Australian Government
Australian Transport Safety Bureau




ATSB TRANSPORT SAFETY BULLETIN
Aviation Level 5 Investigations AB-2010-036
Final

Level 5 Factual Investigations:
1 April 2010 to 30 June 2010

Issue 2

Australian Government
Australian Transport Safety Bureau

ATSB TRANSPORT SAFETY REPORT

Aviation Level 5 Investigations
AB-2010-036
Final

Level 5 factual investigations:
1 April 2010 to 30 June 2010

Issue 2

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

Published by: Australian Transport Safety Bureau

Postal address: PO Box 967. Civic Square ACT 2608

Office location: 62 Northbourne Ave, Canberra City, Australian Capital Territory, 2601

Telephone: 1800 020 616, from overseas +61 2 6257 4150

Accident and incident notification: 1800 011 034 (24 hours)

Facsimile: 02 6247 3117, from overseas +61 2 6247 3117

Email: atsbinfo@atsb.gov.au

Internet: www.atsb.gov.au

Report No.	Publication date	ISBN	Reference Number
AB-2010-036	June 2010	978-1-74251-075-0	Jun10/ATSB106

CONTENTS

AO-2009-003: VH-UYI, Aircraft icing and incipient stall 1

AO-2009-025: VH-VBL, Fumes Event 4

AO-2009-036: VH-TFS, Turbulence Event 7

AO-2009-037: VH-OTD, Smoke event 9

AO-2009-049: VH-VND, Aircraft Diversion 11

AO-2010-002: VH-ELQ, Collision on ground 13

AO-2010-009: ZK-JAO, Fuel starvation 17

AO-2010-011: PK-GMG, Runway incursion 20

AO-2010-015: VH-NXM, Cabin safety event 22

AO-2010-017: VH-WYN, VFR into IMC 24

AO-2010-018: VH-PVV, VH-HUL, CTAF-related event 28

AO-2010-021: VH-AJZ, Weather related precautionary landing 31

AO-2010-022: VH-WZJ and VH-WRR, Aircraft proximity event 34

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.

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 April 2010 and 30 June 2010.

AO-2009-003: VH-UYI, Aircraft icing and incipient stall

Date and time:	5 November 2008, 1838 EST
Location:	Overhead Gayndah NDB, Queensland
Occurrence category:	Serious incident
Occurrence type:	Airframe icing
Aircraft registration:	VH-UYI
Aircraft manufacturer and model:	Saab Aircraft AB 340B
Type of operation:	Air transport – low capacity
Persons on board:	Crew – 3 Passengers –Unknown
Injuries:	Crew – Nil Passengers – Nil
Damage to aircraft:	Minor

SYNOPSIS

On 5 November 2008 at about 1838 Eastern Standard Time[1], the flight crew of a Saab Aircraft AB 340B, registered VH-UYI, identified an incipient stall while flying a holding pattern in icing conditions. The aircraft's stall warning system did not activate. The pilot in command disconnected the autopilot and recovered the aircraft from the stall. During the recovery manoeuvre, both engines exceeded their maximum continuous operating temperature for an extended period.

The manufacturer's Aircraft Operating Manual stated that the Saab 340B stall warning system had an activation level designed for a clean wing only. The manufacturer has issued updated operating procedures for flight in icing conditions, designed to prevent ice build-up on the airframe.

FACTUAL INFORMATION

On 5 November 2008, a Saab Aircraft AB 340B, registered VH-UYI, was being operated on a scheduled passenger service from Townsville to Brisbane via Moranbah, Queensland (Qld). The aircraft departed Moranbah for Brisbane at about 1730. The crew consisted of the pilot in command (PIC), copilot, and a flight attendant. The PIC was the handling pilot.

A cloud band with associated drizzle was passing across the aircraft's flight path and the forecast temperature at flight level (FL) 170[2] was between -1 degrees C and -9 degrees C, conducive to aircraft icing.

In the vicinity of Thangool, air traffic control (ATC) instructed the flight crew to cross the NDB[3] at Gayndah (GAY) at 1834, and they slowed from their cruise speed to about 160 kts. As the aircraft approached GAY at FL170, ATC told the flight crew to expect delays and subsequently instructed them to hold at GAY, in a left-hand, two-minute holding pattern with an inbound track of 129 degrees (Figure 1).

The pilots reported that the air was clear at the northern end of the holding pattern and the air temperature was -3 to -4 degrees C. Icing conditions existed in the southern part of the pattern, which was in cloud with an air temperature of -5 degrees C.

---

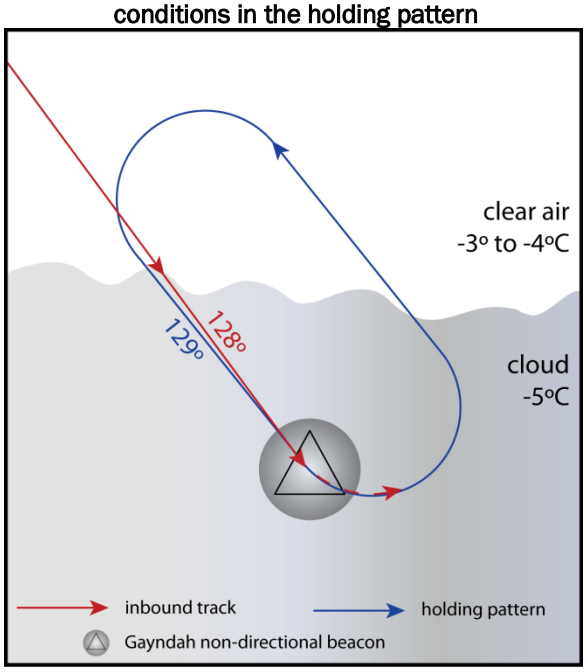
1 The 24-hour clock is used in this report to describe the local time of day, Eastern Standard Time , as particular events occurred. Eastern Standard Time was Coordinated Universal Time (UTC) + 10 hours.

2 Flight level (FL) is a level of constant atmospheric pressure related to a datum of 1013.25 hectopascals, expressed in hundreds of feel. Therefore, FL 170 indicates 17,000 ft.

3 Non-directional beacon (NDB). A ground-based aid to navigation that broadcasts in the 190 to 550 kHz range.

While still in clear air approaching GAY from the north, the flight crew selected engine heat on. Once in cloud, and with the temperature at -5 degrees C, the flight crew selected propeller heat on. The aircraft turned left over GAY to fly outbound for 2 minutes in its first lap of the holding pattern.

Figure 1: The inbound track and weather conditions in the holding pattern



The pilots noticed a build up of soft ice on the windscreen wipers and a dusting of ice on the leading edges of the wings. They discussed activating the de-ice boots, but decided not to. When they re-entered the clear air at the northern end of the holding pattern, they left the engine heat and propeller heat on.

After turning inbound to track towards GAY, they re-entered cloud and the aircraft's speed decreased. To compensate, the PIC increased power until the limit imposed by the maximum permissible inter-turbine temperature (ITT) was reached. The flight data recorder showed that the speed reduced quite rapidly to 133 kts before the aircraft rolled left overhead GAY to fly outbound in its second lap of the holding pattern; as it rolled left, the flight crew felt a buffet. They discussed and dismissed the possibility the buffet was due to ice adhering to and unbalancing the propeller blades, deciding instead it was aerodynamic buffet signalling the onset of a stall.

The PIC disconnected the autopilot, applied substantial power (80 to 83 percent torque), initiated a descent, and maintained the left turn to remain in the holding pattern. The copilot asked ATC for an immediate descent due to icing and they descended at between 1,700 to 1,800 ft per minute, accelerating to about 200 kts, to 10,000 ft where the temperature was +6 degrees C. ATC cleared the aircraft for an instrument landing system (ILS) approach to runway 01 and they landed at Brisbane shortly afterwards.

Information from the aircraft's flight data recorder showed that, during the stall recovery manoeuvre, the inter-turbine temperature (ITT) limit was exceeded on both engines for approximately 50 seconds. Both engines were subsequently replaced.

Stall warning system on the Saab 340B

The stall warning system comprised two independent stall warning computers, two angle-of-attack sensors, two stick shakers (one on each control column), and a stick pusher connected to the control columns. The angle-of-attack sensors were freely-pivoted vanes, one on each side of the forward fuselage, which measured the air flow relative to the fuselage and thus the aircraft's angle-of-attack. This information was relayed to the stall warning computers.

A dual channel stall warning system provided the flight crew with five distinct warnings of an impending stall:

- vibrations in each control column, caused by the stick shaker, which provided a physical warning for the respective channel
- autopilot disengagement
- aural warning (a sharp, continuous clacker)
- a firm forward movement of the control columns, caused by the stick pusher, that would give the aircraft a slight pitch down attitude (if corrective action had not been taken following stickshaker and aural warnings)
- visual warning from three amber lights that were located on the central warning panel and two pusher status lamps, that indicated PUSH 1 and PUSH 2, that were located on the left and right pilots' instrument panels.

The five warnings above were qualified in the Saab 340B Aircraft Operations Manual with the following caution.

> With ice accumulation on the wing, stall may be encountered before the artificial warnings above are activated. (Not applicable with Mod. No. 2650 installed.)

Stall warnings were generated by the system on the basis of angle-of-attack, flap position, and the wing de-ice system. The stall warning computers determined the aircraft's angle-of-attack from the angle-of-attack sensors and adjusted these signals in relation to flap position and de-ice system operation. The Saab 340B Aircraft Operations Manual contained the following note.

> The artificial stall warning system has an activation level designed for a clean wing only. No compensation for stall at lower angle-of-attack with ice accumulation on the wing is included in the stall warning computer. (Not applicable with Mod. No. 2650 installed.)

When the activation levels were exceeded, the corresponding stall warning and stall identification signals activated the stick shakers, the aural stall warning, and stick pusher actuator. The signals were combined in such a way that stall warning was given to both pilots when either angle-of-attack sensor signal exceeded the stall warning threshold, while a stick push command required that stall warning was given on both sides and that the stall identification limit was exceeded on one or both sides (one stall warning computer had to be in stick shaker mode and the other computer in both stick shaker and push mode before the pusher actuator became activated). The stick shaker activation also disengaged the autopilot if it was in use.

Revised standard operating procedures in icing conditions

As a result of a number of other icing occurrences around the world, Saab revised its standard operating procedures for flight in icing. The boots are now activated in continuous mode when entering icing conditions, instead of at the discretion of pilots after a build-up of ice appears on the wing leading edges. However, those procedures had not been introduced at the time of this occurrence.

The procedure also specifies that, when ice accumulation is significant, the boots are to be operated manually between their automatic cycles. The de-icing boots are now used during the entire time in icing conditions, and for 5 boot-inflation/deflation cycles after leaving icing conditions.

ATSB COMMENT

There have been two previous serious incidents in Australia involving Saab 340B aircraft entering a full stall in icing conditions without activation of the stall warning system. The case of VH-UYI is similar, except the pilots identified the incipient stall and took swift corrective action, avoiding a full stall.

In the two previous occurrences, safety attention was focussed on better awareness of and response to the build-up of ice, whether through better ice detection or through changes to the stall warning system. More recently, attention has shifted to better prevention of icing. Effectively, the changes to the operation of the de-icing boots, and propeller and engine anti-ice, make them function more as icing prevention systems, rather than de-icing systems.

The two previous occurrence investigations were:

- In-flight loss of control due to airframe icing, SAAB 340B, VH-OLM, 28 June 2002 (200203074)
- Saab - SF340A, VH-LPI, Eildon Weir, Victoria on 11 November 1998 (199805068).

The investigation reports can be found at www.atsb.gov.au.

AO-2009-025: VH-VBL, Fumes Event

Date and time:	5 June 2009, 1610 EST
Location:	En route Melbourne, Victoria to Coolangatta, Queensland
Occurrence category:	Fumes event
Occurrence type:	Incident
Aircraft registration:	VH-VBL
Aircraft manufacturer and model:	Boeing Company 737-800
Type of operation:	Air transport - high capacity
Persons on board:	Crew – 6 Passengers – 141
Injuries:	Crew – Nil Passengers – Nil
Damage to aircraft:	Nil

SYNOPSIS

On 5 June 2009, during a scheduled passenger service from Melbourne, Victoria (Vic.) to Coolangatta, Queensland (Qld), the cabin crew of a Boeing Company 737-800 aircraft, registered VH-VBL, detected a strong intermittent smell in the rear of the cabin. An inspection by the cabin crew did not detect the source of the smell.

On descent prior to landing, cabin crew presented various symptoms. Two of the cabin crew used oxygen before recovering sufficiently to resume their duties. No passengers were affected.

The airport rescue and fire fighting service attended the aircraft at the arrival gate. Paramedics conducted medical checks on the cabin crew. Both the cabin crew and flight crew were taken to the local hospital for further examination and later released.

The cargo holds were opened prior to a precautionary inspection for the source of the fumes. The source and nature of the fumes was not identified.

As a result of the incident, the operator initiated and completed a number of safety actions to improve communications and processes in relation to air contamination events.

While it was not possible to determine the nature or source of the reported fumes, the incident highlights the potential for crew incapacitation from exposure to toxic smoke and fumes.

FACTUAL INFORMATION

On 5 June 2009 a Boeing Company 737-800 aircraft, registered VH-VBL was being operated on a scheduled passenger service from Melbourne Vic., to Coolangatta Qld. On board were two flight crew, four cabin crew and 141 passengers. The aircraft departed Melbourne at about 1530 Eastern Standard Time[1].

At about 1610, cabin crew reported that while servicing the rear section of the cabin, they detected a strong intermittent smell in the vicinity of the rear 5-rows of seats. The smell was also reported as coming from the air conditioning gasper air vent above seats 24 D, E, and F. The smell was described as similar to acetone, butane, or liquid petroleum gas (LPG).

The pilot in command (PIC) was advised of the smell by the cabin supervisor. The passengers in the rear 5-rows were asked if they had any dangerous goods in their cabin baggage. None of the passengers reported having any dangerous goods. An inspection by cabin crew, of the rear galley area and the overhead lockers from rows 20

[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 (UTC) + 10 hours.

to 24 at the rear of the cabin, did not locate the source of the smell.

During the latter part of the cruise phase of the flight, the copilot, on instruction by the PIC, left the flight deck and entered the cabin to investigate the smell. The copilot was unable to detect or identify any smell or fumes and returned to the flight deck.

One rear cabin crew member, who had not detected the smell, became momentarily debilitated when re-entering the rear galley area. Both rear cabin crew members then presented one or more of the following symptoms; stinging red eyes, distended lips, bright red face, red blotchy skin on the upper chest with white spots, rash, dizziness, tightness in chest, tiredness, nausea, and headaches. Both were administered oxygen by a forward cabin crew member, before recovering sufficiently to resume their duties. Although some passengers had smelt something peculiar, none suffered any adverse effects or displayed any symptoms.

About 15 minutes before landing, the flight crew contacted the Coolangatta Airport Movement Coordinator (AMCO). They informed the AMCO that there was a smell in the cabin, two cabin crew were unwell, oxygen bottles had been used, and that they would require assistance from the airport rescue and fire fighting (ARFF) service.

On descent through 5,000 ft, the smell was detected briefly by only one of the cabin crew in the forward galley. When both forward cabin crew members were seated in preparation for landing, they began to display symptoms similar to those of the rear cabin crew. On inquiry from the PIC, all crew confirmed that they were capable of completing their duties. The aircraft landed at about 1725.

The ARFF established communication with the PIC; the passengers then disembarked the aircraft with their cabin baggage. The ARFF paramedics completed medical checks of the cabin crew. As a precaution, all cabin crew were taken to the local hospital for further examination. The flight crew followed later. The medical examinations did not reveal the source of the symptoms.

The ground servicing crew had been informed of the medical condition of the cabin crew, but not the possibility of fumes onboard. As a consequence, and prior to any assessment for threats in the cargo holds, the ground servicing crew entered the holds to unload baggage and freight.

During the unloading of baggage from the forward cargo hold, a ground crew member notified an ARFF member, of a strong smell coming from an air vent at the rear of the hold. This information was not immediately passed on to the PIC or the ARFF supervisor. The ARFF performed a sweep for fumes from the front to the back of the cabin and cargo compartments using a gas alert detector. There were no findings.

The AMCO had not considered that the information relayed by the flight crew constituted a potential threat to the safety of the ground handling crew. Consequently there was a 26 minute delay in relaying information about the threat to the airline's operations control centre (OCC). On receipt of that notification, the OCC immediately assembled the initial threat assessment team (IAT), however by that time, the aircraft had been disembarked and the baggage unloaded.

Ground staff unloading the cargo holds did not report any unusual smells from passenger baggage. The operator advised that all baggage for the flight had been properly screened prior to loading.

Post-flight inspection

On notification of an unidentified smell in the rear cabin, the operator's engineering personnel checked the cabin, galleys and cargo compartments of the aircraft.

Checks were made for any unusual substances, fluids and electrical burns. The auxiliary power unit bleed air valve and pneumatic ducts were also inspected with no findings. Engineering then completed a satisfactory engine ground run; there was no evidence of oil or other contamination in the aircraft's air conditioning system.

Recent maintenance

There was no recent maintenance completed in the cargo holds, the cabin, or in the fuselage areas between the cargo holds, that would provide an explanation for the source of the fumes.

Cabin air circulation

The primary components of the Boeing Company aircraft air conditioning system control fresh air

flow for airplane pressurisation, ventilation and temperature, and recirculate cabin air for ventilation. There are typically 20 to 30 total cabin air changes per hour, equating to about 2,200 cubic ft per minute.

The main air distribution components are housed in the distribution compartment at the rear of the forward cargo compartment (Figure 1). Air is distributed through manifolds and ducts along the sidewalls and above the ceiling area of the passenger cabin. Waste air is expelled overboard after first flowing through the cockpit and cabin, then the forward cargo hold.

Fifty percent of the cabin air is recirculated for ventilation purposes. The recirculation fan and the filter are the primary cabin air recirculation components. There is no recirculated air flowing into the cockpit.

Figure 1: Cabin Air recirculation schematic

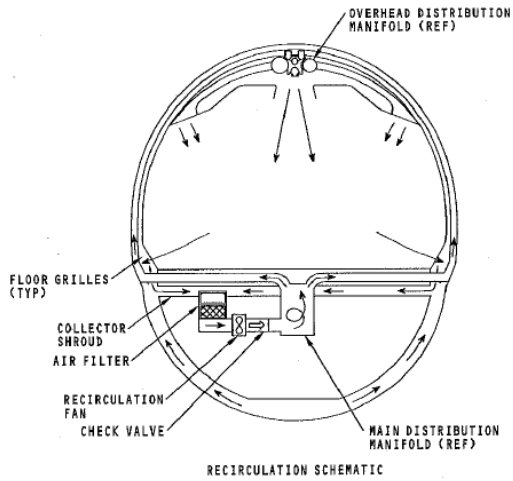


Image courtesy of Boeing Company

The cabin air recirculation system utilises high efficiency particulate air (HEPA) filters positioned before the recirculation fan in the forward cargo hold (Figure 1). These filters can capture particles of 0.3 microns. The operator reported that the removal of these filters for analysis of contaminants is being reviewed in the event the source and nature of fumes could not be determined.

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.

Operator

Communication procedures

As a result of their internal investigation, the operator identified deficiencies in processes and communications, and initiated and completed corrective actions.

Air quality forum

The operator reported that it had initiated an investigative review on air quality. The review would address aircraft air quality and the processes they would need to implement in regards to an air contamination event.

ATSB COMMENT

While it was not possible to determine the nature or source of the reported fumes, the incident highlights the potential for flight crew incapacitation from exposure to toxic smoke and fumes. The following publications provide further information on incapacitation from toxic smoke or fumes, and information on air circulation in aircraft cabins.

- Pilot Incapacitation: Analysis of Medical Conditions Affecting Pilots Involved in Accidents and Incidents (2007)
- Passenger health - the risk posed by infectious disease in the aircraft cabin (2008)

For a full copy of these reports, please visit the ATSB's website at www.atsb.gov.au.

AO-2009-036: VH-TFS, Turbulence Event

Date and time:	9 July 2009, 1250 EST
Location:	37 km S Lizard Island, Queensland
Occurrence category:	Serious incident
Occurrence type:	Turbulence Event
Aircraft registration:	VH-TFS
Aircraft manufacturer and model:	Cessna 208B Grand Caravan
Type of operation:	Charter - passenger
Persons on board:	Crew – 1 Passengers – 3
Injuries:	Crew – 1 (minor) Passengers – 2 (minor)
Damage to aircraft:	Nil

SYNOPSIS

On 9 July 2009, a Cessna 208B Grand Caravan aircraft registered VH-TFS, was being operated on a charter passenger flight from Lizard Island, Queensland (Qld) to Cairns, Qld. The flight was being conducted under instrument flight rules. At about 1250 Eastern Standard Time[1], the aircraft encountered severe turbulence. The pilot and two of the three passengers sustained minor injuries. The flight continued to Cairns and landed without further incident.

The Australian Transport Safety Bureau publication 'Staying Safe against In-flight Turbulence' (2009) provides some useful information on aircraft turbulence events. A full copy of that publication is available at www.atsb.gov.au.

FACTUAL INFORMATION

On 9 July 2009, a Cessna 208B Grand Caravan aircraft, registered VH-TFS, was being operated on a passenger charter flight, in accordance with instrument flight rules, from Lizard Island to Cairns, Qld. The pilot departed Lizard Island with three passengers onboard and climbed to the cruising altitude of 9,000 ft. During the climb, the weather conditions were reported to be normal, with no turbulence being experienced.

About 5 to 10 minutes after reaching the cruising altitude, the aircraft flew through some cloud and associated precipitation, and then encountered turbulent conditions. Due to the turbulence, the pilot turned off the autopilot and manually flew the aircraft.

At about 1250, the aircraft encountered severe turbulence.[2] The reports as to whether or not the aircraft was in cloud, during this turbulence, were inconsistent. On encountering the turbulence, the aircraft climbed between 800 and 1,000 ft within a 15-second period. As the aircraft started to descend, the right wing dropped and the aircraft rolled significantly to the right.

The pilot regained control of the aircraft and then checked on the passengers. He subsequently requested a block level clearance[3] of 9,000 ft to 10,000 ft, from Air Traffic Services, in case the aircraft encountered turbulence again.

---

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 Turbulence is caused by the irregular movement of air, and often cannot be seen. Severe turbulence can influence large, abrupt changes in aircraft altitude/ attitude, with large variation in indicated airspeed. Aircraft may be temporarily out of control.

3 A block level clearance allows for an aircraft to manoeuvre within a section of airspace with specified upper and lower limits, on a specific track.

The pilot sustained a minor injury to his head as a result of impacting the cockpit roof. Two passengers also sustained minor injuries, resulting from their heads impacting the cabin roof during the occurrence.

Before landing, the pilot contacted the operator; he advised them of the occurrence and asked for medical personnel to be arranged to meet the flight on arrival in Cairns to assess the injuries of the passengers.

The flight continued to Cairns and landed without further incident.

Cabin safety information

The aircraft was equipped with lap/sash seatbelts for all passengers and a five point seatbelt for the pilot.

Prior to departure, the pilot provided the passengers with a safety briefing. That briefing included the use of the seatbelts and the pilot informed the passengers that their seatbelts were to remain fastened at all times during the flight. The aircraft had a seatbelt sign in the cabin, which was illuminated for the flight's duration.

Prior to taxiing the aircraft, the pilot checked that the passengers' seatbelts were secure. The pilot and the three passengers were all wearing their seatbelts at the time of the occurrence.

Meteorological Information

The Bureau of Meteorology produces aviation forecasts for defined areas, which are an important source of information for pilots about the en route weather conditions. The pilot had obtained the appropriate meteorological forecasts prior to the occurrence flight.

An area 45[4] forecast was issued at 1152 on 9 July 2009, and was valid from 1150 on 9 July 2009 to 0300 on 10 July 2009. The forecast predicted isolated to scattered showers and isolated to occasional moderate turbulence. Cumulus cloud tops were forecast up to 9,000 ft.

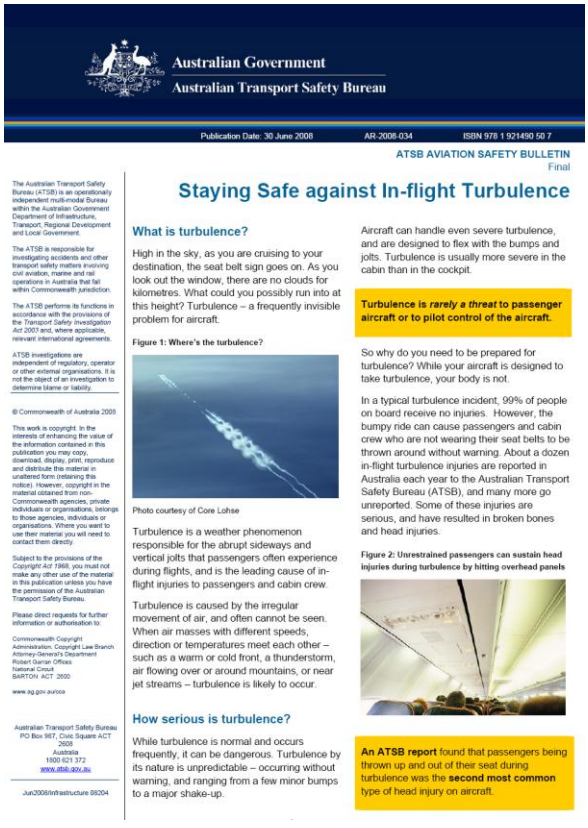
After the occurrence, the Bureau of Meteorology conducted an assessment of the recorded actual weather conditions in the incident location. Their assessment suggested that there may have been some moderate to severe turbulence associated with the towering cumulus cloud and showers that extended to about 15,000 ft.

ATSB COMMENTS

Research published by the ATSB has shown that although turbulence is normal and occurs frequently, it can be dangerous. Turbulence by its nature is unpredictable – occurring without warning, and ranging from a few minor bumps to a major shake-up. It is important that flight crew, cabin crew and passengers are aware of the potential for in-flight turbulence and how they can avoid injury when such an event occurs. The following ATSB publication provides some useful information on aircraft turbulence events:

- Staying Safe against In-flight Turbulence (2009)

For a full copy of that report, please visit the ATSB's website at www.atsb.gov.au.


Australian Government
Australian Transport Safety Bureau

Publication Date: 30 June 2009 AR-2008-034 ISBN 978 1 921490 50 7

ATSB AVIATION SAFETY BULLETIN
Final

Staying Safe against In-flight Turbulence

What is turbulence?

High in the sky, as you are cruising to your destination, the seat belt sign goes on. As you look out the window, there are no clouds for kilometres. What could you possibly run into at this height? Turbulence – a frequently invisible problem for aircraft.

Figure 1: Where's the turbulence?

Photo courtesy of Core Lohse

Turbulence is a weather phenomenon responsible for the abrupt sideways and vertical jolts that passengers often experience during flights, and is the leading cause of in-flight injuries to passengers and cabin crew.

Turbulence is caused by the irregular movement of air, and often cannot be seen. When air masses with different speeds, direction or temperatures meet each other – such as a warm or cold front, a thunderstorm, air flowing over or around mountains, or near jet streams – turbulence is likely to occur.

How serious is turbulence?

While turbulence is normal and occurs frequently, it can be dangerous. Turbulence by its nature is unpredictable – occurring without warning, and ranging from a few minor bumps to a major shake-up.

Aircraft can handle even severe turbulence, and are designed to flex with the bumps and jolts. Turbulence is usually more severe in the cabin than in the cockpit.

Turbulence is *rarely a threat* to passenger aircraft or to pilot control of the aircraft.

So why do you need to be prepared for turbulence? While your aircraft is designed to take turbulence, your body is not.

In a typical turbulence incident, 99% of people on board receive no injuries. However, the bumpy ride can cause passengers and cabin crew who are not wearing their seat belts to be thrown around without warning. About a dozen in-flight turbulence injuries are reported in Australia each year to the Australian Transport Safety Bureau (ATSB), and many more go unreported. Some of these injuries are serious, and have resulted in broken bones and head injuries.

Figure 2: Unrestrained passengers can sustain head injuries during turbulence by hitting overhead panels

An ATSB report found that passengers being thrown up and out of their seat during turbulence was the **second most common** type of head injury on aircraft.

[4] The area 45 forecast was applicable for the flight between Lizard Island and Cairns.

AO-2009-037: VH-OTD, Smoke event

Date and time:	9 July 2009, 2108 EST
Location:	19 km NE of Sydney aerodrome, New South Wales
Occurrence category:	Incident
Occurrence type:	Smoke (Fumes) Event
Aircraft registration:	VH-OTD
Aircraft manufacturer and model:	British Aerospace BAe Jetstream 32
Type of operation:	Low capacity air transport
Persons on board:	Crew – 2 Passengers – 6
Injuries:	Crew – Nil Passengers – Nil
Damage to aircraft:	Nil

SYNOPSIS

On 9 July 2009, at about 2108 Eastern Standard Time[1] a British Aerospace BAe Jetstream 32 aircraft, registered VH-OTD, was being operated on a scheduled passenger service from Sydney to Williamtown, New South Wales (NSW), with two crew and six passengers.

During climb to 9,000 ft, and about 19 km north-east of Sydney, the flight crew noticed a strong electrical burning smell in the cabin. The flight crew requested and received clearance from air traffic control for an immediate return to Sydney. Faced with a high workload, the crew chose not to don their emergency oxygen masks during the return flight to Sydney.

Following an uneventual landing, the crew noticed a light haze of smoke below the roof of the cabin. After the passengers disembarked, engineering staff located the source of smoke as the weather radar indicator.

Examination of the weather radar indicator found that burning of a control circuit board had occurred, damaging the printed circuit board substrate. The damage was not the result of an aircraft system fault.

Research published by the ATSB has shown that the second most common cause of in-flight medical and incapacitation events was exposure to toxic smoke and fumes. Use of supplemental breathing equipment is an important defence against pilot incapacitation.

FACTUAL INFORMATION

At about 2108 on 9 July 2009, a British Aerospace BAe Jetstream 32 aircraft, registered VH-OTD, was being operated on a scheduled passenger service from Sydney, to Williamtown, NSW. On board were two crew and six passengers.

During climb to 9,000 ft, the flight crew noticed a strong electrical burning smell in the cockpit from an unknown source. At the time, the aircraft was about 19 km north-east of Sydney, NSW and in instrument meteorological conditions (IMC).

The pilot in command (PIC) decided to immediately return the aircraft to Sydney. The copilot contacted Sydney air traffic control (ATC), and requested clearance for an immediate return. Air traffic control granted their request for an immediate return, and asked that the crew bring the aircraft to a standstill on a taxiway. The copilot then informed the passengers that they were returning to Sydney.

[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.

At about 2110, Sydney ATC declared a 'local standby' [2] and alerted the airport rescue and fire fighting (ARFF) services.

The crew reported that due to the aircraft being in IMC, at a height of about 9,000 ft, and only 19 km from Sydney aerodrome, they concentrated on bringing the aircraft down for a safe landing as quickly as possible. As a result, they did not consult the aircraft quick reference handbook (QRH) or don their emergency oxygen masks as required by the smoke, fire or fumes emergency procedures.

No smoke was visible during the return flight to Sydney, although the crew noted that the elecrical burning smell remained consistent. There were no other faults identified by the crew during the return flight.

At about 2115, the crew completed an uneventual landing and taxied the aircraft to a taxiway to await the ARFF.

When the copilot entered the cabin to open the entrance door for the ARFF, he observed a light haze of smoke below the roof of the cabin. The ARFF then boarded the aircraft but were unable to locate the source of the smoke or fumes.

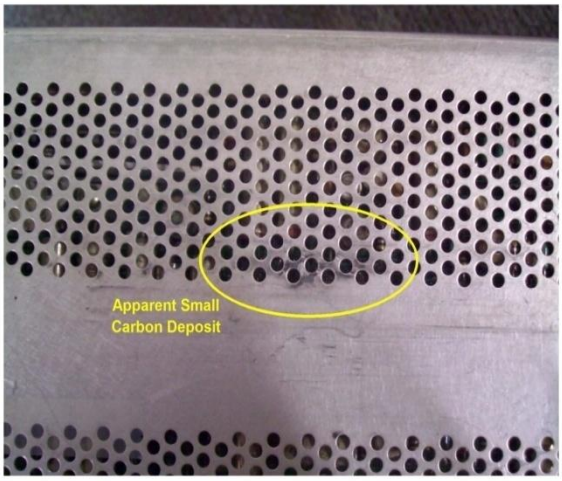
Before the passengers disembarked the aircraft, they confirmed to the PIC that they had not noticed the smoke or experienced any ill affect.

Aircraft Examination

A detailed inspection of the aircraft was carried out by the operator's engineering personnel. The electrical burning smell was traced to the weather radar indicator, positioned on the forward cockpit instrument panel, between the flight crew.

The weather radar indicator was removed and a small carbon deposit was noticed on the exterior of the casing (Figure 1). The weather radar indicator was replaced in accordance with the aircraft maintenance manual and the aircraft was returned to service.

Figure 1: Indicator exterior casing small carbon deposit



Photograph courtesy of the aircraft operator.

Weather Radar Indicator Examination

An inspection of the weather radar indicator confirmed that burning of a control circuit board had occurred, damaging the printed circuit board substrate. The damage was not the result of an aircraft system fault.

ATSB COMMENT

Research published by the ATSB has shown that the second most common cause of in-flight medical and incapacitation events was exposure to toxic smoke and fumes. Use of supplemental breathing equipment is an important defence against pilot incapacitation. The following publication provides useful information on pilot incapacitation.

- Pilot Incapacitation: Analysis of Medical Conditions Affecting Pilots Involved in Accidents and Incidents (2007)

For a full copy of this research report, please visit the ATSB's website at www.atsb.gov.au.

[2] Local Standby is the condition declared by Air Services Australia ATC when an aircraft approaching the airport is known or suspected to have developed some defect but the trouble is not such as would normally involve any serious difficulty in effecting a safe landing; off airport emergency services would not be required to attend.

AO-2009-049: VH-VND, Aircraft Diversion

Date and time:	5 August 2009, 1020 EST
Location:	Near Canberra, Australian Capital Territory
Occurrence category:	Serious incident
Occurrence type:	Mechanical systems failure
Aircraft registration:	VH-VND
Aircraft manufacturer and model:	Airbus A320-232
Type of operation:	Air transport - high capacity
Persons on board:	Crew – 6 Passengers – 139
Injuries:	Crew – Nil Passengers – Nil
Damage to aircraft:	Nil

SYNOPSIS

On 5 August 2009, during on a scheduled flight from Melbourne, Victoria (Vic) to Mackay, Queensland (Qld), the flight crew of an Airbus A320-232 aircraft, registered VH-VND, were advised of an electrical burning smell in the mid cabin area. Within 5 minutes of that advice, multiple left and right engine warnings were observed on the electronic centralised aircraft monitoring (ECAM) display. The flight was diverted to Canberra, Australian Capital Territory (ACT) where an uneventful landing was conducted.

Subsequent examination found the electrical burning smell had originated from a fluorescent light ballast resistor in the cabin. The ECAM warnings were attributed to an internal fault in the number-2 display management computer (DMC).

Following similar incidents, the DMC manufacturer introduced a cyclic software check of parameters used in the receiving function, with an auto reset of the DMC if corrupted parameters were identified.

The aircraft manufacturer reviewed its operational procedures and provided operators with additional procedures for flight crew to transfer from a faulty DMC to an alternate DMC during flight or reset a faulty DMC on the ground.

FACTUAL INFORMATION

On 5 August 2009, an Airbus A320-232 aircraft, registered VH-VND, was being operated on a scheduled passenger flight from Melbourne, Vic to Mackay, Qld. On board were six crew and 139 passengers.

During the cruise, the cabin crew 'crew-in-charge' (CIC) detected an electrical burning smell in the cabin. Upon noticing the smell, the CIC asked other cabin crew if they could smell any strange odours; a second cabin crew confirmed she had noticed an acrid smell around the mid cabin area. At about 1020 Eastern Standard Time[1], on receiving that confirmation, the CIC went to the flight deck and advised the flight crew that he had detected an electrical burning smell in the mid cabin area. The cabin crew did not receive any reports or comments from the passengers seated in the mid cabin area about the smell.

Within 5 minutes of that advice, the flight crew received multiple and continuously scrolling ECAM warnings for the left and right engines and numerous aircraft systems. Despite the ECAM warnings, there was no variation in the engines' performance or aircraft's handling characteristics.

The flight crew elected to divert to nearby Canberra aerodrome, ACT where an uneventful landing was conducted (Figure 1).

[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.

Figure 1: VH-VND

Electrical burning smell

A post-flight examination of the cabin located the source of the burning smell as being from a fluorescent light ballast resistor in the cabin. Closer inspection found the presence of the electrical burning odour at the light's ballast resistor connection.

Multiple Warnings

The flight crew commented that the performance and handling of the aircraft did not reflect the level of system failures displayed on the ECAM. As such, the lack of physical evidence of aircraft or engine system faults indicated that the multiple warnings observed were erroneous by nature and not actual system failures.

Electronic Centralised Aircraft Monitoring

Testing of the ECAM system through its built-in test equipment (BITE), attributed the displaying of multiple continuous paging warnings to a fault in the number-2 DMC. After that DMC was replaced, the system was further tested and operated normally. The number-2 DMC was sent to the manufacturer for testing and examination.

Number 2 DMC findings

The number-2 DMC underwent manufacturer inspection and testing in accordance with procedures laid down in the component maintenance manual. No defects or faults were found. However, a review of the DMC's BITE memory indicated that an internal fault had occurred, resulting in corruption of software parameters used in the DMC's data receiving function.

Other occurrences

The DMC manufacturer advised that other operators had reported experiencing similar multiple ECAM message faults that were traced to corrupt data within a DMC.

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.

DMC Manufacturer

Design improvement

As a result of similar reported DMC failures, the DMC manufacturer introduced a cyclic software check of parameters used in the receiving function, with an auto reset of the DMC occurring if corrupted parameters were identified.

Aircraft Manufacturer

Flight Operations Procedural Change

The aircraft manufacturer reviewed its operational procedures and provided operators with additional procedures for flight crew to transfer from a faulty DMC to an alternate DMC during flight or reset a faulty DMC on the ground.

AO-2010-002: VH-ELQ, Collision on ground

Date and time:	9 January 2010, 1140 EST
Location:	'Tippler's Passage', South Stradbroke Island, Queensland
Occurrence category:	Accident
Occurrence type:	Collision on ground
Aircraft registration:	VH-ELQ
Aircraft manufacturer and model:	Cessna Aircraft Company A185E (floatplane)
Type of operation:	Charter - passenger
Persons on board:	Crew – 1 Passengers – 4
Injuries:	Crew – Nil Passengers – 1 (minor)
Damage to aircraft:	Serious

SYNOPSIS

On 9 January 2010, the pilot of a Cessna Aircraft Company A185E floatplane, registered VH-ELQ, commenced the take-off run in Tippler's Passage on a charter flight around South Stradbroke Island, Queensland (Qld), with four passengers onboard. Immediately after the aircraft's floats came out of the water, the pilot reported 'feeling something hitting and vibrating on the right float'. The pilot rejected the takeoff and landed the aircraft straight ahead. The aircraft struck a sandbank and came to rest inverted. The five occupants exited the aircraft; one passenger received minor injuries.

Shortly after, a crab pot was observed within the immediate vicinity of the aircraft. The pilot reported that it was likely that the crab pot became entangled around the aircraft's right water rudder during taxiing.

An investigation conducted by the Queensland Police Service determined that there was evidence to suggest that the crab pot had come into contact with the aircraft's float. However, where the contact was made, and for how long, was not determined. A number of differences were also identified throughout the course of the investigation relating to the wind conditions at the time of the accident, the position of the aircraft at the time of the takeoff, whether or not the takeoff was commenced into wind, and the location of the crab pots. These differences could not be reconciled.

While the aircraft occupants in this accident were able to don life jackets and exit the aircraft without difficulty, previous ATSB investigations have highlighted the challenges faced when exiting from an inverted, submerged aircraft cabin. In 2009, the Civil Aviation Safety Authority issued a Notice of Proposed Rule Making, proposing that each occupant of a seaplane taking off or landing on water must wear a life jacket. This will ensure that the availability of life jackets after the occupants have exited the aircraft into the water is assured.

FACTUAL INFORMATION

On 9 January 2010, a Cessna Aircraft Company A185E floatplane, registered VH-ELQ, with one pilot and four passengers onboard, was being prepared for a scenic charter flight around South Stradbroke Island, Qld.

The pilot conducted the passenger safety brief and commenced taxiing towards the channel in Tippler's Passage[1], completing the pre-takeoff checklist during the taxi.

[1] Tippler's Passage is located on the western shore of South Stradbroke Island.

The pilot reported that at about 1140 Eastern Standard Time[2], the aircraft was taxied to the 40 kt speed marker at the end of Tippler's Passage and the takeoff run to the north was commenced. During the takeoff, the pilot did not observe any floats, debris or objects in the take-off path. Immediately after the aircraft's floats came out of the water, the pilot stated that he felt something hitting and vibrating on the right float, causing drag. The pilot elected to reject the takeoff and land the aircraft straight ahead.

During the ensuing landing, the pilot reported that he was unable to steer the aircraft to the right due to an approaching vessel and chose to continue the landing roll straight ahead. As the aircraft's speed reduced to about 20 kts, the aircraft's floats made contact with a sandbank. The pilot maintained rearward pressure on the control column, however, the front of the floats struck the sandbank again. The aircraft rocked forward due to momentum and came to rest inverted.

The pilot secured the engine and instructed the passengers to don their life jackets and exit the aircraft. All of the occupants successfully egressed and were assisted to shore by a nearby boat.

Figure 1: VH-ELQ

Photo courtesy of the Queensland Police Service

Shortly after, a crab pot was observed within close proximity to the aircraft. The pilot reported that it was probable that the crab pot had become entangled around the aircraft's right water rudder[3], subsequently striking the float and leading to a vibrating sensation.

Witness recollections

The Queensland Police Service conducted an investigation into the accident. As part of their investigation, they interviewed a number of the passengers, and also persons who observed the accident. Some of the information collected through the witness reports included:

- the pilot provided a thorough and effective passenger safety brief
- one passenger reported observing the aircraft passing to the left of a red channel marker[4]
- there were differing accounts as to whether or not the takeoff was commenced into wind
- it appeared that the aircraft was experiencing difficulties in taking off
- the passengers interviewed stated that during the takeoff, the pilot advised them that he was going to turn the aircraft around and attempt a second takeoff
- the passengers interviewed were unable to confirm the pilot's account of feeling a vibration and hearing a banging noise during the takeoff
- after the accident, a witness reported observing crab pots no more than 100 m from where the aircraft came to rest and stated that they were not located in the takeoff path. Another witness reported sighting a crab pot (including the float and line) about 10 m behind, and in line with the aircraft.

Weather conditions

Prior to the accident flight, the pilot had ferried the aircraft from the Gold Coast City Marina to Tippler's Passage. On arrival at Tippler's Passage, the pilot reported that he had observed the wind conditions as 5 kts or less from the north-north-east.

Daily weather observations from the Bureau of Meteorology's automatic weather station located at the northern end of Southport Spit (Gold Coast Seaway) indicated that at 0900 on the day of the

[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] Water rudders, located at the rear of each float, are used to steer the aircraft at low speeds while on the water. The rudders are controlled by manipulating the rudder pedals located in the cockpit.

[4] When travelling in a northerly direction within Tippler's Passage, vessels should pass to the right of the red channel markers.

accident, the wind direction and speed was south-south-east at 22 km/h (about 12 kts).

Crab pot float and line

An examination of the crab pot float and line by the Queensland Police Service determined that the float sustained damage consistent with the line being pulled with some force and subsequently, cutting into the foam structure. A grease-like substance and a number of indentations were also found on the float. These were compared with the surface of the aircraft's floats and found to be consistent. The Queensland Police investigation was, however, unable to determine where the contact was made, and for how long the crab pot was attached to the aircraft.

Crab pot owner

The owner of the crab pot advised the Queensland Police Service that, while the exact position of the crab pot could not be confirmed, he was confident that it had been placed outside the marked channel beacons in shallow waters. The owner also reported that he believed the final position of the aircraft was within 50 m from the location of the crab pot, if not the same position.

Crab pots

Under the Queensland Government (Department of Primary Industries and Fisheries) rules and regulations for recreational fishing in tidal waters[5]:

> Crab pots and dillies must be marked by an identifying tag bearing the surname and address of the owner.
>
> When not attached to a fixed object (for example tied to a tree above the high water mark), all crab apparatus must have a light coloured surface float attached. The float must not be less than 15 cm in any dimension and must be marked clearly with the owner's name.

The Queensland Police confirmed that the crab pot found near the aircraft was marked correctly and located in legal fishing ground.

[5] Department of Employment, Economic Development and Innovation. (2009). Crabs and lobsters. Retrieved 19 March 2010, from http://www.dpi.qld.gov.au/28_3065.htm

ATSB COMMENTS

There were different understandings or recollections of the wind conditions at the time of the accident, the position of the aircraft at the time of the takeoff, whether or not the takeoff was commenced into wind, and the location of the crab pots. In analysing this occurrence, it was not possible to reconcile the differences.

Life jackets

While the aircraft occupants in this accident were able to don life jackets and exit the aircraft without difficulty, previous ATSB investigations have highlighted the challenges faced when exiting from an inverted, submerged aircraft cabin.

In 2001 and 2005, the ATSB investigated two floatplane accidents where the occupants did not have sufficient time to retrieve the life jackets from underneath their seats, before exiting an inverted, submerged aircraft.

ATSB investigation 200105932:

> The aircraft was at the start of the take-off run when the pilot assessed the water state as being marginal and elected to return to the wharf. After negotiating the wake from a passing catamaran, the pilot became concerned about the buoyancy of the right float, and increased power and applied left aileron and aft elevator, but the aircraft nosed over and came to rest inverted. The pilot and passengers evacuated from the submerged cabin. Three life jackets floating in the water nearby were retrieved by the pilot and were donned by the passengers.

As a result of this investigation, the ATSB issued a recommendation to the Civil Aviation Safety Authority (CASA) to review the requirements for wearing life jackets under Civil Aviation Order (20.11). In particular, to extend the requirements for the occupants of any aircraft that is standing, taxying, taking off, landing or approaching to land, on water.

ATSB investigation 200500216:

> Shortly after becoming airborne, the aircraft rolled 45 degrees to the left causing the left wing to strike the water. The aircraft came to rest inverted and shortly after the cabin became submerged. Given the rapid nature of the event and the need to exit the inverted cabin quickly, the passengers

> did not retrieve the life jackets which were stowed underneath their seats.

Although the carriage and stowage of life jackets in both accidents were in accordance with CAO 20.11, the availability of the life jackets after the occupants had exited the aircraft into the water was not assured.

On 16 February 2009, CASA issued a Notice of Proposed Rule Making (NPRM 08080S) detailing the proposed legislative changes to Civil Aviation Safety Regulation (CASR) Part 135 regarding 'Passenger Transport Services and International Cargo Operations – Small Aeroplanes'[6]. This included:

> 'Each occupant of a seaplane or an amphibian that is taking off from or landing on water must wear a life jacket equipped with a whistle and a survivor locator light.'

This change will ensure that the availability of life jackets after the occupants have exited the aircraft into the water is assured.

---

6 CASA. (2009). Proposed Legislative Changes – Civil Aviation Safety Regulations (CASR) Part 135 - Passenger Transport Services & International Cargo Operations – Small Aeroplanes (Annex A). Retrieved 14 January 2010, from http://www.casa.gov.au/scripts/nc.dll?WCMS:PWA::pc=PC_93259

AO-2010-009: ZK-JAO, Fuel starvation

Date and time:	14 February 2010, 1443 EDT	
Location:	19 km E of South West Rocks, New South Wales	
Occurrence category:	Serious incident	
Occurrence type:	Fuel starvation	
Aircraft registration:	ZK-JAO	
Aircraft manufacturer and model:	Cessna Aircraft Company TU206C	
Type of operation:	Private - Ferry	
Persons on board:	Crew – 1	Passengers – Nil
Injuries:	Crew – Nil	Passengers – Nil
Damage to aircraft:	Nil	

SYNOPSIS

On 14 February 2010, the pilot of a Cessna Aircraft Company TU206C (C206), registered ZK-JAO, was being operated on a private ferry flight under the visual flight rules (VFR) from Lord Howe Island, New South Wales (NSW) to Coolangatta, Queensland (Qld) via Port Macquarie, NSW. Those sectors comprised the final stage of the ferry flight, which had originated from New Zealand. The pilot was the only person on board the aircraft.

The pilot reported that he had experienced intermittent ferry tank fuel flow problems during the flight from Lord Howe Island, NSW to mainland Australia. The pilot consequently selected the aircraft's main fuel tanks to ensure a reliable supply of fuel to the engine. At approximately 19 km east of South West Rocks, NSW, when the fuel was exhausted from the aircraft's main fuel tanks, the pilot selected fuel from the ferry tank, but was unable to restart the engine. The fuel flow from the ferry tank had been disrupted and the remaining 300 L in that tank was unable to be accessed. The pilot conducted a successful forced landing at an airstrip in the vicinity of South West Rocks, NSW. There was no reported damage to the aircraft or injuries to the occupant.

The reason why the ferry tank's fuel flow was disrupted could not be established; however, the pilot stated it was likely that an air pocket somewhere in the fuel system between the ferry tank and the aircraft's main fuel lines starved the engine of fuel.

The pilot had installed the ferry tank in New Zealand without the appropriate regulatory authorisations and qualifications to do so.

Although there was no evidence as to whether the installation of the ferry tank played a role in the incident; it is a reminder that approved modifications, carried out by appropriately qualified and licensed people are likely to reduce risk.

FACTUAL INFORMATION

On 14 February 2010, at about 0631 Eastern Daylight-saving Time[1], the pilot of a Cessna Aircraft Company TU206C (C206), registered ZK-JAO, departed Norfolk Island for Lord Howe Island, NSW, on the second last stage of a private ferry flight[2] under the visual flight rules (VFR). The aircraft was fitted with a collapsible ferry fuel tank[3] to increase the aircraft's range. The Trans Tasman ferry flight originally departed from Ardmore, New Zealand on 12 February 2010. The flights had proceeded without incident. The pilot was the only person on board the aircraft.

---

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 Coordinated Universal Time (UTC) + 11 hours.

2 Ferry flight is a flight whose purpose is to reposition aircraft at a different place.

3 Ferry fuel tank is an extra fuel tank for ferry flight over range greater than normal limit.

At about 1200, the pilot departed Lord Howe Island, NSW for Coolangatta, Qld via Port Macquarie, NSW. Those sectors comprised the final stage of the ferry flight.

The pilot reported that he had experienced intermittent ferry tank fuel flow problems during the flight from Lord Howe Island, NSW to mainland Australia. At 1443, the pilot declared a PAN[4] when the aircraft was approximately 37 km from the east coast of Australia citing fuel flow problems and the possible need to ditch[5]. The pilot consequently selected the aircraft's main fuel tanks to ensure a reliable supply of fuel to the engine.

At 1448, the pilot advised air traffic control that the engine was still running; the aircraft was maintaining 7,000 ft. At 1451, the pilot declared a MAYDAY[6] when the aircraft was approximately 9 to 19 km east of South West Rocks, NSW. The fuel was exhausted from the aircraft's main fuel tanks. The pilot selected fuel from the ferry tank, but was unable to restart the engine.

The fuel flow from the ferry tank had been disrupted and the remaining 300 L in that tank was unable to be accessed. The pilot conducted a successful forced landing at an airstrip in the vicinity of South West Rocks, NSW. There was no reported damage to the aircraft or injuries to the occupant.

Pilot information

The pilot held a current Commercial Pilot (Aeroplane) Pilot Licence and had registered with the New Zealand Civil Aviation Authority (CAA) in accordance with Civil Aviation Regulation (CAR) Part 61.5, for the purpose of exercising pilot licence privileges in New Zealand registered aeroplanes. This was the first over water Trans Tasman ferry flight that the pilot had undertaken.

The pilot owned an Australian aircraft maintenance facility, but he was not a Licensed Aircraft Maintenance Engineer (LAME).

[4] PAN indicates that originating station has urgent message to transmit concerning safety of vehicle or occupant(s) but not yet at level of MAYDAY.

[5] Ditching – emergency alighting of aircraft, especially landplane, on water.

[6] MAYDAY is an international distress call for urgent assistance.

Ferry tank

The collapsible ferry tank was purchased in Australia and brought to New Zealand by the pilot. The pilot then installed the ferry tank in the aircraft at Ardmore, New Zealand. The ferry tank was a relatively common type of portable collapsible ferry tank. The type of tank was used globally by both civil and military aircraft operators. The system was a gravity fed system with no auxiliary pump or venting. As fuel was used, the tank collapsed. The pilot elected not to install an optional auxiliary mechanical fuel pump to restore fuel flow in the event of a fuel disruption.

The pilot tested the ferry tank after installation and fuel flow was found to be satisfactory. There were no problems with fuel flow until after departure from Lord Howe Island, NSW. The aircraft had flown without difficulty in New Zealand and then to Lord Howe Island, NSW via Norfolk Island without fuel disruption.

The reason(s) why the ferry tank's fuel flow was disrupted could not be established. However the pilot suspected that it was possible that an air pocket somewhere in the fuel system between the ferry tank and the aircraft's main fuel lines starved the engine of fuel. The pilot reported that the aircraft encountered turbulence during the flight, which may have had a bearing on the ferry fuel system's ability to deliver fuel, including the formation of an air pocket(s) in the fuel lines.

Both the Civil Aviation Authority (CAA) of New Zealand and the Civil Aviation Safety Authority (CASA) required that a modification to an aircraft, such as the installation of a ferry fuel tank, be approved and required that such a modification be installed by an appropriately qualified and licensed person.

The CAA and CASA provided guidance material on the means for gaining approval of aircraft modifications to reduce risk and ensure the airworthiness of the aircraft.

The pilot did not gain the appropriate authorisations or approvals to carry out the fuel tank modification nor was he appropriately licensed or qualified to carry out the modification.

Meteorological information

The Bureau of Meteorology (BoM) forecasts indicated dynamic conditions with convective

activity and precipitation for the flight but maintaining visual meteorological conditions (VMC) was still possible. Strong north-westerly winds and moderate to severe turbulence were forecast. The associated SIGMET[7] indicated occasional severe turbulence below 10,000 ft to the west and south-west of the aircraft's flight path. The pilot reported encountering turbulence during the flight.

ATSB COMMENTS

Fuel management issues, including fuel starvation[8] and exhaustion[9], are not new in aviation, and have been a continuing safety concern for aviation authorities worldwide for many years. The ATSB has published the following research report (available at www.atsb.gov.au) related to these types of events:

- Australian Aviation Accidents Involving Fuel Exhaustion and Starvation (2002).

Although there was no evidence as to whether the installation of the ferry tank played a role in the incident; it is a reminder that approved modifications, carried out by appropriately qualified and licensed people are likely to reduce risk.

---

7 Significant Meteorological Hazard Warning – weather advisory service to warn of potentially hazardous (significant) extreme meteorological conditions dangerous to most aircraft.

8 Fuel starvation – the state in which all of the aircraft's useable fuel has not been consumed, but that fuel is not available to the engine.

9 Fuel exhaustion – the state in which all of the aircraft's useable fuel has been consumed.

AO-2010-011: PK-GMG, Runway incursion

Date and time:	24 February 2010, 1609 WST
Location:	Perth aerodrome, Western Australia
Occurrence category:	Incident
Occurrence type:	Runway incursion
Aircraft registration:	PK-GMG
Aircraft manufacturer and model:	Boeing Company 737-800
Type of operation:	Air transport - high capacity
Persons on board:	Crew – 8 Passengers – 119
Injuries:	Crew – Nil Passengers – Nil
Damage to aircraft:	Nil

SYNOPSIS

On 24 February 2010, a Boeing Company 737-800, registered PK-GMG, was being operated on a scheduled passenger service from Denpasar, Republic of Indonesia to Perth, Western Australia (WA). The aircraft was cleared by air traffic control (ATC) to land on runway 03.

During the landing roll, the crew received instructions from ATC to exit runway 03 by taking taxiway November, the second on their right. In complying, the aircraft was turned onto the cross runway 06, which was active. The crew then received instructions to expedite their exit via taxiway S. The aircraft was exited from the active runway and moved to its parking stand.

This incident is a reminder that all radio communications phraseology should be clear, concise and unambiguous and should reflect international practices and standards where possible, particularly with regard to instructions provided to and received from international aircraft, and in safety critical situations. It is also a reminder to crews to seek clarification of ATC instructions should there be any doubt as to the content or intent of any clearance or instruction.

FACTUAL INFORMATION

On 24 February 2010 at about 1609 Western Standard Time[1], a Boeing Company 737-800 registered PK-GMG, landed at Perth aerodrome on a scheduled passenger service from Denpasar, Republic of Indonesia. On board were two flight crew, six cabin crew and 119 passengers.

Prior to landing, ATC cleared the flight crew for a standard terminal arrival route (STAR) and for an approach to runway 03. The crew reported that they were not given any taxi instructions as part of this clearance nor would it be expected that they receive any taxi instructions at this point.

The crew stated that they had discussed the probable taxi route during their approach to landing briefing. They had determined that taxiway P was the first exit and taxiway N as the second exit off runway 03 (Figure 1).

[1] The 24-hour clock is used in this report to designate local time of day. Western Standard Time was Coordinated Universal Time (UTC) + 8 hours.

Figure 1: Perth aerodrome

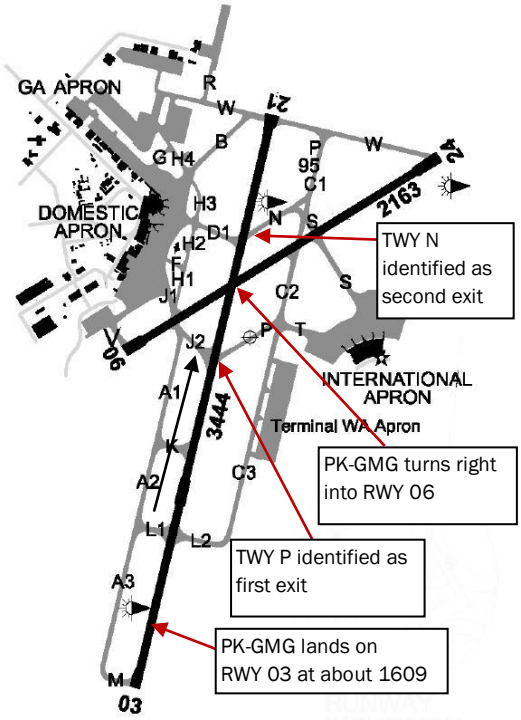


Image courtesy of Airservices Australia

At about 1609, the aircraft landed at Perth aerodrome. During the aircraft's landing roll, the tower controller issued the flight crew with the instruction, *'... take taxiway November, second on your right now.'* Following a short pause, the instruction was added, *'Taxi to holding point November. Hold short of taxiway Charlie'*.

The crew reported that they had confirmed these instructions. A few moments later, the aircraft was turned right onto runway 06, which lies between taxiways P and N. The crew were then given instructions by Perth ATC to expedite their exit from runway 06 via taxiway S. The crew confirmed and complied, taxiing the aircraft without further incident to its parking stand.

Crew information

The flight crew reported that they had regularly and recently flown into Australia and into Perth aerodrome. They stated that they were experienced aviators with many hours flying on this aircraft type.

The crew reported that they normally landed on runway 21 and departed on runway 03, so this landing was different from what they normally experienced. They also stated that they usually exited the runway on taxiway P.

The flight crew reported that they were neither fatigued nor operating under a high workload during the flight. The flight had proceeded normally and the weather was clear.

Crew comments on incident

Both crew members stated that the ATC instructions issued on roll were not garbled, indistinct or unclear. However, they did feel that due to being on roll rather than taxiing, they were moving faster than they normally would for receiving taxi instructions.

The crew noted that an ATC instruction of 'cross runway 06, take taxiway November' would have been less ambiguous than the clearance they received. However, unless an aircraft is participating in Land and Hold Short Operations (LAHSO), a clearance to land on a runway constitutes the full length of the runway and a clearance is not required for active crossing runways while in the landing roll.

The crew reported no issues with Perth aerodrome markings or signage or the LAHSO operations signage situated prior to the intersection of the runways.

Perth Air Traffic Control phraseology

The phraseology utilised by the controller on the night of the incident contained elements that did not accord with the Aeronautical Information Package (AIP) or International Civil Aviation Organisation (ICAO) Doc 4444. 'Taxi via' may well have been used rather than 'take' November and 'second right' rather than 'second on your right now'. However, instructions to exit the runway via taxiway November were clearly issued to a crew experienced in landing at Perth aerodrome.

ATSB COMMENT

This incident is a reminder that all radio communications phraseology should be clear, concise and unambiguous and should reflect international practices and standards where possible, particularly with regard to instructions provided to and received from international aircraft, and in safety critical situations. It is also a reminder to crews to seek clarification of ATC instructions should there be any doubt as the content or intent of any clearance or instruction.

AO-2010-015: VH-NXM, Cabin safety event

Date and time:	4 March 2010, 1500 CST
Location:	Ayers Rock aerodrome, Northern Territory
Occurrence category:	Accident
Occurrence type:	Cabin safety event
Aircraft registration:	VH-NXM
Aircraft manufacturer and model:	Boeing Company 717-200
Type of operation:	Air transport – high capacity
Persons on board:	Crew – 6 Passengers – 91
Injuries:	Crew – 1 (serious) Passengers – Nil
Damage to aircraft:	Nil

SYNOPSIS

On 4 March 2010, a Boeing 717-200 aircraft, registered VH-NXM, was being prepared to depart Ayers Rock, Northern Territory (NT) on a scheduled passenger flight to Cairns, Queensland (Qld).

At about 1500 Central Standard Time[1], the passengers had boarded the aircraft and the pilot in command instructed the cabin crew to close the aircraft doors. The cabin crew member allocated to the forward left door had difficulty unlatching the door, so the cabin crew member allocated to the forward right door came to assist. The assisting cabin crew member placed one foot outside the aircraft onto the portable stairs to assist with closing the door. At this point, ground personnel commenced moving the portable stairs and the assisting cabin crew member fell through the open door onto the apron. The cabin crew member sustained a fractured left arm, a sprained right wrist and some other minor injuries.

The aircraft operator and ground handling agent advised the ATSB that as a result of this occurrence, the ground handling agent has issued an interim procedure, which includes increased safety checks to ensure that the aircraft's doors are closed prior to the removal of the portable stairs.

[1] 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.

FACTUAL INFORMATION

On 4 March 2010, the crew of a Boeing 717-200 aircraft, registered VH-NXM, were preparing the aircraft for a scheduled passenger service from Ayers Rock, NT to Cairns, Qld. At about 1500, the six crew and 91 passengers had boarded the aircraft and the pilot in command instructed the cabin crew to close the aircraft doors.

After receiving the relevant paperwork, the ground crew runner[2] onboard the aircraft confirmed with the cabin crew that they were ready to close the aircraft doors. The runner then descended the portable stairs and stated 'doors closed' to the movement controller[3] over a two-way radio. The stair operator[4], located at the foot of the stairs, and the marshaller[5], located at the base of the stairs under the fuselage, reported hearing the runner say 'doors closed'.

When the cabin crew member assigned to the left forward door received the instruction to close the doors from the pilot in command, they attempted

[2] The ground crew runner was a customer service agent responsible for the dispatch of the aircraft.

[3] The movement controller was a customer service agent responsible for the ground operations of the operator's aircraft at the aerodrome.

[4] The stair operator was responsible for the forward stairs on the aircraft.

[5] The marshaller at the time of the incident was assisting the stair operator.

to unlatch the door from the fuselage. However, as they experienced difficulties unlatching the door, the cabin crew member allocated to the forward right door came to assist. In preparation to assist, the cabin crew member placed one foot outside the aircraft onto the stairs.

At the same time, the runner had descended the stairs and gave a 'thumbs-up' signal to the stair operator. The stair operator released the brakes and commenced moving the stairs away from the aircraft. The marshaller, who could not see the aircraft door from their location, also assisted in moving the stairs.

When the stairs commenced moving, the assisting cabin crew member, who still had a foot on the stairs, fell through the open door onto the apron. The cabin crew member sustained a fractured left arm, a sprained right wrist and some other minor injuries in the fall.

Ground crew operations

Ground crew operations for the aircraft at Ayers Rock aerodrome were contracted out to ground handling agents from another operator. The service agreement between the two operators did not specifically cover the requirements relating to ground handling procedures. An investigation conducted by the ground handling agent identified that each operator had in place procedures for ramp operations; however, it was not clear as to which operator's procedures should be complied with.

The ground crew runner had been employed by the ground handling agent for about 1 month and was conducting their first shift as runner on the day of the occurrence. Prior to the accident flight, the movement controller had been working alongside the runner. The dispatch of the occurrence aircraft was the runner's first flight without direct supervision.

It was the runner's understanding that they were to inform the movement controller that the flight was ready to depart by stating 'doors closed' over the two-way radio. The runner did this while descending the stairs. When the runner stepped off the stairs, they gave a 'thumbs-up' signal to the stair operator to indicate they had completed their role.

Both the operators' standard operating procedures required that the stair operator check whether the aircraft door had been closed prior to moving the stairs. After hearing the runner state 'doors closed' and receiving the 'thumbs-up' signal, the stair operator reported disengaging the stabiliser and commenced moving the stairs away from the aircraft, without first checking the door was closed.

Similar events

Both the aircraft operator and ground handling agent examined their respective safety databases to identify similar occurrences to the accident flight. The search returned four occurrences between 2 February 2008 and 14 February 2010, where both operators were involved. In each of these events, the stairs had been removed prematurely, either before the doors were closed or while a door was being closed; however, no injuries were recorded on those occasions. Information surrounding these events had been shared between the operators, and after the 14 February event the ground handling agent released a Safety Alert Notice.

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 accident has been submitted by those organisations.

Ground handling agent

Safety Alert Notice

On 5 March 2010, the ground handling agent implemented an interim procedure for the removal of mobile stairs. The procedure requires a ground crew member to remain at the top of the platform or stairs and observe the door being closed and locked. They are then required to alight the stairs and give a 'thumbs-up' signal to the ground staff personnel who are manning the stairs, who are then to visually confirm that the door has been closed prior to removing the stairs.

AO-2010-017: VH-WYN, VFR into IMC

Date and time:	26 February 2010, 1218 WST
Location:	56 km NE of Kununurra aerodrome, Western Australia
Occurrence category:	Incident
Occurrence type:	VFR into IMC
Aircraft registration:	VH-WYN
Aircraft manufacturer and model:	Cessna Aircraft Company U206G
Type of operation:	Charter – passenger
Persons on board:	Crew – 1 Passengers – 1
Injuries:	Crew – Nil Passengers – Nil
Damage to aircraft:	Nil

SYNOPSIS

On 26 February 2010, a Cessna Aircraft Company U206G aircraft, registered VH-WYN, departed Forest River, Western Australia (WA) on a charter passenger flight to Kununurra, WA under visual flight rules (VFR) conditions.

Shortly after departing Forest River, the pilot observed dark clouds in the direction of Kununurra. The pilot listened to the aerodrome weather information service (AWIS) at Kununurra and determined that the conditions were appropriate to continue the flight. While en route, the weather conditions deteriorated further. The pilot diverted to the east in an attempt to avoid the weather, however, a rain band was also moving in a north-easterly direction.

The pilot reported that the weather conditions deteriorated around the aircraft and after considering the available options, the instrument flight rated pilot elected to enter instrument meteorological conditions (IMC). The aircraft was flown through moderate to heavy rainfall and light turbulence for a period of between 1 and 2 minutes, but remained clear of cloud. The remainder of the flight was conducted in visual meteorological conditions (VMC) and the aircraft landed at Kununurra without further incident.

Weather-related general aviation accidents remain one of the most significant causes for concern in aviation safety; the often fatal outcomes of which are usually all the more tragic because they were avoidable.

The ATSB has published several weather-related research reports (available at www.atsb.gov.au). The Civil Aviation Safety Authority (CASA) also provides pilots with weather-related educational resources.

FACTUAL INFORMATION

On 26 February 2010, at 0935 Western Standard Time[1], the pilot of a Cessna Aircraft Company U206G, registered VH-WYN, departed Kununurra aerodrome to pick up a passenger at Forest River airstrip and then return to Kununurra (WA). Prior to departure, the pilot obtained the appropriate weather forecasts and re-fuelled the aircraft, sufficient for 220 minutes of flying time. In accordance with the operator's requirements, this included additional fuel for TEMPO[2] conditions.

The aircraft arrived at Forest River about 35 minutes later. The pilot reported that the weather conditions en route were typical of a fair weather wet season day, with small scattered cumulus clouds present.

---

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 + 8 hours.

2 TEMPO is used in aviation weather forecasts to indicate a significant variation, of a temporary nature, to the prevailing conditions that is expected to last for a period of between 30 and 60 minutes.

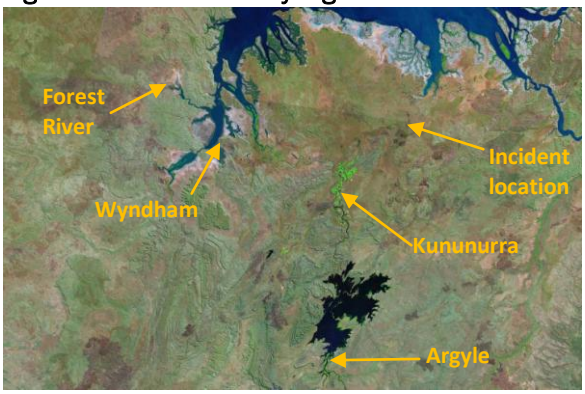
At about 1115, the pilot and one passenger departed Forest River on a VFR charter flight back to Kununurra. At the time, the weather conditions were similar to that experienced on the previous flight; however, the cloud base was slightly lower, at around 4,000 ft to 4,500 ft.

Shortly after, the pilot observed a band of rain from the south-west of Wyndham to the east of Kununurra and heavy dark clouds.

As soon as the aircraft was within range, the pilot listened to the AWIS broadcast for Kununurra. The pilot reported that the weather conditions were within acceptable limits and elected to continue the flight. By this time, the pilot had diverted the aircraft off track in an attempt to fly around the weather.

When passing Wyndham, the pilot noted that the weather had closed in around the aerodrome and determined that it would not be suitable as an alternate landing point. Several aircraft operating within the region (Figure 1) were also affected by the deteriorating weather conditions; one aircraft landed at Wyndham, while another was unable to and diverted to Forest River.

Figure 1: East Kimberley region



The pilot continued to monitor the AWIS, with conditions at the aerodrome deemed to be reasonable. An approach into Kununurra was made from the north, however, when about 19 km from the aerodrome, the AWIS broadcast conditions deteriorated below VMC. The pilot was unable to visually sight the aerodrome and decided to turn the aircraft back to the north away from Kununurra. At this stage, the pilot assessed that the storm was tracking in a line to the north-west, with a band of rain to the north-north-east. The pilot observed a break in the rain and tracked to the east, in an attempt to approach Kununurra from behind the rain band.

At about 1200, the crew of a Fokker 100 aircraft, broadcast that they were south-east of Kununurra inbound at 20 NM (37 km). At the same time, VH-WYN was 30 km to the east, maintaining 1,500 ft. To allow the Fokker to continue the approach into Kununurra, the pilot of VH-WYN amended course and tracked to the north. The passenger on VH-WYN was due to connect with this flight in Kununurra.

The pilot of VH-WYN then decided to approach Kununurra from the south-east and amended the aircraft's track accordingly. The weather to the south was also poor and the pilot considered a diversion to Argyle. The crew of the inbound Fokker aircraft advised that the weather conditions at Argyle were unfavourable and the pilot of VH-WYN elected to track back to the north-east.

At this stage, the pilot assessed that the weather was deteriorating in the area to the east of Kununurra. In particular, the pilot recalled that the weather had closed in to the south and south-west, there were showers to the east, cumulus clouds to the north-east, and a rain band to the west, south-west and north-west of the aircraft. Given the inclement weather conditions, the pilot then evaluated the available options, including:

- diverting to the nearest airfield, which was a dirt strip at Timber Creek. The pilot, however, did not have any weather information and considered it too far away
- conducting a precautionary landing. The terrain within the area was rocky and hilly, and therefore not conducive to a safe precautionary landing
- tracking around the rain band to the north and returning to Forest River or Wyndham; or approaching Kununurra from the east. Due to the length of the rain band, the pilot did not believe this was possible.

The pilot contacted the aircraft operator at Kununurra, who observed the progress of the storm on the Bureau of Meteorology (BoM) weather radar system. The pilot reported that the operator advised, of what appeared to be a clear passage into Kununurra from the north-west, with a relatively thin band of weather. The pilot observed the weather and noted that there was no electrical activity in the clouds.

Based on the information from the operator, the pilot's weather observations, the fact that the pilot was instrument flight rated, and the absence of suitable alternatives, the pilot elected to fly through the rain band and approach Kununurra from the north-west.

At 1218, the aircraft was climbed to 3,000 ft, which was above the lowest safe altitude for the area. In the interests of safety, the pilot made a broadcast on the Kununurra Common Traffic Advisory Frequency (Radio) (CTAF(R)), advising of the aircraft's current location and heading, and the intention to enter IMC. The pilot then entered IMC, where the visibility was below 500 m. The pilot reported that the sky was overcast with a cloud base of 3,500 ft, and light turbulence and moderate to heavy rainfall were experienced. The aircraft remained below the cloud base.

The aircraft remained in IMC for a period of between 1 and 2 minutes, after which, the pilot regained VMC and tracked toward the aerodrome. At 1238, the aircraft landed at Kununurra.

Meteorological conditions

For the purposes of issuing flight and other forecasts, the BoM divides Australia into a number of forecast areas. The flight from Forest River to Kununurra was conducted in Area 69.

The amended Area 69[3] forecast that was valid from 0400 to 1800 on 26 February 2010, included:

- isolated showers and thunderstorms, becoming scattered showers and occasional thunderstorms after 1200
- isolated cumulonimbus cloud from 3,000 ft to 40,000 ft, broken[4] stratus cloud from 1,000 ft to 3,000 ft, and scattered cumulus cloud from 4,000 ft to 20,000 ft
- visibility 1,000 m in thunderstorms, and 3,000m in rain showers.

Actual weather

The Kununurra METAR[5] that was issued by the BoM at 1100, recorded scattered cloud at 1,700 ft, broken cloud at 2,700 ft and overcast conditions at 3,500 ft; visibility was greater than 10 km. The SPECI, issued at 1145, reported scattered cloud at 500 ft, broken cloud at 1,400 ft and overcast conditions at 3,800 ft; visibility was reduced to 700 m. At 1211, visibility improved to greater than 10 km, but the cloud base lowered, with scattered cloud at 400 ft, broken cloud at 1,100 ft and overcast conditions at 3,800 ft.

The radar images provided by the BoM for around the time of the incident indicated the rain band moving to the north-north-east and that rain was present in the area.

VMC requirements

The Aeronautical Information Publication (AIP) (AIP En route 1.2) stipulates the requirements relating to VFR flight. Specifically, paragraph 1.1.1 (a) states that VFR flight may only be conducted in VMC. The aircraft VMC requirements applicable for flight in non-controlled airspace (Class G) for fixed-wing aircraft are detailed in Table 1.

Table 1: VMC in non-controlled airspace

Height	Flight visibility	Distance from cloud
At or above 10,000 ft AMSL	8 km	1,500 m horizontal 1,000 ft vertical
Below 10,000 ft AMSL	5,000 m	1,500 m horizontal 1,000 ft vertical
At or below 3,000 ft AMSL or 1,000 ft AGL whichever is the higher	5,000 m	Clear of cloud and in sight of ground or water

ATSB COMMENT

Weather-related general aviation accidents remain one of the most significant causes for concern in

[3] The area 69 forecast was applicable for the flight between Forest River and Kununurra.

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

[5] Routine recordings by automatic weather stations or observations by approved observers of the meteorological conditions at aerodromes. A METAR is issued at a fixed time, while a SPECI is issued when conditions fluctuate about, or below, specified criteria.

aviation safety; the often fatal outcomes of which are usually all the more tragic because they were avoidable (e.g. ATSB investigation report A0-2008-063 available at www.atsb.gov.au.)

The ATSB has published several weather-related research reports (available at www.atsb.gov.au), including:

- Destination Weather Assurance: Risks associated with the Australian operational rules for weather alternate minima (2006)
- General Aviation Behaviours in the Face of Adverse Weather (2005)

The Civil Aviation Safety Authority (CASA) also provides pilots with weather-related educational resources, including:

- A DVD titled 'weather to fly', which provides information on flying in cloud and other weather
- Regular safety seminars for pilots held at locations across Australia, which discuss the topic of VFR into IMC.

AO-2010-018: VH-PVV, VH-HUL, CTAF-related event

Date and time:	17 March 2010, 1411 EDT
Location:	Cessnock aerodrome, New South Wales
Occurrence category:	Incident
Occurrence type:	Aircraft separation - other
Aircraft registration:	VH-PVV and VH-HUL
Aircraft manufacturer and model:	VH-PVV: Cessna Aircraft Company C152 VH-HUL: Robinson Helicopter Co. R44 Raven I
Type of operation:	VH-PVV: Flight Training VH-HUL: Private
Persons on board:	VH-PVV: Crew – 2 Passengers – Nil VH-HUL: Crew – 1 Passengers – Nil
Injuries:	Crew –Nil Passengers – Nil
Damage to aircraft:	Nil

SYNOPSIS

On 17 March 2010, a Cessna Aircraft Company 152 (C152), registered VH-PVV, and a Robinson Helicopter Co. R44 (R44), registered VH-HUL, were operating from the Cessnock Common Traffic Advisory Frequency (CTAF) aerodrome, New South Wales (NSW). A flight instructor and student pilot were on board the C152 and were preparing to take off from runway 35 to commence a session of dual circuit training. At about the same time, the R44 was taxied for a departure from runway 17 grass-left on a private flight with only the pilot on board the helicopter. Both aircraft were operating under the Visual Flight Rules (VFR) in Visual Meteorological Conditions (VMC). Both aircraft's radio communication systems were serviceable and used by the pilots during the occurrence sequence.

The pilot in command (PIC) of the C152 reported taking evasive action, shortly after becoming airborne on runway 35, to avoid the R44 allegedly taking off in the opposite direction. The PIC of the R44 reported that he had positioned the helicopter outside of the runway 17 flight strip and had sighted the C152 taking off. The R44 pilot also reported that he had just transitioned into forward flight from the hover when the C152 was abeam his position and that at no time did a collision risk exist. However, the C152 pilot was adamant that the R44 commenced the takeoff along runway 17 and presented an imminent collision risk.

The differing accounts from both pilots could not be reconciled. No additional reports from potential eyewitnesses were received by the ATSB. The incident serves as a useful reminder for both fixed-wing and rotary-wing pilots to review the various requirements governing their respective operations at CTAF aerodromes and, in particular, to be mindful that helicopters may not be operating to the same pattern as fixed-wing aircraft. Pilots are advised to consult relevant Civil Aviation Advisory Publications (CAAPs), effective 3 June 2010, regarding changes to operations at non-towered (non-controlled) aerodromes.

FACTUAL INFORMATION

On 17 March 2010, at approximately 1405 Eastern Daylight-saving Time[1], a Cessna Aircraft Company 152, registered VH-PVV, was taxied for runway 35 to conduct circuits at Cessnock aerodrome, NSW. A flight instructor and a student pilot were on board that aircraft. At the same time,

[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 Coordinated Universal Time (UTC) + 11 hours.

a Robinson Helicopter Co. R44, registered VH-HUL, was being prepared to taxi for a departure from runway 17 grass-left on a private flight. The pilot was the only person on board that aircraft. Both aircraft were operating under the VFR in VMC.

Pilot reports were consistent with the meteorological data that a light easterly wind prevailed during the occurrence sequence. This resulted in a direct, but light cross-wind for aircraft operating on runway 35 and/or runway 17.

The airspace surrounding Cessnock aerodrome was designated as a Common Traffic Advisory Frequency (CTAF) . Runway 35 was in use by fixed-wing aircraft at the time of the occurrence.

The PIC of the C152 reported taking evasive action shortly after becoming airborne from runway 35 at about 1411, to avoid the R44 allegedly taking off in the opposite direction. He estimated that aircraft separation had reduced to approximately 20 ft vertical and 20 m lateral clearance.

The R44 pilot reported that he had positioned the helicopter outside of the runway 17 flight strip and had sighted the C152 taking off. The R44 pilot reported that he had just transitioned into forward flight from the hover when the C152 was abeam his position and that at no time did a collision risk exist.

Figure 1: A Robinson R44 aircraft and VH-PVV

Images courtesy of Robinson Helicopter Co. and the operator of VH-PVV

Pilot radio communications

The Australian Transport Safety Bureau (ATSB) examined recordings of the transmissions made on the Cessnock CTAF. That examination revealed that the pilot of the C152 broadcast taxiing for and lining up on runway 35. A radio check was conducted in between those two transmissions and confirmed that the aircraft's radio communication system was serviceable. After the line-up broadcast by the pilot of the C152, the pilot of the R44 broadcast that he was taxiing for a departure from runway 17 grass-left for a local flight to the north-west. The C152 pilot's next broadcast was that he had missed the R44 by 20 ft. There was no response from the R44 pilot.

The R44 pilot later reported that he thought the pilot of the C152 was a student pilot who didn't understand the operational flexibility available to helicopters. Therefore, he did not respond to the C152 pilot's near miss broadcast. In addition, the R44 pilot reported that he never entered runway 17. The R44 pilot reported that he was aware of the location of the C152 through the pilot's radio transmissions, but he did not recall hearing a rolling call.

The C152 pilot reported that during the takeoff, he heard the R44 pilot transmit taxiing for runway 17. He thought that must have been a mistake and that he must be taxiing for runway 35 instead.

The R44 pilot was adamant that no collision risk existed because he was clear of the runway 35 flight strip. The C152 pilot was equally adamant that the R44 tracked along runway 17 directly towards him and therefore presented an imminent collision risk.

CTAF procedures

Aeronautical Information Publication - En Route

The Aeronautical Information Publication (AIP) En Route (ENR) section detailed various requirements relating to operations outside controlled airspace (G Airspace), including CTAF procedures, separation minima, and communications for both fixed-wing and rotary-wing aircraft.

With reference to separation minima, AIP ENR 57.2 detailed aircraft and glider separation requirements before an aircraft commences take-off. The relevant requirements included that an aircraft must not commence takeoff until:

- a preceding aircraft, using another runway, has crossed or stopped short of the take-off aircraft's runway.

AIP ENR 82 detailed various requirements for helicopter operations, including that at non-towered aerodromes:

- A pilot may take-off from any area which is assessed as being suitable as a HLS [Helicopter Landing Site].

- When the pilot elects to conduct the take-off from outside the flight strip of the runway in use by aeroplanes, the helicopter take-off path must be outside that flight strip.
- Before take-off, the helicopter is to be positioned to the appropriate side of the runway in use so that the turn after take-off does not cross the extended centre line of that runway.

There are various other requirements in the AIP governing helicopter circuit operations, but they are not presented in the report because the helicopter was not conducting circuits.

The AIP ENR also provided a summary of communication reports for VFR aircraft operating at CTAF aerodromes. For radio equipped aircraft, pilots should generally broadcast taxiing, entering runway for take-off, inbound/transiting, joining circuit, turning downwind, base and final, and clear of the runway. However, these transmissions are to be used judiciously depending on the volume of traffic and the need to ensure sufficient information is broadcast to enable pilots to maintain separation with other aircraft.

En Route Supplement Australia

The En Route Supplement Australia (ERSA) entry for Cessnock aerodrome listed the following relevant local traffic regulations:

- Right hand circuits required for all OPS RWY 35.
- Preferred runway 35 NIL or L/V wind or direct crosswind.
- Pilots should limit radio transmissions in the circuit to those necessary to provide traffic information and separation. Broadcast with intentions turning base is recommended.

The entry did not list any specific local traffic regulations for helicopters

Civil Aviation Orders

Civil Aviation Order (CAO) 95.7 Exemption from provisions of the *Civil Aviation Regulations 1988* – helicopters, paragraphs 3, 4, 5, and 6 detailed situations where helicopters are exempted from various requirements governing taxiing over aerodromes, horizontal aircraft separation, landing and taking off from aerodromes and the requirement to use the landing area of an uncontrolled aerodrome for takeoff or landing. In summary, unless clearly documented for a specific aerodrome, a helicopter pilot is permitted to use the helicopter's flexible operating envelope to arrive and depart an uncontrolled aerodrome in a manner that does not conform to fixed-wing operating procedures as long as helicopter separation from people, obstacles and other aircraft is assured.

ATSB COMMENTS

Separation between aircraft in the vicinity of Cessnock aerodrome in VMC was based on pilots visually acquiring and avoiding other aircraft. A diverse range of aviation activities occurred at Cessnock aerodrome, with aircraft of different size and speed conducting various operations. Visual acquisition was enhanced by the voluntary use of radio by pilots of all aircraft in the vicinity to make broadcasts, creating an alerted see-and-avoid environment.

The differing accounts from both pilots regarding aircraft separation and collision risk could not be reconciled. No additional reports from potential eyewitnesses were received by the ATSB. Therefore, the ATSB was unable to make a determination regarding the factors contributing to the occurrence. However, it may be useful for both fixed-wing and rotary-wing pilots to review the various requirements governing their respective operations at CTAF aerodromes and, in particular, to be mindful that helicopters may not be operating to the same pattern as fixed-wing aircraft. In addition, helicopter pilots may wish to review their operations at CTAF aerodromes to ensure that the flexibility of their operations does not compromise aircraft separation assurance.

Pilots are advised to consult the following Civil Aviation Advisory Publications (CAAP), effective 3 June 2010, regarding changes to operations at non-towered (non-controlled) aerodromes:

- CAAP 166-1 (0) – Operations in the vicinity of non-towered (non-controlled) aerodromes.
- CAAP 166-2 (0) – Pilots' responsibility for collision avoidance in the vicinity of non-towered (non-controlled) aerodromes using 'see-and-avoid'.

AO-2010-021: VH-AJZ, Weather related precautionary landing

Date and time:	21 March 2010, 1500 WST
Location:	24 km SE of Geraldton aerodrome, Western Australia
Occurrence category:	Incident
Occurrence type:	Weather related event
Aircraft registration:	VH-AJZ
Aircraft manufacturer and model:	Gippsland Aeronautics GA8 Airvan
Type of operation:	Charter – passenger
Persons on board:	Crew – 1 Passengers – 7
Injuries:	Crew – Nil Passengers – Nil
Damage to aircraft:	Nil

SYNOPSIS

On 21 March 2010, a Gippsland Aeronautics GA8 Airvan aircraft, registered VH-AJZ, departed East Wallabi Island, in the Abrolhos Islands group, for a return flight to Geraldton, Western Australia (WA), under visual flight rules. On departure, the pilot reported observing a line of thunderstorms with frequent lightning, oriented in about a north-south direction, and approaching Geraldton from the west.

At about 27 km from Geraldton, flying through moderate rain, the pilot noted a vacuum pump failure. At about 11 km, the pilot encountered hail, and at 6 km a '…blanket of rain…' which had obscured the aerodrome, and turbulence which had increased '…quite dramatically…'.

The pilot turned the aircraft away from the line of storms to the south of Geraldton, and at 24 km and at about 1500, elected to conduct a precautionary landing. The pilot selected a suitable landing area in a paddock and landed the aircraft. The aircraft was undamaged and there were no injuries to the pilot or passengers.

Subsequent to this occurrence, the operator provided its pilots with a means for more reliable access to up to date weather information when on the ground at the Abrolhos Islands group.

FACTUAL INFORMATION

On 21 March 2010, at about 1420 Western Standard Time[1], a Gippsland Aeronautics GA8 Airvan aircraft, registered VH-AJZ, departed East Wallabi Island, in the Abrolhos Islands group, for Geraldton, WA. The aircraft was being operated on a scenic charter flight, conducted under visual flight rules. On board were the pilot and seven passengers. The pilot had earlier departed Geraldton at 0915 that morning for the charter flight, and had been on the ground at East Wallabi Island for a number of hours.

On departure, the pilot reported observing a line of thunderstorms with frequent lightning, oriented in about a north-south direction, and approaching Geraldton from the west. The pilot determined that the flight path for the return flight was clear and that the area to the south of Geraldton was also clear. The Geraldton Aerodrome Weather Information Service (AWIS)[2] broadcast did not

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

[2] Aerodrome Weather Information Service (AWIS) broadcasts are observations of meteorological conditions, by approved observers or automated recording devices, within a radius of about 8 km of an aerodrome's reference point, by radio broadcast, telephone or both.

indicate conditions suggestive of thunderstorm activity at that time.

At about 27 km from Geraldton, the pilot observed the illumination of an amber warning light on the annunciator panel, indicating a vacuum pump failure, and that the directional gyro and artificial horizon were '...spinning...'. The pilot commenced a descent towards a clear area to the south of Geraldton and was flying through moderate rain. He noted that the Geraldton AWIS radio broadcast still did not indicate conditions suggestive thunderstorm activity.

At about 11 km from Geraldton, the pilot reported encountering hail, but with the runway in sight. At about 6 km, he encountered a '...blanket of rain...' that had obscured the aerodrome, and turbulence, which had increased '...quite dramatically...'. The pilot noted that the AWIS radio broadcast was reporting winds of up to 40 kts from the west. The pilot turned the aircraft away from the line of storms to the south of the aerodrome and was flying at about 800 ft above mean sea level.

The pilot reported that he discounted a return to the islands and was reluctant to hold away from the aerodrome due to the aircraft malfunction, unfamiliarity with the area, and uncertainty of the path the line of storms was taking. At about 24 km from Geraldton and at about 1500, the pilot elected to conduct a precautionary landing. The pilot selected a suitable landing area in a large paddock below him, briefed the passengers and landed the aircraft. The aircraft was undamaged and there were no injuries to the pilot or passengers.

Meteorological information

Prior to departing Geraldton at 0915, the pilot obtained aviation meteorological forecasts for the Geraldton and Abrolhos Islands area from the Bureau of Meteorology (BoM). The area forecast issued at 0158 indicated scattered showers and isolated thunderstorms for the area in which the flight was to occur, with north-easterly winds at 15 to 20 kts, 3 to 4 oktas[3] of cloud from 4,000 to 8,000 ft, and isolated cumulonimbus cloud (thunderstorm cells) at 10,000 ft and above. The forecast also indicated reduced visibility from thunderstorms, showers and rain, and smoke from ongoing fires in the area.

The Geraldton aerodrome forecast issued at 0640 indicated wind from 070 degrees at 10 kts (changing to 200 degrees and 12 kts between the period 1100 and 1300), visibility greater than 10 km, and 1 to 2 oktas of cloud at 2,000 ft. Between 1400 on the day of the occurrence and 0600 the following morning, there was a 30 per cent probability of a temporary change in weather conditions, which would last between 30 and 60 minutes. Those conditions included variable winds at 20 kts, with a maximum of 40 kts, visibility of 4,000 m in thunderstorms and rain, 1 to 2 oktas of cloud at 4,000 ft, and 1 to 2 oktas of cumulonimbus cloud at 10,000 ft.

The BoM recorded weather observations for Geraldton aerodrome at 1455 and 1500, which indicated westerly winds of 27 to 37 kts in heavy thunderstorms and 23 kts in heavy rain, 3 to 4 oktas of cloud at 7,000 ft, and 5 to 7 oktas of cumulonimbus cloud at 8,000 ft. Recent thunderstorm activity had been recorded since 1400. Recent showers and rain activity had been recorded since 1449. The heaviest rainfall throughout the day was during the period 1455 to 1500.

The pilot reported that about 5 minutes after landing in the paddock, the thunderstorm struck their location, with '...heavy rain, lightning and strong winds...'. In addition, he reported that the aircraft airspeed indicator was reading 40 kts on the ground.

Scenic charter flights could involve several hours on the ground in the Abrolhos Islands area. While there was no stated requirement in the operator's operations manual, the pilot reported that he had a habit of calling the operator's Geraldton base to obtain updated weather information for the return flight. On the day of the occurrence, the pilot was unable to obtain that information either by use of the aircraft's very high frequency (VHF) radio or his mobile telephone. Mobile telephone reception in the Abrolhos Islands can be unreliable, dependent upon the service provider. The pilot was unable to obtain reception on the day.

[3] 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.

Landing area information

The pilot reported that he selected a large landing area in a paddock aligned in an east-west direction. Following an inspection run at 500 ft, during which the pilot ascertained that the field was devoid of obstacles and long enough to stop safely, he briefed the passengers and landed. The operator subsequently reported that the landing area selected by the pilot was as good as, if not better than, a number of the aircraft landing areas used by the operator's pilots as part of normal operations.

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.

Operator

In order to ensure that pilots can obtain updated weather information for Geraldton while on the ground in the Abrolhos Islands group, the operator has issued all its pilots with a mobile telephone, which has a service capable of obtaining reception in the Abrolhos Islands group.

AO-2010-022: VH-WZJ and VH-WRR, Aircraft proximity event

Date and time:	24 March 2010, 1235 EST
Location:	37 km NE of Horn Island aerodrome, Queensland
Occurrence category:	Serious incident
Occurrence type:	Airprox
Aircraft registration:	VH-WZJ and VH-WRR
Aircraft manufacturer and model:	VH-WZJ: Cessna Aircraft Company 208B, Grand Caravan VH-WRR: Pilatus Britten-Norman Ltd BN2A-26, Islander
Type of operation:	VH-WZJ: Air transport – low capacity VH-WRR: Charter - passenger
Persons on board:	VH-WZJ: Crew – 2 Passengers – 9 VH-WRR: Crew – 1 Passengers – 9
Injuries:	Crew – Nil Passengers – Nil
Damage to aircraft:	Nil

SYNOPSIS

On 24 March 2010, at about 1235 Eastern Standard Time[1], a Cessna Aircraft Company 208B (Caravan), registered VH-WZJ, was descending through cloud inbound to Horn Island aerodrome, Queensland (Qld), when the pilot received an aural traffic warning on the Caravan's traffic advisory system. The system indicated that an aircraft was 200 ft below and 3 NM (5.6 km) ahead of the Caravan. Communications were established with the pilot of a Pilatus Britten-Norman BN2A-26 (Islander), registered VH-WRR, who was transiting the area, and was confirmed as the conflicting aircraft.

In response, the pilot of the Caravan reported commencing a climb, and at this point observed the Islander pass to the right of the aircraft. The pilot of the Islander also reported sighting the Caravan pass above and to the right of his aircraft. It was estimated that the distance between the two aircraft was about 50 m.

As a result of this incident, the following safety actions are being considered:

- The operator of the Islander is considering changing its procedures so that all flights conducted within the Torres Strait, in marginal weather conditions, are carried out under instrument flight rules (IFR).
- The Civil Aviation Safety Authority (CASA) is reviewing the two discrete frequencies currently assigned to the Horn Island and Northern Peninsula aerodrome Common Traffic Advisory Frequencies (Radio) ((CTAF(R)).

FACTUAL INFORMATION

Sequence of events

Britten-Norman Islander, VH-WRR

On 24 March 2010, at about 1218, a Pilatus Britten-Norman BN2A-26 (Islander), registered VH-WRR, departed Northern Peninsula aerodrome, Qld on a charter passenger flight to Saibai Island, Qld (Figure 1). The aircraft was being operated under visual flight rules (VFR) and on board the aircraft were the pilot and nine passengers.

After departing, the pilot broadcast a departure call on the Northern Peninsula aerodrome CTAF(R).[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. Eastern Standard Time was Coordinated Universal Time (UTC) + 10 hours.

[2] In a CTAF(R) the carriage and use of a very high frequency (VHF) radio was mandatory for operations in the vicinity of the aerodrome.

Due to the weather conditions, the pilot was required to vary the aircraft's altitude, initially between 800 ft and 1,500 ft, and track east of the intended flight path to remain in visual meteorological conditions (VMC).

When the Islander was about 46.3 km north of Northern Peninsula, the pilot reported changing the radio frequency to the Horn Island CTAF(R) and recalled making a traffic advisory call. At this stage of the flight, the Islander was at about 3,500 ft, where the pilot stated the best weather conditions were at the time.

Cessna Caravan, VH-WZJ

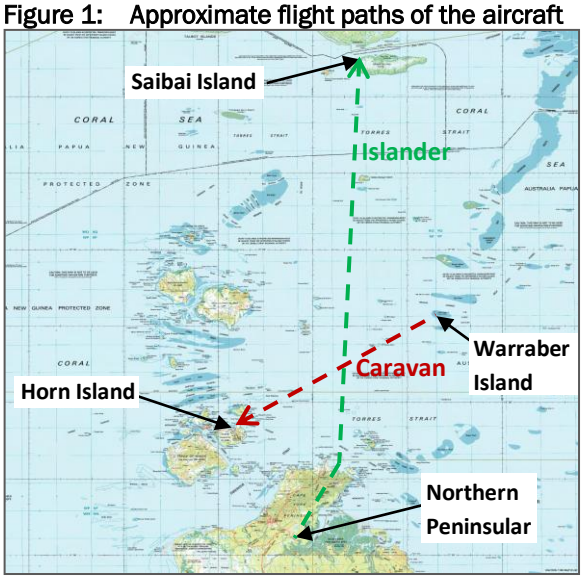
At about 1225, a Cessna Aircraft Company 208B (Caravan), registration VH-WZJ, departed Warraber Island, Qld on a scheduled passenger flight to Horn Island, Qld (Figure 1). The flight was operated in accordance with IFR and on board the aircraft was the pilot, a baggage handler[3] and nine passengers.

The pilot reported making the appropriate departure and traffic calls on the Horn Island CTAF(R), and was aware of two other aircraft operating in his vicinity. Communications were established with both aircraft to ensure separation was maintained.

After departure, the Caravan climbed to 4,000 ft. The pilot stated that the flight was conducted in IMC, with cloud, light turbulence and light to moderate rainfall experienced.

Prior to commencing the descent, the pilot contacted Brisbane Centre requesting traffic around Horn Island. Air traffic control advised that there was no additional IFR traffic. The pilot then made a broadcast on the Horn Island CTAF(R) that he was 20 NM (37 km) north-east of Horn Island leaving 4,000 ft on decent inbound. No response to the traffic advisory call was received. The pilot recalled checking the traffic advisory system (TAS)[4] and observing two aircraft on the display. The pilot was already aware of these aircraft and was maintaining separation accordingly.

Figure 1: Approximate flight paths of the aircraft



Incident

At about 1235, as the Caravan descended through about 3,700 ft, in cloud, the pilot received an aural traffic warning[5] from the TAS. The pilot reported stopping the aircraft's descent and noted traffic on the TAS at 200 ft below and about 3 NM (5.6 km) ahead of the Caravan. The pilot then made a broadcast on the Horn Island CTAF(R) for aircraft north-east of Horn Island at 3,500 ft. The pilot of the Islander responded and confirmed that he was north-east of Horn Island at that altitude; but he had not heard the Caravan pilot's inbound call as he had just changed the radio frequency over to the Horn Island CTAF(R). Neither the pilot nor baggage handler in the Caravan could recollect hearing the pilot of the Islander make a traffic advisory call when he changed radio frequencies[6].

The pilot of the Caravan reported that he commenced a climb back to 4,000 ft. At this point, a passenger in the rear of the aircraft, on the right side and the baggage handler, sitting in the front right seat next to the pilot, stated that the clouds

---

3 The baggage handler was seated in the front right-hand seat and was wearing a headset.

4 The TAS provided visual information on the relative altitude and location of other aircraft, based on information received from their transponders.

The pilot of the Caravan reported that in his experience aircraft displayed on the TAS can appear and disappear.

5 The TAS provided an aural warning 'TRAFFFIC, TRAFFIC' when another aircraft was within a distance of 3 NM (5.6 km) laterally or 500 ft vertically. The system could not provide traffic resolution advice.

6 Broadcasts made by the pilots during their flights were outside the range of the aerodrome and therefore not recorded on the Horn Island CTAF(R).

cleared slightly. The passenger recalled sighting another aircraft on the left side and slightly below. From his view point, the passenger observed the aircraft pass under the Caravan and commented that it was very close, but was unable to estimate a distance.

The baggage handler was aware that another aircraft was in the vicinity and was maintaining a lookout. He observed the Islander in the right window and saw the underside of the fuselage and one of the aircraft's wheels, indicative of a banked turn to the left. He estimated the aircraft was about 50 m away and at about the same altitude. The pilot of the Caravan stated that they also saw an object flash past the right side of the aircraft.

The pilot of the Islander reported that at the time of the incident the aircraft was at about 3,500 ft, but had been climbing and descending to remain in VMC. The pilot sighted the Caravan out the right side of the aircraft and saw the aircraft pass above and behind. The pilot estimated the distance between the two aircraft to have been about 45 m.

At the time of the incident the pilot of the Islander reported that the aircraft was below overcast cloud, in rain, and had broken[7] cloud below; and that there was the required forward visibility to remain in VMC. The pilot also stated that the other aircraft (the Caravan) was just coming out of the cloud at the time of the incident.

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

Torres Strait Common Traffic Advisory Frequencies

Horn Island aerodrome shares a common CTAF(R) frequency with a number of aerodromes within the Torres Strait, including Warraber Island, Badu Island, Kubin, and Mabuiag Island. Prior to November 2009, Northern Peninsula aerodrome also shared this frequency. However, in November 2009, Northern Peninsula aerodrome was allocated its own discrete CTAF(R), to reduce the level of frequency congestion experienced within the Horn Island CTAF(R). The boundary between the Horn Island CTAF(R) and the Northern Peninsula CTAF(R) is shown on the En Route Chart (low) as generally being along the mainland land mass (Figure 2).

At a North Queensland Regional Airspace and Procedures Advisory Committee (RAPAC) meeting, prior to the incident, operators in the Torres Strait indicated that the allocation of a discrete frequency for Northern Peninsula was not helpful and requested it be reviewed.

Figure 2: Horn Island CTAF(R) boundary

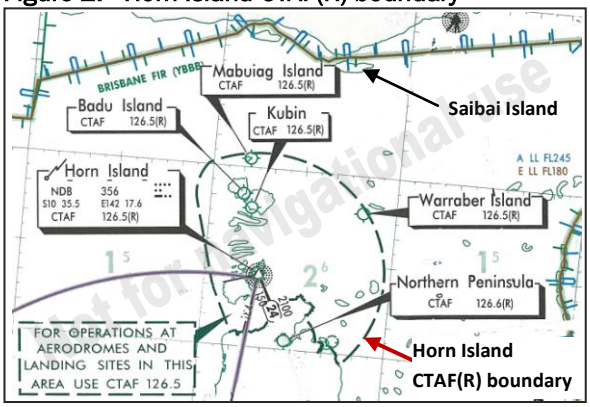


Image courtesy of Airservices Australia.

Meteorological information

In order to facilitate the provision of aviation weather forecasts by the Bureau of Meteorology (BoM), Australia is divided into a number of forecast areas.

The Area 45 forecast was issued by the BoM at 0721 on 24 March 2010, and was valid from 0900 on 24 March 2010 to 2100 on 24 March 2010. In the area covered by the flight path of both aircraft, the forecast predicted:

- areas of rain, scattered showers and isolated thunderstorms
- isolated cumulonimbus cloud from 2,000 ft to 40,000 ft, broken stratus cloud from 1,000 ft to 2,000 ft, and scattered cumulus cloud from 2,000 ft to 20,000 ft along the coast
- visibility 1,000 m in thunderstorms, 2,000 m in rain showers, and 3,000 m in rain
- moderate turbulence below 8,000 ft and in cumulus cloud, and severe turbulence associated with cumulonimbus cloud

[7] 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.

Actual weather

The Horn Island METAR[8], that was issued by the BoM at 1430, recorded scattered cloud at 1,700 ft, broken cloud at 2,700 ft, and overcast conditions at 3,500 ft; visibility conditions were not provided. A SPECI was issued 10 minutes later and reported scattered cloud at 600 ft, broken cloud at 2,000 ft, and overcast conditions at 2,900 ft; visibility was 4,400 m.

The radar and satellite images provided by the BoM for around the time of the incident indicate cloud and rain were present in the Horn Island area.

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.

Civil Aviation Safety Authority

Review of the Horn Island Area CTAF boundary

The Civil Aviation Safety Authority is currently reviewing the use of two distinct frequencies for the Horn Island and Northern Peninsula CTAF(R)s.

Operator of the Islander

Review of company procedures

Due to the amount of traffic operating within the Torres Strait area, the company is considering the possibility of changing its operating procedures so that all flights carried out in this region are conducted under IFR, when marginal VMC weather conditions exist.

ATSB COMMENT

This incident highlights the fundamental role radio broadcasts have, particularly in uncontrolled airspace, to ensure that separation between aircraft is established and maintained; and the value of applying effective see-and-avoid principles.

For more information regarding see-and-avoid principles, the following publication is available from the ATSB's website (www.atsb.gov.au):

- Limitations of the See-and-Avoid Principle (1991)

[8] Routine recordings by automatic weather stations or observations by approved observers of the meteorological conditions at aerodromes. A METAR is issued at a fixed time, while a SPECI is issued when conditions fluctuate about, or below, specified criteria.

Level 5 Factual Investigations:
1 April 2010 to 30 June 2010
Issue 2