but remained upright (Figure 1). The pilot could not recall if the aircraft had encountered a gust of wind after becoming airborne.

The pilot noticed that the left float was damaged at the attachment points and proceeded to shut down the aircraft. The aircraft was listing to the left, but was in no danger of sinking. The pilot and passengers remained in the aircraft until assistance arrived.

Shortly after, a boat arrived from Green Island and the pilot and passengers exited on the right side of the aircraft and were taken to shore. The passengers did not inflate their life jackets. None of the aircraft occupants received injuries.

The aircraft sustained serious damage to the left float, left and right wing tip and left elevator.

Figure 1: VH-PCF

Photo courtesy of aircraft operator

The pilot reported that his first flight of the day, from Cairns to Green Island, was cancelled because the weather conditions exceeded the operator's limitations for Green Island.

About 1 hour prior to the accident, the pilot conducted a flight from Cairns to Green Island and return without incident. The weather conditions were similar to those experienced on the accident flight.

Meteorological information

The Bureau of Meteorology's coastal weather observations at Arlington Reef[5] indicated that the wind at 1600 was 21 kts gusting to 25 kts from the south-south-east, while at 1630 the wind was 22 kts gusting to 26 kts from the south-south-east.

Throughout the day, the pilot monitored the wind conditions at Arlington Reef and stated that the wind speed remained relatively consistent. At the time of the accident, the pilot estimated the wind conditions were 22 kts gusting to 25 kts from 150 degrees.

Tide and wind chart

In preparation for the flight, the pilot obtained the predicted tide height for Green Island and the wind speed/direction details for Arlington Reef. With this information, the pilot then referenced the operator's tide and wind restrictions chart for Green Island to determine if the flight was within the operator's prescribed limitations.

The chart, designed by the operator, was divided into four sectors (Figure 2) based on wind direction. For each sector, the maximum allowable wind speed, based on the predicted tide height was provided.

For the accident flight, the wind direction was from 150 degrees, which was located in the third sector. Given that the tide was 1.2 m, the maximum allowable wind speed for the flight was 27 kts. Consequently, the pilot elected to conduct the flight.

The pilot reported that while the flight was conducted at the higher end of the operator's limitations, the conditions were manageable.

Pilot information

The pilot held a Commercial Pilot (Aeroplane) Licence, with a total of 2,230 hours experience. He had 611 hours on floatplanes, of which 110 hours were on the De Havilland Canada DHC-2 aircraft, in an open water environment. The pilot estimated that he had conducted about 80 flights to Green Island in the previous 6 weeks.

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5 Arlington Reef is located about 6 km to the north-east of Green Island and is the closest reference point for wind speed and direction information.

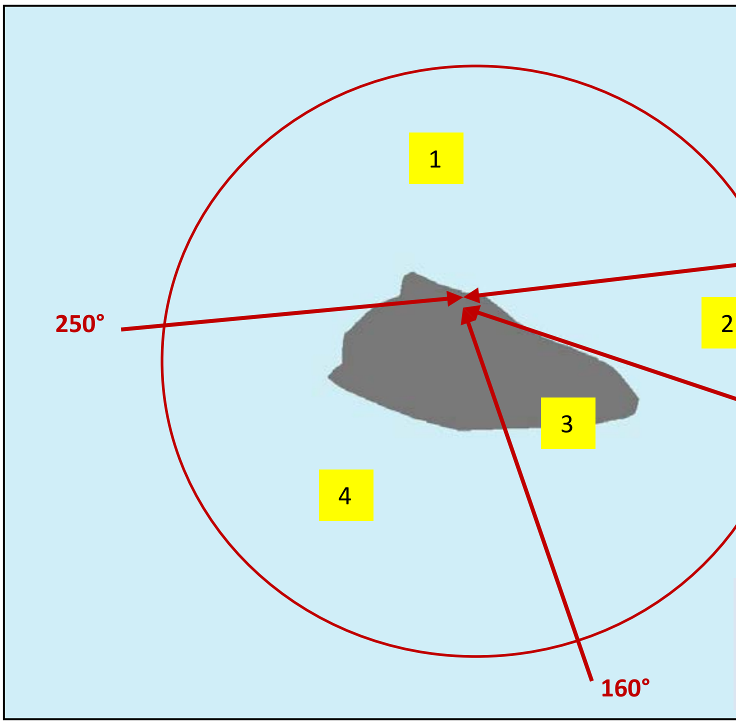
ATSB COMMENT

Operating in an open water environment can be challenging for pilots, particularly when water conditions are rough. Not only does the pilot have to deal with spray being picked up by the propeller and the aircraft bouncing from wave to wave, but also crosswinds.

To compensate for cross wind, pilots are required to place the flight controls in a position to counter the effects of wind during the take-off run. For example, if a cross wind from the right was present, right aileron should be applied to offset any drift to the left, and left rudder applied to neutralise the effects of weather vane. However, as the takeoff surface is moving, it is difficult to judge any drift from a crosswind by looking at the water. It is crucial that pilot's have an appreciation of the existing wind conditions prior to the takeoff, and in the event of unexpected wind gusts during the takeoff, the pilot responds appropriately by either applying rudder or aileron, or rejecting the takeoff.

Under these circumstances, it is important for pilots to not only be aware of aircraft and operator limitations, but also their own personal limitations.

Figure 2: Tide and wind limitation chart (degrees magnetic)



Tide	Maximum wind
<1.0 m	30 kt
1.0 – 1.5 m	*27 kt*
>1.5 m	23 kt

Adapted from the aircraft operator's *Green Island – Tide and Wind Restrictions* chart

AO-2010-083: VH-HCC and VH-XSN, Aircraft proximity event

Date and time:	23 October 2010, 0914 EDT
Location:	Bankstown aerodrome, New South Wales
Occurrence category:	Serious incident
Occurrence type:	Airprox
Aircraft registration:	VH-HCC and VH-XSN
Aircraft manufacturer and model:	VH-HCC: Cessna Aircraft Company 152 VH-XSN: Piper Aircraft Corporation PA-28-161
Type of operation:	VH-HCC: Flying training - solo VH-XSN: Flying training - dual
Persons on board:	VH-HCC: Crew – 1 Passengers – Nil VH-XSN: Crew – 2 Passengers – Nil
Injuries:	VH-HCC: Crew – Nil Passengers – Nil VH-XSN: Crew – Nil Passengers – Nil
Damage to aircraft:	Nil

FACTUAL INFORMATION

Sequence of events

Cessna 152, VH-HCC

On 23 October 2010, a Cessna Aircraft Company 152, registered VH-HCC (HCC), was being operated on a training flight at Bankstown aerodrome, New South Wales. The purpose of the flight was to conduct the student pilot's[1] third solo check, followed by the student conducting three solo circuits.

Prior to conducting the solo flight, the student and instructor flew three dual circuits, operating on runway 29 Left (29L). The instructor stated that the flight went well and the student showed traffic awareness, including slowing down to maintain separation from other aircraft. After the three circuits were completed, the aircraft was landed and the instructor exited. The student took off from runway 29L with the intention of conducting another three circuits.

After takeoff, the student of HCC turned onto the crosswind leg of the circuit at about 500 ft above ground level (AGL). Shortly after turning onto crosswind, the student recalled sighting another aircraft turn onto downwind; he believed the separation between the two aircraft was sufficient. When positioned at a 45° angle to the runway threshold, the aircraft was turned onto downwind. Once abeam the air traffic control (ATC) tower (Figure 1), the pilot broadcast his downwind call, which ATC acknowledged.

While on downwind, the pilot reported that he did not see any other aircraft. When the aircraft was at a 45° angle with the runway threshold, the pilot conducted a visual scan for other aircraft. The pilot observed an aircraft landing on runway 29L and assumed that it was the aircraft previously sighted. The aircraft was turned onto base.

Piper PA-28-161, VH-XSN

The flying instructor and student pilot of a Piper Aircraft Corporation PA-28-161, registered VH-XSN (XSN), were conducting dual training circuits on runway 29L at Bankstown. The aircraft was positioned ahead of HCC in the circuit.

The instructor of XSN reported that they were following another Cessna 152 aircraft that was flying a wider than normal circuit pattern. Consequently, XSN was required to slow down and fly a longer downwind leg to ensure separation with the preceding aircraft.

1 The student had about 25 hours experience.

The incident

At about 0915 Eastern Daylight Time[2], when midway through the base leg, at a height of 750 ft above ground level (AGL), the pilot of HCC reported sighting another aircraft at a 90° angle to his right. He noted that the aircraft was higher and some distance from the aerodrome. As the pilot was not aware of the other aircraft's intentions, he elected to continue the circuit as normal. At the end of his base leg he turned onto final.

At the same time, XSN was on final for runway 29L, when the student, who was the pilot flying, alerted his instructor of a Cessna 152 aircraft (HCC) that had turned in front, and below the aircraft.. The instructor confirmed the position of HCC, assumed control of the aircraft, and initiated a go-around. The instructor then contacted ATC to advise they had commenced a go-around. The distance between the two aircraft was estimated at 100 m horizontally and 100 ft vertically.

The instructor reported that ATC did not respond to his initial call and he contacted them again advising of the go-around and stating that they were 'cut-off' by a Cessna on final.

The pilot of HCC reported that he first became aware the incident when he heard the broadcast from XSN. He was then asked by ATC if he was the aircraft in front, on short final, he confirmed that he was and was subsequently given a clearance to conduct a touch-and-go.

Both crews continued their circuit training without further incident.

ATSB COMMENT

When learning to fly, student pilots are taught to make the turn from the crosswind leg of the circuit onto downwind and downwind to base when the aircraft is positioned at a 45° angle to the runway threshold. While this practice generally ensures that a 'standard' circuit pattern is achieved, there are instances where deviations from this may be required in order to maintain separation from other aircraft. The pilot may need to slow the aircraft down and/or widen or lengthen a leg of the circuit.

It is important that pilots apply the principles of 'see-and-avoid' by maintaining a constant lookout for other traffic in the circuit and actively listen to the radio to ensure that separation with preceding aircraft is maintained. If there is any doubt as to the position of other aircraft, contact ATC or make a broadcast.

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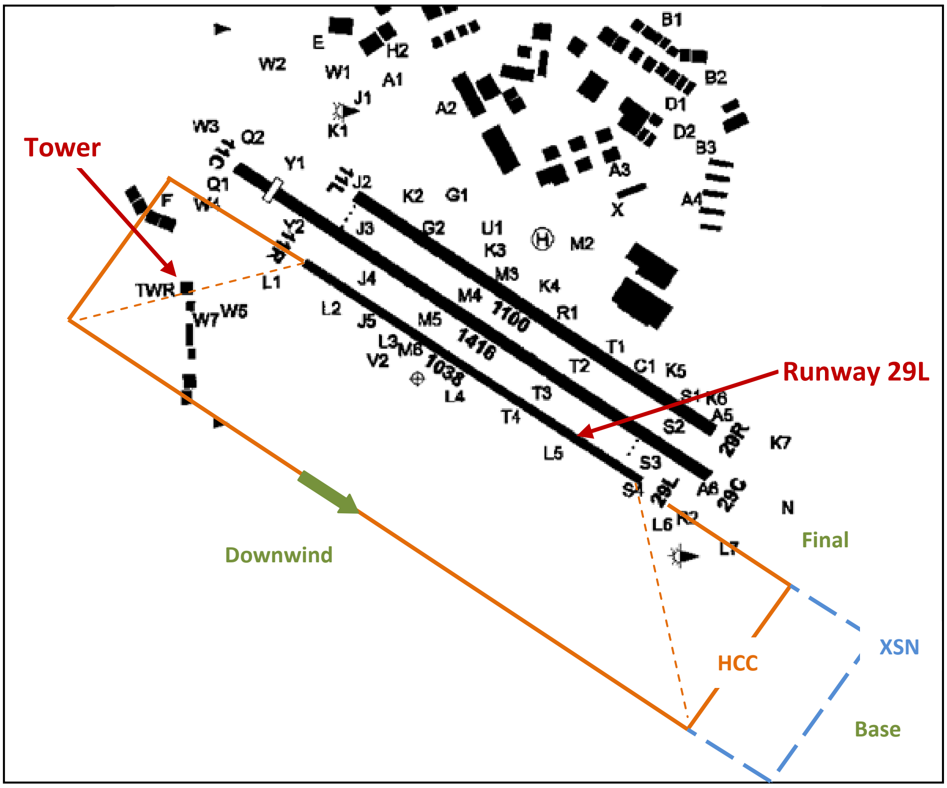
2 The 24-hour clock is used in this report to describe the local time of day, Eastern Daylight-saving Time, as particular events occurred. Eastern Daylight-saving Time was Coordinated Universal Time (UTC) + 11 hours.

Figure 1: Bankstown aerodrome and the aircraft positions



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AO-2010-087: VH-EAL, Total power loss

Date and time:	31 October 2010, 1130 EDT
Location:	South Grafton (ALA), New South Wales
Occurrence category:	Accident
Occurrence type:	Total power loss
Aircraft registration:	VH-EAL
Aircraft manufacturer and model:	Cessna Aircraft Company TU206C
Type of operation:	Private – parachute operations
Persons on board:	Crew – 1 Passengers – Nil
Injuries:	Crew – Nil Passengers – Nil
Damage to aircraft:	Serious

FACTUAL INFORMATION

On 31 October 2010, a Cessna Aircraft Company TU206C, registered VH-EAL (EAL), was being operated from the South Grafton aircraft landing area (ALA), New South Wales on the third of a series of parachuting flights. On board the aircraft were the pilot, three Tandem Master parachutists and three tandem passengers.

In preparation for the flight, the pilot and aircraft owner refuelled the aircraft. After refuelling, the parachutists boarded and the aircraft departed on runway 08. At that time, the right fuel tank was selected, which, according to the aircraft's fuel gauges, contained 45 L of fuel. The left tank contained 55 L of fuel.

The aircraft was climbed to 10,000 ft, with the pilot obtaining the appropriate clearance from air traffic control (ATC) to operate in controlled airspace.

When maintaining 10,000 ft, the pilot heard broadcasts from an aircraft preparing to taxi for takeoff at South Grafton and an aircraft 19 km to the north that was inbound. The pilot of EAL contacted the pilots of both aircraft and requested that both the takeoff and the arrival at South Grafton be delayed until the parachute drop had been completed. The aircraft taxiing delayed his departure, while the inbound aircraft orbited the township of Grafton.

The parachutists exited the aircraft and the pilot commenced his descent to the south of the airstrip. The pilot advised ATC that the parachute drop had been completed and received instructions for leaving controlled airspace.

Throughout the descent, the pilot of EAL reported that he continued to converse with the pilots of the other aircraft to ensure that they remained in their current positions until the parachutists were on the ground. When the parachutists were on the ground, the pilot advised the waiting aircraft. The aircraft on the ground subsequently departed and the other aircraft tracked to the ALA and joined the circuit for runway 08 on the downwind leg.

The pilot of EAL elected to join the circuit on crosswind for runway 08 at 1,500 ft above ground level. The aircraft was turned onto downwind and descended to 1,000 ft. The pilot noticed that he was close to the preceding inbound aircraft, so he slowed the aircraft down and conducted a wider base turn.

After the preceding aircraft landed, EAL was turned onto final at about 500 ft. By this time, the pilot had applied three stages of flap, reduced the engine power and placed the propeller pitch and fuel mixture controls in the full forward position.

Shortly after, at about 1130 Eastern Daylight-saving Time[1], the pilot reported that the engine went quiet and the power decreased. In response, the pilot

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

changed the fuel tank selection and applied full throttle, but the engine did not respond.

The pilot determined that the aircraft would not make the runway and elected to land in a field about 300 m short of runway 08. The aircraft landed hard; the nose wheel dug into the muddy ground and became separated from the aircraft. The propeller and left wing tip also sustained damage from contacting the ground (Figure 1).

The pilot reported that he had been distracted by the other aircraft operating in the area at the time and did not change the fuel tank selection during the descent or on downwind, as per his normal procedure. Also, the pilot stated that he forgot to turn the auxiliary fuel pump on as part of his response procedure following the engine failure, as required by the aircraft's pilot's operating handbook.

Figure 1: VH-EAL

Photo courtesy of the Civil Aviation Safety Authority

Refuelling

Prior to the flight, the pilot and aircraft owner refuelled the aircraft from fuel drums. As the drums were in a fixed position, they elected to refuel the right tank only[2]. At that time, a dip stick was not available to measure the quantity of fuel in the right tank; consequently, the owner referenced the fuel gauges in the cockpit. The right tank fuel gauge indicated 45 L and the left tank had 55 L.

The pilot reported that, due to the fixed position of the drums, their refuelling procedure for the weekend[3] was to use the right tank for flight fuel and the left tank for the fixed fuel reserve of 45 minutes, which equated to about 50 L. Normally, the left and right tanks would be refuelled as required, with the flight fuel and fixed reserve distributed across both tanks.

The pilot stated that they typically used about 45-60 L of fuel for a parachute drop, depending on delays.

Pilot information

The pilot held a Commercial Pilot (Aeroplane) Licence, with a total of about 402 hours at the time of the accident. He had been flying with the skydiving organisation for a period of about 5 months and had obtained 120 hours conducting parachute operations.

ATSB COMMENT

Similar occurrence

A similar accident occurred in April 2008 when a Piper PA-32-300 Cherokee Six aircraft lost engine power shortly after takeoff and ditched into the sea as a result of fuel starvation. The subsequent ATSB investigation identified that the operator's fuel management policy was to use the outer fuel tank in each wing (tip tank) for flight fuel and the inner fuel tank (main tank) for reserve fuel. As a result of this accident, the operator amended their procedures to ensure that there was a minimum of 30 L of fuel in the selected fuel tank for any takeoff. (www.atsb.gov.au/publications/investigation_reports/2008/aair/ao-2008-022.aspx)

Pilot distraction

A research report published by the ATSB in 2005 identified 325 accidents and incidents (occurrences) between the period January 1997 and September 2004 associated with pilot distractions. An analysis of these occurrences identified the distraction source in 247 instances[4], of which 5.3

2 If required, the left tank could have been refuelled using 20 L jerry cans.

3 The skydiving organisation was conducting parachute operations from South Grafton over the weekend, the accident occurred on the Sunday.

4 The distraction source was identified for 234 occurrences; however, some occurrences involved two or more sources. Therefore, the number of

per cent were related to situations where the pilot's attention was focussed on nearby aircraft.

The Flight Safety Foundation recognises that distractions occur frequently, but some cannot be avoided, but some can be minimised or removed. The Foundation recommends that after a distraction source has been identified, pilots should re-establish situational awareness by applying the following:

- *Identify*: What was I doing?
- *Ask*: Where was I distracted?
- *Decide/act*: What decision or action shall I take to get 'back on track'?

This accident is a prime example of how distractions impact aircraft operations and a reminder that distractions are not unique to any one type of operation and that no pilot is immune.

The following publications provide additional information on pilot distractions:

- Dangerous Distraction: An examination of accidents and incidents involving pilot distraction in Australia between 1997 and 2004 (www.atsb.gov.au/publications/2005/distraction_report.aspx)
- Flight Safety Foundation Approach-and-landing Accident Reduction Briefing Note 2.4 – Interruptions/Distractions (http://flightsafety.org/files/alar_bn2-4-distractions.pdf)

distractions identified was slightly higher (n = 247) than the number of actual occurrences.

AO-2010-065: VH-ZVF, Loss of control

Date and time:	30 August 2010, 0714 WST
Location:	Jandakot Aerodrome, Western Australia
Occurrence category:	Accident
Occurrence type:	Loss of control
Aircraft registration:	VH-ZVF
Aircraft manufacturer and model:	Robinson Helicopter Company R44 Clipper II
Type of operation:	Private
Persons on board:	Crew – 1 Passengers – 1
Injuries:	Crew – Minor Passengers – Nil
Damage to aircraft:	Serious

FACTUAL INFORMATION

On 30 August 2010, the pilot of a Robinson Helicopter Company R44 Clipper II, registered VH-ZVF, was intending to operate a private flight from Jandakot aerodrome to Hillside station, Western Australia, under visual flight rules (VFR). The pilot planned to make fuel stops at Mount Magnet, Meekatharra, and Newman. The weather at the time was a light westerly breeze with no precipitation.

The helicopter was prepared for departure and moved from its hangar to a helipad adjacent to the apron at the front of the hangar. At about 0700 Western Standard Time[1] the pilot commenced the 'before starting engine' checks followed by the 'starting engine and run-up' checks. Part of the latter checklist was a check that the hydraulic system was functioning correctly. The pilot confirmed that this test was completed with no anomalies.

After the checklists had been completed, a problem arose with the Bluetooth connection between the pilot's mobile phone and the helicopter communication system[2]. The pilot left the helicopter running, with the passenger on board and went to retrieve the Bluetooth handbook from the hangar. Further attempts were made to rectify the Bluetooth problem to no avail and the decision was made to operate without it.

The pilot then contacted Jandakot Tower, who requested that he contact Melbourne Centre. Centre instructed the pilot to report once airborne. This was an unfamiliar procedure to the pilot and a variation to his routine.

A Jandakot tower controller reported that at 0714 they observed the helicopter rise above the hangar, tilt towards it and then descend out of their view. About a second later, they heard a loud bang. The helicopter sustained serious damage in the impact (Figure 1). The pilot sustained minor injuries while the passenger was uninjured.

Figure 1: VH-ZVF at the accident site

1 The 24 hour clock is used in this report to describe the local time of day, Western Standard Time, as particular events occurred. Western Standard Time was Coordinated Universal Time (UTC) + 8 hours.

2 The Bluetooth system enables an incoming mobile phone call to be heard over the helicopter communication system.

Pilot information

The pilot held a Private Pilot (Helicopter) Licence, issued on 3 September 2008 and, at the time of the accident, had accumulated 412 total flying hours, about half of which were on the R44. In the week preceding the accident, the pilot underwent a flight review that included a practice hydraulic system failure.

Aircraft information

The helicopter had a single engine, a two-bladed main rotor and a two-bladed tail rotor. It was fitted with hydraulic power controls designed to eliminate cyclic stick shake and control forces in flight. If a hydraulic system failure occurred, the R44 pilots operating handbook (POH) recommended firstly verifying that the hydraulic switch was on (Figure 2). If hydraulics were not restored, it then recommended moving the hydraulic switch to off and landing as soon as practical.

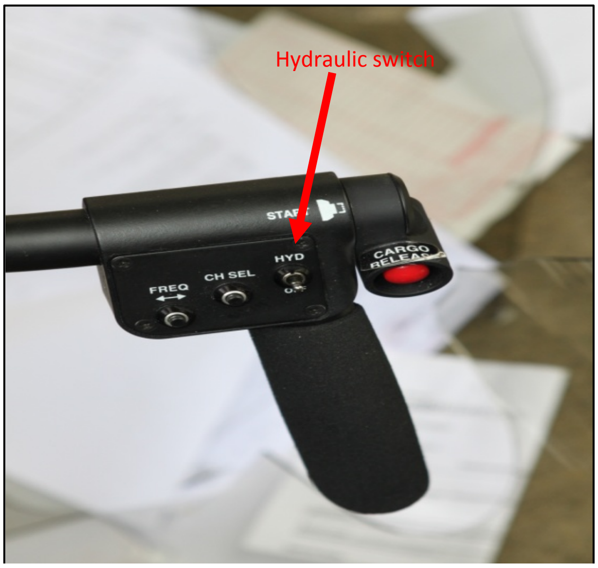
Hydraulic system test

The POH contained the following guidance in relation to the hydraulic system test:

> For hydraulic system check, use small cyclic inputs. With hydraulics off, there should be approximately one half inch of freeplay before encountering control stiffness and feedback. With hydraulics on, controls should be free with no feedback or uncommanded motion.

The pilot had been taught a supplementary method of checking the hydraulic system that, in addition to the preceding check, involved the momentary de-activation of the hydraulic circuit breaker. Once the circuit breaker was re-set, the cyclic hydraulic switch must be returned to ON. It was after this supplementary procedure that the pilot believes he may have inadvertently forgot to switch the hydraulics switch back to ON.

Figure 2: VH-ZVF Cyclic mounted hydraulic switch



Wreckage and impact information

The helicopter came to rest on its right side and fuel leaked from the fuel vent lines, about 70 litres was recovered by emergency services. As a result of the main rotor blades impacting the apron, fragments of blade were deposited over a large area. The furthest of these fragments was found 352 m from the accident site within an area of parked aircraft. Main rotor blade fragments also penetrated the hangar doors adjacent to the accident site.

ATSB COMMENT

Heavy and stiff controls should give an immediate and apparent indication that hydraulics are off. However in this incident, the pilot was not immediately aware he was attempting to lift-off with the hydraulics off.

The pilot could not recall switching the hydraulics on following the supplementary hydraulic system check. This may have been due to distraction created by the Bluetooth problem and the unfamiliar departure sequence. The following ATSB publication provides some useful information on distraction:

- Dangerous Distraction: Aviation Research Investigation Report B2004/0324

A copy of the report is available on the ATSB website here:

www.atsb.gov.au/publications/2005/distraction_report.aspx

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