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Investigation

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Contents

Turboprop aircraft

Piston aircraft

Helicopters

Turboprop aircraft

Left main landing gear collapse involving a Raytheon B200, VH-ZCO

What happened

On 27 March 2013, a Raytheon B200 aircraft, registered VH-ZCO (ZCO), was being operated on an aero-medical flight from Darwin to Port Keats, Northern Territory. On board the aircraft were the pilot and two flight nurses.

In preparation for landing at Port Keats, the pilot selected the landing gear down. The left and right main landing gear down indication lights did not illuminate, while the nose landing gear down (green) indication light illuminated. The unsafe landing gear (red) warning light was illuminated. The pilot cycled the landing gear and the landing gear control circuit breaker tripped. The circuit breaker was reset in accordance with the quick reference handbook and the circuit breaker tripped again. At about 1458 Central Standard Time,[1] the pilot elected to return to Darwin and advised air traffic control. Air traffic control declared an alert phase and notified the Darwin tower. During the return flight to Darwin, the pilot completed the unsafe gear checklist including using the emergency gear extension system. The unsafe gear red warning light remained illuminated.

In the Darwin circuit area, the pilot reported that the tower and a company pilot observed the landing gear and indicated that the gear appeared to be down.

The pilot reported that on landing, the right main landing gear wheel touched down first and when the left landing gear wheel touched down the pilot felt the left side of the aircraft start to sink. The pilot arrested the sink, transferred the weight to the right landing gear, shut down the left engine and feathered the left propeller. The pilot then shut down the right engine and feathered the right propeller. The left wing then contacted the runway and the aircraft skidded to a stop. The pilot and flight nurses evacuated the aircraft via the overwing exit. The aircraft sustained substantial damage, while the pilot and flight nurses were not injured (Figure1).

Figure 1: VH-ZCO on runway 29 at Darwin

Source: Aircraft operator

[1] Central Standard Time (CST) was coordinated Universal Time (UCT) + 9.5 hours.

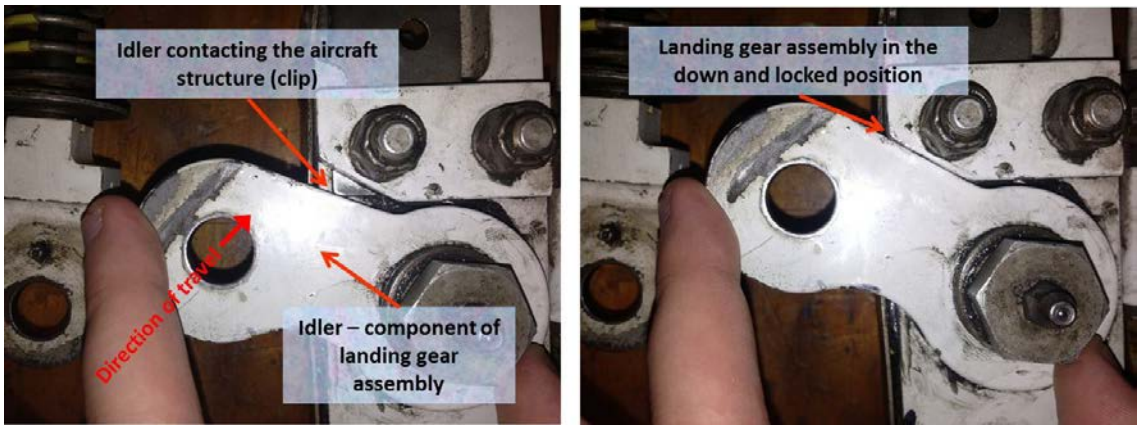
Operator investigation

On 22 March 2013, the left main landing gear was installed on ZCO. At the time of installation, this landing gear had conducted a total of 1,830 landings, since it was last overhauled. The accident flight was the first flight after the landing gear installation.

The operator determined that during the last overhaul of the left main landing gear, a washer had not been installed. The operator believed this resulted in the landing gear contacting the aircraft structure preventing the landing gear from locking in the down and locked position (Figure 2). The operator inspected their other B200 aircraft and found another aircraft where the main landing gear was incorrectly assembled.

Figure 2: VH-ZCO main landing gear assembly

Position found at the accident site *Normal position*



Source: Aircraft operator

Civil Aviation Safety Authority investigation

The Civil Aviation Safety Authority (CASA) conducted an investigation into the accident and found that there was no conclusive way to determine when the washer installation error occurred. They were also unable to determine why the landing gear did not contact the aircraft structure when it was installed on another aircraft. CASA also established that this issue was an isolated event. A search of both the CASA and US Federal Aviation Administration (FAA) service difficulty report databases identified landing gear issues for the aircraft type, but none of the reports identified the missing washer as a contributing factor.

Aircraft manufacturer comments

The manufacturer was informed of the accident and determined that the missing washer would not have led to the failure of the landing gear to lock down. They believed that it was more likely that the drag brace[2] was not installed or rigged correctly when installed on ZCO or that another landing gear assembly or maintenance error occurred, causing the circuit breaker to trip, resulting in the accident.

The manufacturer reviewed the aircraft component maintenance manual and illustrated parts catalogue; it found that both documents referenced the installation of two washers, although there was an inconsistency in the item numbering. The component maintenance manual and the maintenance manual required a check that the idler fully engaged to the idler stops. In addition, the manufacturer found that the link assembly extension would allow the lock hook to fully engage the lock pin, thereby locking the landing gear down, even with the idler contacting the corner of the clip.

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[2] A brace that supports an aircraft landing gear against loads trying to force the landing gear backward, locking the landing gear in the down position.

Safety action

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

Aircraft operator

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

Relocate medical bag

A medical bag that was located near the overwing emergency exit was relocated.

B200 fleet inspection

All B200 aircraft were inspected. The main landing gear on one aircraft was found not to be correctly assembled and this was rectified before further flight.

Safety Bulletin

A safety bulletin was issued to all staff to inform them of the accident.

Pilot training

The training and checking department were to review the part within the proficiency check about this type of landing and ensure it is reiterated at the next base check.

Aircraft manufacturer

As a result of this occurrence, the aircraft manufacturer has advised the ATSB that the component maintenance manual will be revised to remove the inconsistent numbering.

General details

Occurrence details

Date and time:	27 March 2013 – 1551 CST	
Occurrence category:	Accident	
Primary occurrence type:	Left main landing gear collapse	
Location:	Darwin Airport, Northern Territory	
	Latitude: 12° 24.88' S	Longitude: 130° 52.60' E

Aircraft details

Manufacturer and model:	Raytheon Aircraft Company B200	
Registration:	VH-ZCO	
Type of operation:	Aerial work	
Persons on board:	Crew – 3	Passengers – Nil
Injuries:	Crew – Nil	Passengers – Nil
Damage:	Substantial	

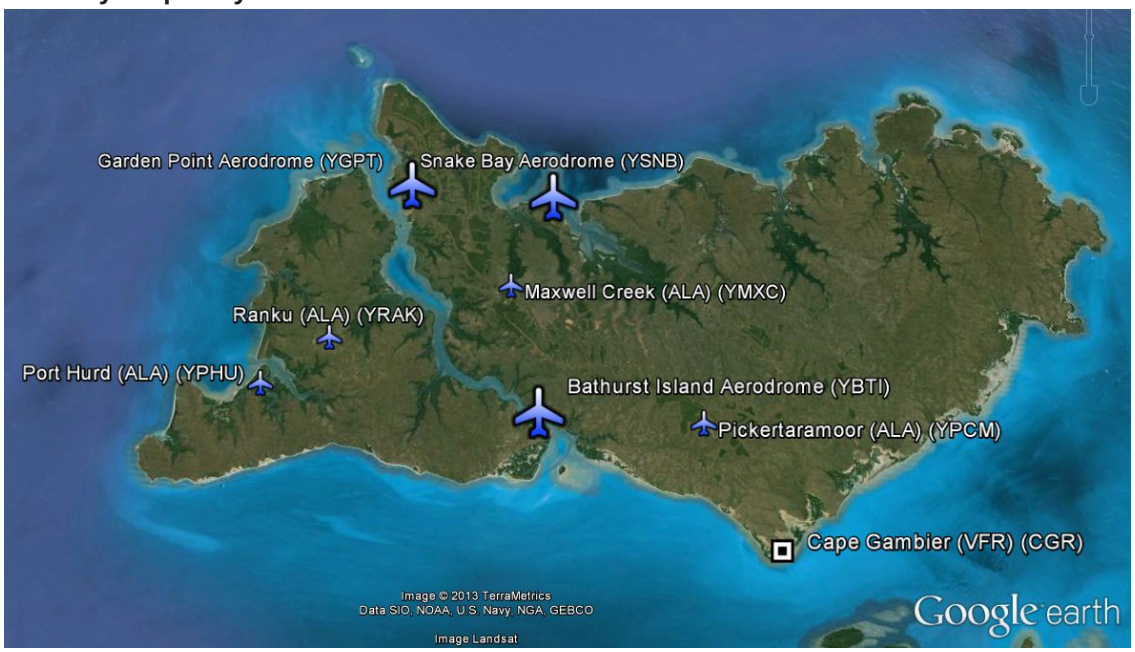
Aircraft proximity event between a Fairchild SA227, VH-HVH and an Aerospatiale AS.350, VH-JRJ

What happened

On 21 June 2013, at about 1700 Central Standard Time,[1] a Hardy Aviation Fairchild SA227 aircraft, registered VH-HVH (HVH), was being operated on a scheduled passenger flight from Bathurst Island to Darwin, Northern Territory. Prior to departing, the crew broadcast a taxi, entering the runway, and a rolling call on the Bathurst Island common traffic advisory frequency (CTAF).[2] After takeoff, the crew broadcast another call advising that they intended to depart the circuit on the downwind leg, on climb to 5,000 ft.

At about the same time, the pilot of an Aerospatiale AS.350 helicopter, registered VH-JRJ (JRJ), was departing Barra Base, near the Port Hurd aeroplane landing area (ALA) (Figure 1) for a ferry flight to Darwin. The pilot reported broadcasting a taxi and an airborne call on the CTAF. He had planned to overfly the Bathurst Island aerodrome, along the coast to Cape Gambier and then to Darwin (Figure 2).

Figure 1: Bathurst Island and surrounding aerodromes using the common traffic advisory frequency



Source: Google earth

When at 16 NM and 7 NM from the Bathurst Island aerodrome, the pilot of JRJ broadcast on the CTAF advising he was overflying the aerodrome and then flying coastal to Cape Gambier. At 1708, JRJ was 3 NM to the west of the aerodrome at 2,589 ft (Figure 2).[3]

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1 Central Standard Time (CST) was Coordinated Universal Time (UTC) + 9.5 hours.

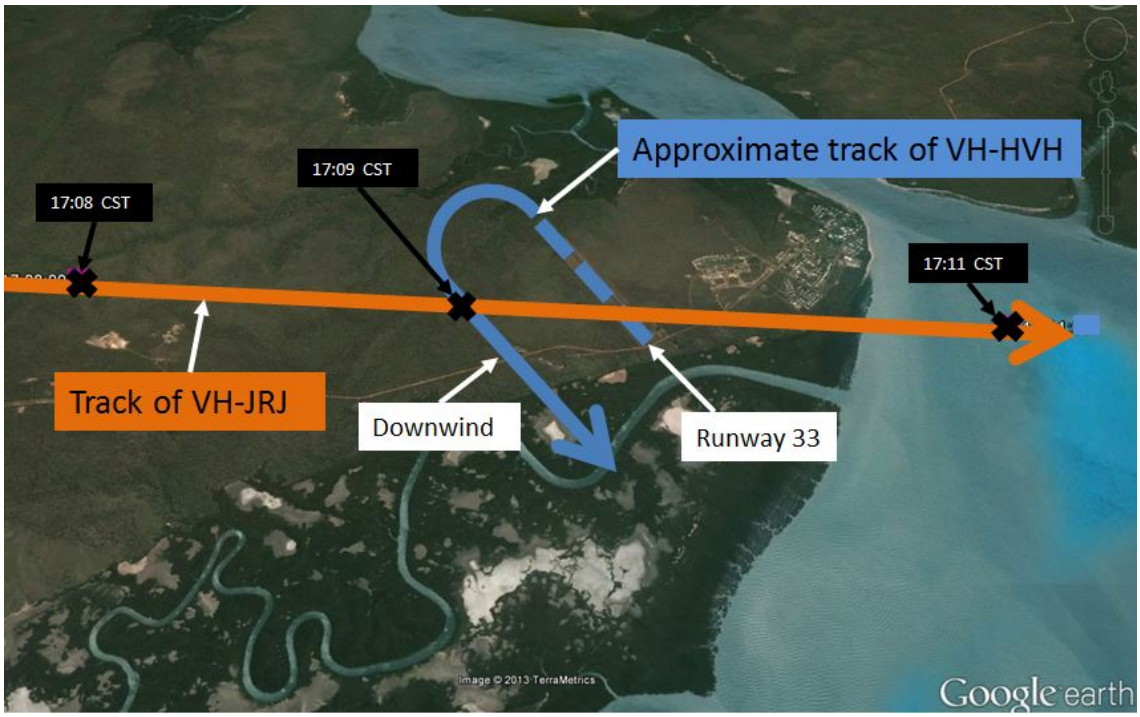
2 The Bathurst Island aerodrome shares a common CTAF frequency with a number of aerodromes at Bathurst Island, including Garden Point, Snake Bay, Maxwell Creek, Ranku, Port Hurd and Pickertaramoor.

3 VH-JRJ was fitted with 'Spidertracks', which recorded data regarding the helicopter's track.

At 1709, HVH was heading downwind following take-off and climbing through 2,000 ft when the first officer exclaimed on sighting a helicopter (JRJ). The captain had been recording the departure time and looked up and saw JRJ about 50-100 ft above and 400 m to his right. The first officer initiated a descent and JRJ passed overhead.

At 1711, JRJ was about 1 NM to the east of the aerodrome at 2,025 ft. JRJ was fitted with a GPS monitoring system, Spidertracks, that provided route reports to the operator. The relevant data was provided to the ATSB.

Figure 2: VH-JRJ 'Spidertracks' and approximate track of VH-HVH



Source: Google earth

The crew of HVH had not heard any radio calls from the pilot of JRJ on the CTAF. The captain called the pilot of JRJ, who responded. The pilot of JRJ reported hearing an aircraft taxiing at Bathurst Island, but as he had planned to overfly the aerodrome at 2,500 ft, he did not believe the aircraft would be in conflict. The pilot of JRJ also stated that he did not see HVH.

Pilot comments (VH-HVH)

The captain reported that broadcasts made on the very high frequency (VHF) radio (CTAF) on the ground at any of the aerodromes on Bathurst Island had limited coverage due to a lack of ground infrastructure. Consequently, only aircraft operating in the immediate vicinity of that location would hear broadcasts. While on the ground, pilots use the high frequency (HF) radio to contact Melbourne centre. The captain stated that the background noise associated with the HF radio could be a distraction and make it difficult to hear broadcasts made on the VHF. The captain suggested that enhanced VHF coverage would improve communications, enabling pilots to hear broadcasts made both on the ground and airborne over a larger area.

Pilot comments (VH-JRJ)

The pilot of JRJ reported that there was radio congestion at the time, which was normal for the area given the number of aerodromes using the same CTAF. He reported that JRJ had not descended from 2,589 ft until it had passed HVH.

Safety action

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

Operator of VH-JRJ

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

Mandatory reading

The operator has mandated that all pilots read CAAP 166-1

www.casa.gov.au/wcmswr/_assets/main/download/caaps/ops/166-1.pdf

and the ATSB publication Safety in the vicinity of non-towered aerodromes:

www.atsb.gov.au/publications/2008/ar-2008-044(2).aspx

Forum

The operator has opened a forum on an internal operator bulletin board and instructed all pilots to advise on their understanding of the literature and procedures in the vicinity of non-towered aerodromes to evaluate and determine if there are any deficiencies within their operations.

Flight Safety Instruction

The operator issued a company Flight Safety Instruction advising the company of the incident and advises pilots to

> *'monitor the relevant radio frequency in the vicinity of non-towered airfields and keep a sharp look out while transiting over or around such airports. Switch on landing/strobe/search lights when available to aid in making Company helicopters more visible in the vicinity of busy/often used airfields. Never assume that there is/will be no aircraft taxiing, transiting, landing or taking off from such airports no matter how remote or unused the airport or ALA may appear to be.'*

Safety Notice

The company also issued a Safety Notice regarding flight in the vicinity of non-towered aerodromes specifically reminding pilots to:

- Maintain a lookout for other aircraft at all times.
- Always make the standard radio broadcasts — even when you think there is no nearby traffic.
- Achieve radio alerted see-and-avoid by making all of the standard broadcasts within 10 NM of a non-towered aerodrome.
- Use the same procedures at all non-towered aerodromes, unless otherwise stated in the En Route Supplement Australia (ERSA).
- Be aware that any radio-equipped aircraft could be conducting straight-in approaches at non-towered aerodromes
- Avoid overflying aerodromes where possible, and take note of IFR inbound and outbound routes.

Safety message

This incident emphasises the importance of alerted see-and-avoid practices. Issues associated with unalerted see-and-avoid have been documented in an Australian Transport Safety Bureau (ATSB) research report *Limitations of the See-and-Avoid Principle*. Unalerted see-and-avoid relies entirely on the ability of the pilot to sight the other aircraft.

A broadcast made on the CTAF is radio-alerted see-and-avoid, which is more likely to be successful because knowing where to look greatly increases the pilot's chance of sighting the traffic. The *Limitations of See-and-Avoid Principle* research report is available at www.atsb.gov.au/publications/2009/see-and-avoid.aspx.

In addition, Safety around non-towered aerodromes is one of the focuses of the ATSB SafetyWatch campaign and is available at www.atsb.gov.au/safetywatch/safety-around-aeros.aspx.

General details

Occurrence details

Date and time:	21 June 2013 – 1709 CST	
Occurrence category:	Serious incident	
Primary occurrence type:	Aircraft proximity event	
Location:	near Bathurst Island Airport, Northern Territory	
	Latitude: 11° 46.15' S	Longitude: 130° 37.18' E

Fairchild SA227, VH-HVH

Manufacturer and model:	Fairchild Industries Inc. SA227-DC	
Registration:	VH-HVH	
Type of operation:	Air transport - low capacity	
Persons on board:	Crew – 2	Passengers – 19
Injuries:	Crew – Nil	Passengers – Nil
Damage:	Nil	

Aerospatiale AS.350, VH-JRJ

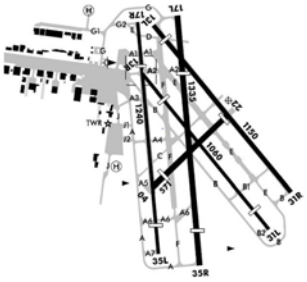
Manufacturer and model:	Aerospatiale Industries AS.350	
Registration:	VH-JRJ	
Type of operation:	Private	
Persons on board:	Crew – 1	Passengers – Nil
Injuries:	Crew – Nil	Passengers – Nil
Damage:	Nil	

Piston aircraft

Aircraft proximity event between two Cessna 172s, VH-EOE and VH-LWX

What happened

Moorabbin Airport



Source: Airservices Australia

On the evening[1] of Tuesday19 March 2013, up to eight aircraft were operating under the visual flight rules (VFR)[2] in the circuit at Moorabbin Airport, Victoria in Class D[3] airspace. The numbers were typical for periods of night training at Moorabbin and fluctuated as some aircraft landed and others joined the circuit. At 2025 Eastern Daylight-saving Time,[4] there were six aircraft in the circuit, including two Cessna 172 aircraft, registered VH-EOE (EOE) and VH-LWX (LWX). Both aircraft were engaged in flying training, EOE with an instructor and student on-board and LWX with a solo student.

When LWX was on early downwind, the pilot advised Moorabbin air traffic control (ATC) of his intentions for the next approach and he was instructed to follow[5] the preceding aircraft mid-downwind (EOE).

As LWX approached the position where the pilot normally turned from downwind onto base, the pilot looked to the left and identified what he thought were the flashing lights of the aircraft he had been instructed to follow (Figure 1). The flashing lights were below the horizon against a background of lights from the surrounding Melbourne suburbs. The turn brought LWX onto a base leg inside that of EOE (Figures 2 and 3).

Approaching the position where he was to turn onto final approach (Figure 4), the pilot of LWX looked to the right, to check for aircraft on final further away from the airport, then looked left and again misidentified the aircraft he had been instructed to follow.

At about 2028, as the pilot of LWX levelled out on final (Figure 5), ATC queried whether he still had the aircraft he had been instructed to follow in sight. Before he could answer, the instructor pilot of EOE transmitted he was descending as '…they're passing right over the top of us'. After acknowledging EOE, ATC instructed the pilot of LWX to go-around[6] (Figure 6).

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1 On the night of 19 March 2013, last light was at 2000, 28 minutes prior to the incident. Last light is the time when the centre of the sun is at an angle of 6° below the horizon following sunset. At this time, large objects are not definable but may be seen and the brightest stars are visible under clear atmospheric conditions. Last light can also be referred to as the end of evening civil twilight.

2 Visual flight rules (VFR) are a set of regulations which allow a pilot to only operate an aircraft in weather conditions generally clear enough to allow the pilot to see where the aircraft is going.

3 Class D – All aircraft must get an airways clearance and communicate with air traffic control. IFR aircraft are positively separated from other IFR aircraft and are provided with traffic information on all VFR aircraft. VFR aircraft are provided traffic information on all other aircraft.

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

5 The instruction to 'follow' requires the pilot to sight the preceding aircraft, and regulate the aircraft's circuit speed and approach path to achieve longitudinal separation.

6 Go around – overshoot straight ahead.

The following figures are a sequence of radar screen shots showing VH-LWX and VH-EOE with the misidentified aircraft (circled).

Figure 1

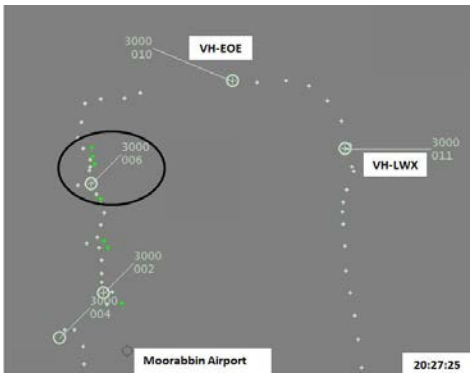


Figure 2

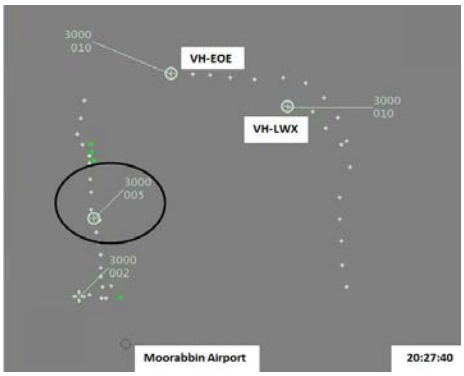


Figure 3

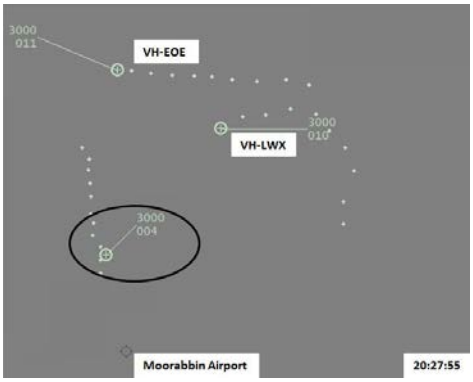


Figure 4

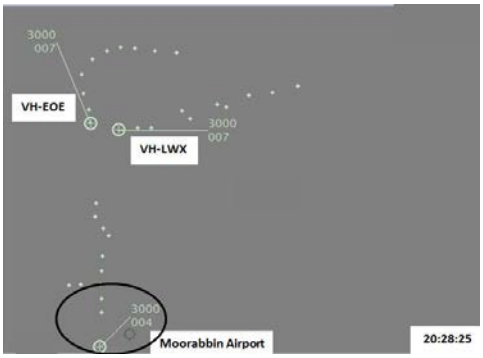


Figure 5

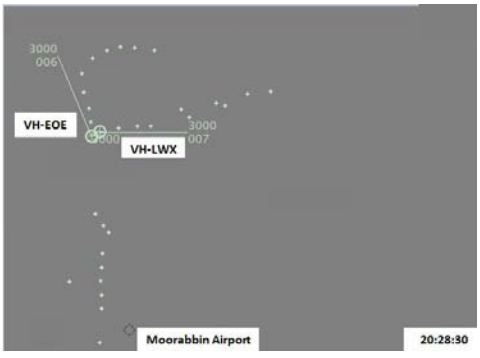
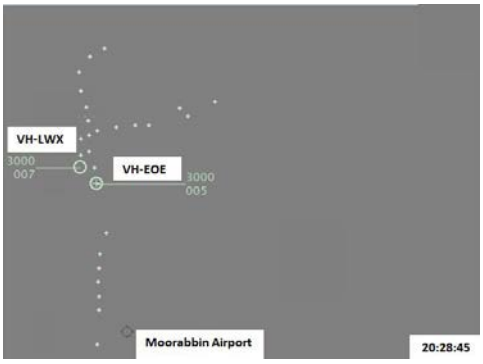


Figure 6



Source: Airservices Australia

Air traffic services at Moorabbin Airport

During daylight-saving time, Class D air traffic services (ATS) were provided at Moorabbin Airport until 2200 on Tuesdays and Wednesdays. On other weekdays, ATS was provided until 2100 and on weekends and public holidays, until 1900. Moorabbin ATC limited the number of aircraft in the circuit at night to eight[7] by requiring aircraft wishing to operate in the circuit to obtain a start clearance.

Flying training at Moorabbin

Up to 13 flying training organisations operate at Moorabbin. Although there may not be a requirement for night flying during all types of training, the majority include night flying as part of the syllabus.

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[7] At the time of the incident, there were six aircraft operating in the circuit.

The CASA produced *Flight Instructor Manual (Aeroplane)* included a chapter on night flying and noted that a pre-flight briefing should include the number of aircraft engaged in night flying at a given time.

On the evenings when air traffic services were not available at Moorabbin, the Aviation Information Publication (AIP)[8] Australia stated that the airspace became Class G[9] and common traffic advisory frequency (CTAF)[10] procedures applied. The AIP further stated that, during CTAF operations, the number of aircraft in the circuit was limited to five and that circuits were not permitted after 2200 on weekdays and 2100 on weekends and public holidays.

Pilot comments (VH-EOE)

The instructing pilot of EOE commented that the aircraft's landing light may have been off for training purposes. Additionally, he commented that there was a lot of aircraft in the circuit with constant radio traffic at the time of the incident, and that the circuit pattern was wider than normally expected. The instructing pilot also commented that the preference was to send students solo for night circuits only on those nights when air traffic services were provided, resulting in a concentration of traffic on those nights.

Pilot comments (VH-LWX)

The pilot of LWX commented that he did not see EOE until after the other pilot had broadcast that he was descending. Stretching up in his seat, he then observed EOE appear from underneath the cowl of his aircraft. Additionally, he commented that the provision of a sequence number[11] may have aided his situational awareness. He added that an all stations broadcast by Moorabbin ATC of the number of aircraft in the circuit at a regular interval may also have assisted the pilot to maintain situational awareness.[12]

ATSB investigation 200203449

The Australian Transport Safety Bureau (ATSB) investigation into a midair collision at Moorabbin airport in 2002 involving two C172 aircraft found that one of the aircraft misidentified the aircraft it was following onto final at night. However, that collision occurred when air traffic services were not provided. The investigation report is available at www.atsb.gov.au/publications/investigation_reports/2002/aair/aair200203449.aspx

ATSB comment

The *Review of Midair Collisions Involving General Aviation Aircraft in Australia between 1961 and 2003*, published by the ATSB, found that most of the midair collisions in Australia had occurred in the circuit area, and a high proportion of those on the final approach or the base-to-final turn. Although the review noted that there was a wide variety of contributing factors in the collisions with no dominant factors, the circumstances of a majority of the collisions were consistent with the inherent difficulties in sighting aircraft in time to avoid a collision.

The review is available at www.atsb.gov.au/publications/2004/review_of_midair_collisions.aspx

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8 AIP – A package of documents that provides the operational information necessary for the safe and efficient conduct of national (civil) and international air navigation throughout Australia and its Territories.

9 Class G – IFR and VFR flights are permitted and do not require an airways clearance. IFR flights must communicate with air traffic control and receive traffic information on other IFR flights and a flight information service. VFR flights receive a flight information service if requested.

10 CTAF – Common traffic advisory frequency is the frequency on which pilots operating at a non-towered aerodrome should make positional radio broadcasts.

11 Airservices Australia clarified with the ATSB that sequence numbers were not required as per the AIP ENR 1.1 paragraph 15.1.3 and that sequence numbers were normally provided by ATC (particularly during rapidly changing landing sequence in a busy circuit) unless there was the possibility of confusion amongst aircraft.

12 Airservices Australia advised that they considered that such a procedure was not compatible with current ATC procedures and the impact on pilot situational awareness had not been validated.

Safety action

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

Operator of VH-LWX

As a result of this occurrence, the operator of LWX has advised the ATSB that they have implemented a night-flying checklist to record details briefed to students on expected flight conditions and traffic densities.

Operator of VH-EOE

As a result of this occurrence, the operator of EOE has advised the ATSB that they have implemented a procedure to liaise with other training organisations at Moorabbin to determine the number of aircraft programmed for night circuits.

Safety message

The following ATSB reports provide further information on aircraft proximity events at Moorabbin.

- AO-2012-099 – Aircraft proximity event – two Cessna 172s, VH-EWE and VH-EOP at Moorabbin airport on 19 July 2012, available at www.atsb.gov.au/publications/investigation_reports/2012/aair/ao-2012-099.aspx
- AO-2012-111 – Airspace related event between Cessna 172, VH-EPB and Piper Warrior, VH-BZE, Moorabbin Airport, Victoria on 27 August 2012, available at www.atsb.gov.au/publications/investigation_reports/2012/aair/ao-2012-111.aspx
- AO-2012-159 – Aircraft proximity event between two Piper PA-28 aircraft, VH-LXH and VH-TAU at Moorabbin Airport, Victoria, 26 November 2012, available at www.atsb.gov.au/publications/investigation_reports/2012/aair/ao-2012-159.aspx

The CASA *Flight Instructor Manual (Aeroplane)* is available at www.casa.gov.au/scripts/nc.dll?WCMS:STANDARD::pc=PC_90306

General details

Occurrence details

Date and time:	19 March 2013– 2028 EDT	
Occurrence category:	Serious incident	
Primary occurrence type:	Airprox	
Location:	Moorabbin Airport, Victoria	
	Latitude: 37° 58.55' S	Longitude: 145° 06.13' E

Cessna 172R, VH-LWX

Manufacturer and model:	Cessna Aircraft Company 172R	
Registration:	VH-LWX	
Type of operation:	Flying training – solo	
Persons on board:	Crew – 1	Passengers – Nil
Injuries:	Crew – Nil	Passengers – Nil
Damage:	Nil	

Cessna 172S, VH-EOE

Manufacturer and model:	Cessna Aircraft Company 172S	
Registration:	VH-EOE	
Type of operation:	Flying training – dual	
Persons on board:	Crew – 2	Passengers – Nil
Injuries:	Crew – Nil	Passengers – Nil
Damage:	Nil	

Aircraft proximity event between a Piper PA-28, VH-TXH and a Cessna 172S, VH-EWX

What happened

Moorabbin Airport

Source: Google earth

On 22 March 2013, circuits were being conducted to both runway 31 Left (31L) and 31 Right (31R) at Moorabbin Airport, Victoria. The aircraft in the two circuits were operating on different frequencies and being controlled by different air traffic controllers under the visual flight rules (VFR).[1]

At about 1625 Eastern Daylight-saving Time,[2] a Cessna 172S aircraft, registered VH-EWX (EWX), entered the Moorabbin control zone from the south-east and was instructed to track for base as number 1 in the landing sequence for runway 31R. Another aircraft, a Piper PA-44 aircraft, had been instructed to follow EWX as number 2 and a Piper PA-28 aircraft, registered VH-TXH (TXH), was number 3. A number of aircraft were operating to the west of Moorabbin in the circuit for runway 31L.

As EWX approached base, at about 1626, the pilot became aware of TXH in his 2 o'clock[3] position, tracking contrary to the runway 31R circuit pattern (Figure 1). TXH was observed to pass under the nose of EWX, about 100 to 150 m in front and about 50 ft below. To avoid the other aircraft and to keep it in sight, the pilot of EWX turned to track behind and subsequently follow TXH. As the pilot executed this manoeuvre, Moorabbin Tower broadcast a safety alert.

TXH crossed the runway centreline for both runway 31R and 31L before joining final for runway 31R from the west. Both aircraft subsequently landed without further incident.

Pilot comments (VH-TXH)

The pilot of TXH held a student pilot licence and was conducting solo circuit training. He had about 65 hours flying experience and had not flown in the previous 3 weeks. The pilot reported that he had not conducted a pre-flight brief with his instructor regarding operations on runway 31 and felt apprehensive, as he had only once operated on that runway. As the pilot was unfamiliar with the runway in use, he took time to note down headings for the various legs of the runway 31 circuit. Also, the pilot had initially taxied out in another aircraft, but had to return it due to an unserviceability, before being assigned TXH.

The pilot believed he may have inadvertently aligned his circuit with the runway 35 direction and that, when he turned base he had already crossed the centreline for runway 31R and 31L. He stated he could not conduct a 'go around' as he was well past the position from where such a manoeuvre could be commenced. The pilot reported seeing no traffic at the base position or subsequently.

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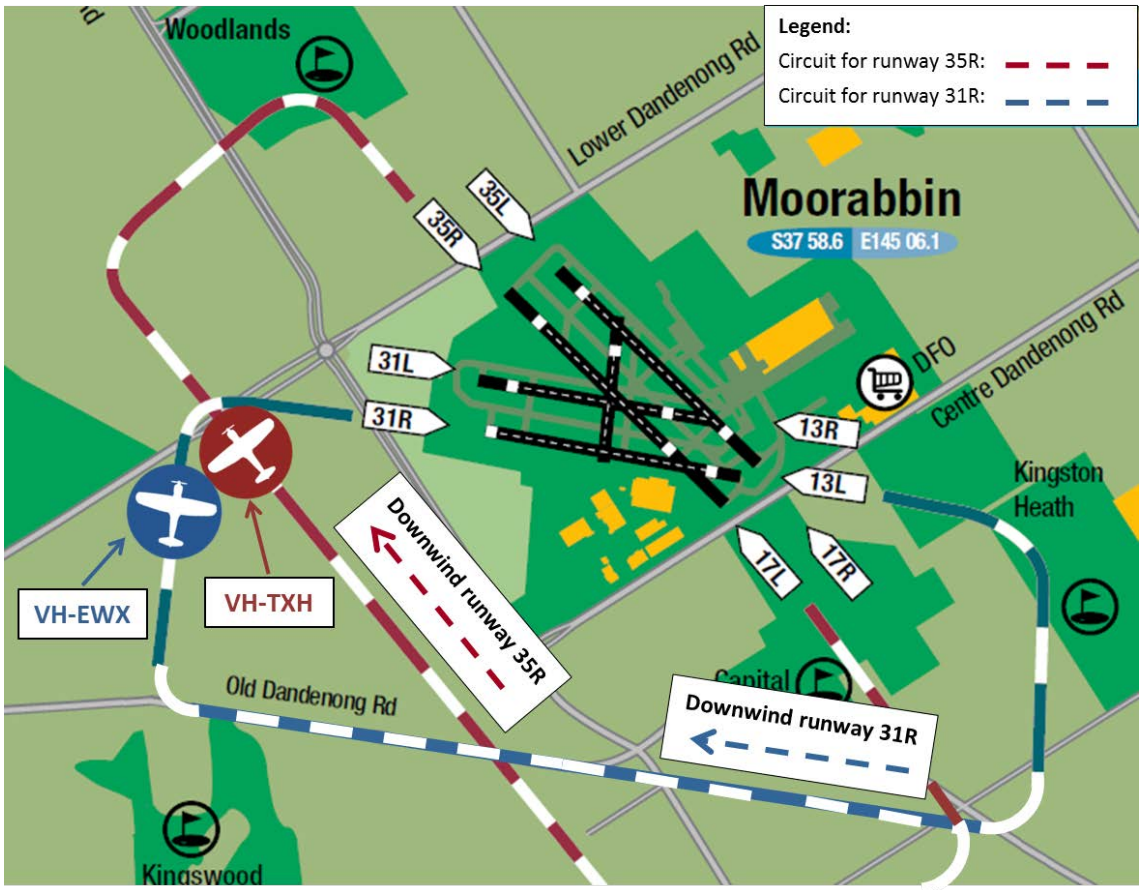
1 Visual flight rules (VFR) are a set of regulations which allow a pilot to only operate an aircraft in weather conditions generally clear enough to allow the pilot to see where the aircraft is going.

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

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

Figure 1: Approximate positions of VH-TXH and VH-EWX in relation to circuit directions



Source: Civil Aviation Safety Authority

Safety message

While pilots conduct a pre-flight inspection of their aircraft to determine airworthiness, this incident highlights the importance of pilots also assessing their own status. Personal minimums[4] should be considered prior to flight, as well as the impact of stressors such as being unfamiliar with operations from a particular runway or the need to change aircraft due to an unserviceability.

This incident highlights the importance of conducting a self-brief or having a discussion with someone who is familiar with operations when using an unfamiliar airfield or an unfamiliar runway.

The Civil Aviation Safety Authority (CASA) has developed a number of tools to assist in assessing your personal minimums, including PAVE:

- **P**ilot,
- **A**ircraft,
- en**V**ironment, and
- **E**xternal pressures.

CASA's *Flight Planning Kit*, that includes information about PAVE, was designed to assist low-hour VFR pilots with good flight planning habits and is available from the CASA Online Store. Such a checklist enables a pilot to determine if they are physically and mentally prepared for a flight.

The following links provide additional information on operations at Moorabbin and on the impact of stress in the aviation environment.

[4] Personal minimums are conditions, pre-determined by the pilot, which must be met if a flight is to proceed.

- *Class D Airspace Procedures* is available at www.casa.gov.au/scripts/nc.dll?WCMS:STANDARD::pc=PC_100101
- *On Track* is available at www.casa.gov.au/scripts/nc.dll?WCMS:STANDARD::pc=PC_100138
- *Visual Pilot Guides* are available at www.casa.gov.au/scripts/nc.dll?WCMS:STANDARD::pc=PC_90007

The CASA Online Store is available at www.casa.gov.au/scripts/nc.dll?WCMS:STANDARD::pc=PC_91316

The Federal Aviation Authority (FAA) has extensive training material and their Airman Education Program (Human Factors Series) includes *Stress in the Aviation Environment* and is available at www.faa.gov/pilots/training/airman_education/hf_videos/

General details

Occurrence details

Date and time:	22 March 2013 – 2245 EST	
Occurrence category:	Serious incident	
Primary occurrence type:	Airprox	
Location:	Moorabbin Airport, Victoria	
	Latitude: 37° 58.55' S	Longitude: 145° 06.13' E

Piper PA-28-161, VH-TXH

Manufacturer and model:	Piper Aircraft Corporation PA-28-161	
Registration:	VH-TXH	
Type of operation:	Flying training – solo	
Persons on board:	Crew – 1	Passengers – Nil
Injuries:	Crew – Nil	Passengers – Nil
Damage:	Nil	

Cessna 172S, VH-EWX

Manufacturer and model:	Cessna Aircraft Company 172S	
Registration:	VH-EWX	
Type of operation:	Flying training – solo	
Persons on board:	Crew – 1	Passengers – Nil
Injuries:	Crew – Nil	Passengers – Nil
Damage:	Nil	

Operation below minimum safe altitude involving Aero Commander, VH-TQA

What happened

An Aero Commander 500

Source: Roel van der Velpen

On 11 April 2013, at about 0851 Eastern Standard Time,[1] an Aero Commander 500-U aircraft, registered VH-TQA (TQA), departed Townsville, Queensland on a private flight to Moorabbin, Victoria, under the instrument flight rules (IFR).

Prior to taxiing, the pilot received a clearance from Townsville air traffic control (ATC)[2] to depart via the runway 19 TOWNSVILLE SOUTH THREE standard instrument departure (SID). Due to the proximity of Mount Stuart[3] and Restricted Areas 'R768A' and 'R768B'[4] (Figure 1), the SID required the pilot to turn left onto a track of 105°when at 1 NM; ATC will then issue radar vectors according to the flight planned track and other traffic at the time.

The pilot was familiar with operations at Townsville, but as he had not previously flown the TOWNSVILLE SOUTH THREE SID, he briefed himself on the departure and noted the requirement to turn left at 1 NM. After takeoff, while passing through 200 ft, the pilot attempted to establish communications with Townsville Approach ATC,[5] but no response was received. The Approach controller reported that they did not hear this call.

At about 0853, while passing through 400 ft, the pilot checked his radios to confirm the correct frequency had been selected. At the same time, the Tower controller alerted the Approach controller that TQA did not appear to be turning left at 1 NM, as per the SID. As TQA passed through 500 ft, the pilot attempted again to contact the Approach controller. The Approach controller responded and was about to question the pilot regarding the aircraft's track, when he noted that TQA's predicted tracking line on the radar display indicated that a turn in the direction of the SID had commenced. The controller stopped the rest of this response and advised the pilot to 'disregard'. The pilot reported that the controller's abnormal response had distracted him.

At the same time, while in visual meteorological conditions (VMC)[6] and encountering moderate turbulence, the pilot noted a disparity between the aircraft's two engine power gauges. Believing the aircraft may have had a partial engine failure, the pilot commenced his troubleshooting actions. He determined that the difference in indications had been caused by the turbulence.

When at about 3 NM from the airport, the Approach controller noted that the aircraft's predicted tracking line had changed and was pointing to the south, indicating the aircraft was not on the SID.

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1 Eastern Standard Time (EST) was Coordinated Universal Time (UTC) + 10 hours.

2 At Townsville, ATC is provided by the Department of Defence.

3 Mount Stuart has an elevation 2,422 ft AMSL.

4 A Notice to Airman (NOTAM) advised that Restricted Area R768B was active from 0700 until 1600 on 11 April 2013. This restricted area applied from 2,000 – 3,000 ft AMSL.

5 The same controller handles both Approach and Departure procedures at Townsville Airport, but is addressed as Townsville Approach.

6 Visual meteorological conditions is an aviation flight category in which visual flight rules (VFR) flight is permitted – that is, conditions in which pilots have sufficient visibility to fly the aircraft maintaining visual separation from terrain and other aircraft.

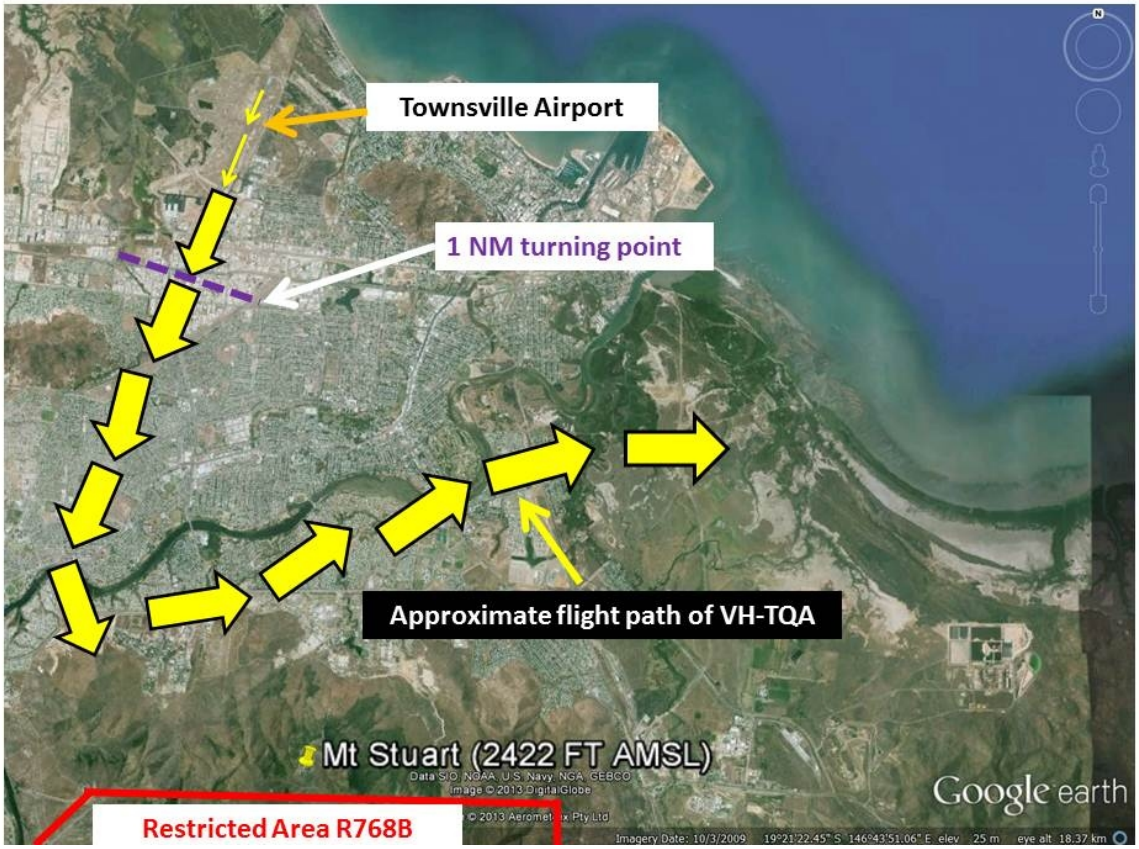
The Approach controller reminded the pilot of the SID requirement to turn onto a track of 105° at 1 NM.

The pilot misunderstood this comment to be a radar vector, read back 'left 105°' and commenced a turn onto that heading. The aircraft was now in instrument meteorological conditions (IMC)[7] and approaching 4 NM south of the airport. At that time, the aircraft was 1,500 ft below the radar terrain clearance chart (RTCC) step.

Shortly after, the Tower controller suggested to the Approach controller that a safety alert be issued. The Approach controller then issued a restricted airspace alert to the pilot. He also reminded the pilot that the lowest safe altitude (LSALT)[8] for the area was 3,500 ft, which the pilot acknowledged, advising TQA was now climbing through 2,500 ft.

As TQA continued to climb, the Approach controller vectored the aircraft back on track and then cleared the pilot to resume his own navigation.

Figure 1: Approximate flight path of VH-TQA



Source: Google earth

Pilot comments

The pilot of TQA could not recall the Notices to Airman (NOTAMs) advising of the Restricted Area R768B being active at the time. The pilot stated that the turn at 1 NM DME was not conducted as he had become distracted by the abnormal broadcast made by the Approach controller and the apparent engine issue.

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7 Instrument meteorological conditions describes weather conditions that require pilots to fly by reference to instruments, and therefore under Instrument Flight Rules (IFR), rather than by outside visual reference.

8 The segment minimum altitude for radar vectoring is 3,500 ft, however the minimum safe altitude (MSA) within 10 NM of the Townsville VOR is 3,600 ft.

Meteorological information

The Bureau of Meteorology (BoM) area 44 aviation weather forecasts ARFOR, which included Townsville, was valid until 1000 on 11 April 2013. It forecast moderate turbulence below 6,000 ft above mean sea level (AMSL) around coastal areas north of Mackay, which included Townsville.

Forecast weather[9]	**Actual weather**[10]
Light showers of rain	Heavy rain
Visibility of 10 km	Visibility reduced to 5,000 m
Scattered cloud at 1,400 ft	Broken cloud at 2,100 ft
Broken cloud at 2,500 ft and 4,000 ft	Overcast at 3,000 ft

Air Traffic Services provider

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

- the Approach controller did not hear TQA call on frequency the first time
- it is common for the radar to show fluctuations in the aircraft's predicted track when an aircraft is just airborne on departure
- due to the abnormal response by the Approach controller to the second transmission from the pilot, the pilot was distracted
- the Tower controller suggested to the Approach controller that he issue a safety alert to the pilot
- the Approach controller did not check at any time, that the pilot was visual.

Safety message

This incident reinforced the need for ATC to remain vigilant and be proactive by responding promptly to any observed abnormal tracking or situation, and the importance of issuing an immediate safety alert when they become aware that an aircraft is in a situation that is considered to place it in unsafe proximity to terrain, obstructions, active restricted or prohibited areas, or other aircraft.

The incident further highlighted the importance of maintaining situational awareness. There is a substantial amount of aviation related situational awareness research. Much of this research supports loss of situational awareness mitigation concepts. These include the need to be fully briefed, in order to completely understand the particular task at hand. That briefing should also include a risk management or threat and error management assessment. Forewarned is considered being forearmed. Another important mitigation strategy is distraction management. It is important to minimise distraction, however if a distraction has occurred during a particular task, to 'back up 'a few steps, and check whether the intended sequence has been followed. A chapter dedicated to situation awareness is available in the book:

Flin, R., O'Connor, P., & Chrichton, M. (2008). Safety at the Sharp End: A Guide to Non-Technical Skills. Chapter 2.

While pilots are taught to 'aviate, navigate and communicate' when prioritising actions, this incident highlighted the importance of pilots alerting ATC as soon as possible, when a potential failure, error or malfunction presents itself. A recent Airservices Australia Safety Bulletin highlights different scenarios where early advice from the pilot to ATC, could have allowed for more timely and informed assistance and conflicting traffic management service.

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[9] The terminal area forecast (TAF) for Townsville Airport, valid from 0700 to 2000 on 11 April 2013.

[10] The automated airport special weather report (SPECI) at 0500.

The safety bulletin can be found at:
www.airservicesaustralia.com/wp-content/uploads/Safety-Bulletin-April-2013_Early-Advice.pdf

The ATSB produced an Aviation Research paper covering a range of occurrences from the 1997 to 2004 period. This research found that the majority of over 500 occurrences studied, involved pilot distraction. The analysis highlighted that distractions can arise unexpectedly, during periods of high or low workload, and during any phase of flight. Furthermore, distractions can affect a pilot operating in any type of organisation, from general aviation through to major airlines. The report can be found at www.atsb.gov.au/publications/2005/distraction_report.aspx

General details

Occurrence details

Date and time:	11 April 2013 – 0853 EST	
Occurrence category:	Incident	
Primary occurrence type:	Operational non-compliance	
Location:	7 km south of Townsville Airport, Queensland	
	Latitude: 19° 19.13' S	Longitude: 146° 45.35' E

Aircraft details

Manufacturer and model:	Aero Commander 500-U	
Registration:	VH-TQA	
Type of operation:	Private	
Persons on board:	Crew – 1	Passengers – Nil
Injuries:	Crew – Nil	Passengers – Nil
Damage:	Nil	

TCAS warning between a Cessna 310R, VH-AEY and a Fokker F28-100, VH-FKJ

What happened

On 22 May 2013, at about 0710 Western Standard Time,[1] an Alliance Airlines Fokker F28-100 (F100) aircraft, registered VH-FKJ (FKJ), was approaching Karratha, Western Australia, on a scheduled passenger flight from Perth. FKJ tracked to approach Karratha on the 204 radial,[2] 11 NM behind a Boeing 717 (B717).

At 0714, a Cessna 310R (C310) aircraft, registered VH-AEY (AEY), departed Karratha on a charter flight to Exmouth, under the visual flight rules (VFR). During the climb, Karratha Tower air traffic control (ATC) instructed the pilot of AEY to track to intercept the 180 radial outbound, for segregation with the inbound F100.

At 0717, FKJ was approaching 21 NM from Karratha and 7,000 ft on descent, when the flight crew were cleared to make a visual approach and track to the airport. FKJ was 10 NM behind the B717 which was conducting an approach to a 5 NM final for runway 08.

At 0718, ATC provided the pilot of AEY with traffic information on an F100 aircraft on approach to Karratha, on the 204 radial at about 13 NM. The pilot replied that the traffic had been sighted in the 2 o'clock[3] position. The pilot was then instructed by the controller to pass behind that aircraft and track direct to Exmouth. The pilot believed at this stage that the B717 was the aircraft AEY was to pass behind and as AEY was well clear of that aircraft, the pilot commenced tracking to Exmouth. AEY was climbing and passing through about 2,500 ft.

At 0719, AEY appeared on the traffic collision avoidance system (TCAS)[4] display in FKJ as proximity traffic. At this time, FKJ had left 6,000 ft on descent and was tracking to a 5 NM final. As AEY came within 5 NM on the TCAS display, the crew levelled the aircraft off at about 4,000 ft, as a precaution.

The crew of FKJ then received a TCAS traffic advisory (TA).[5] Neither of the crew sighted AEY, which was climbing and approaching 4,000 ft.

At about the same time, the pilot of AEY made a visual scan and saw the F100 (FKJ) coming towards AEY in a 10 o'clock, high, position, about 1 to 2 NM away. The pilot pushed forward on the control column and the aircraft descended about 200 ft as FKJ passed overhead. At 0720, the crew of FKJ received a TCAS resolution advisory (RA)[6] climb instruction, which they complied with. The TCAS display showed that AEY passed about 700 ft below FKJ (Figure 1).

FKJ landed without further incident.

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

2 A radial is a magnetic bearing from a navigation aid or station.

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

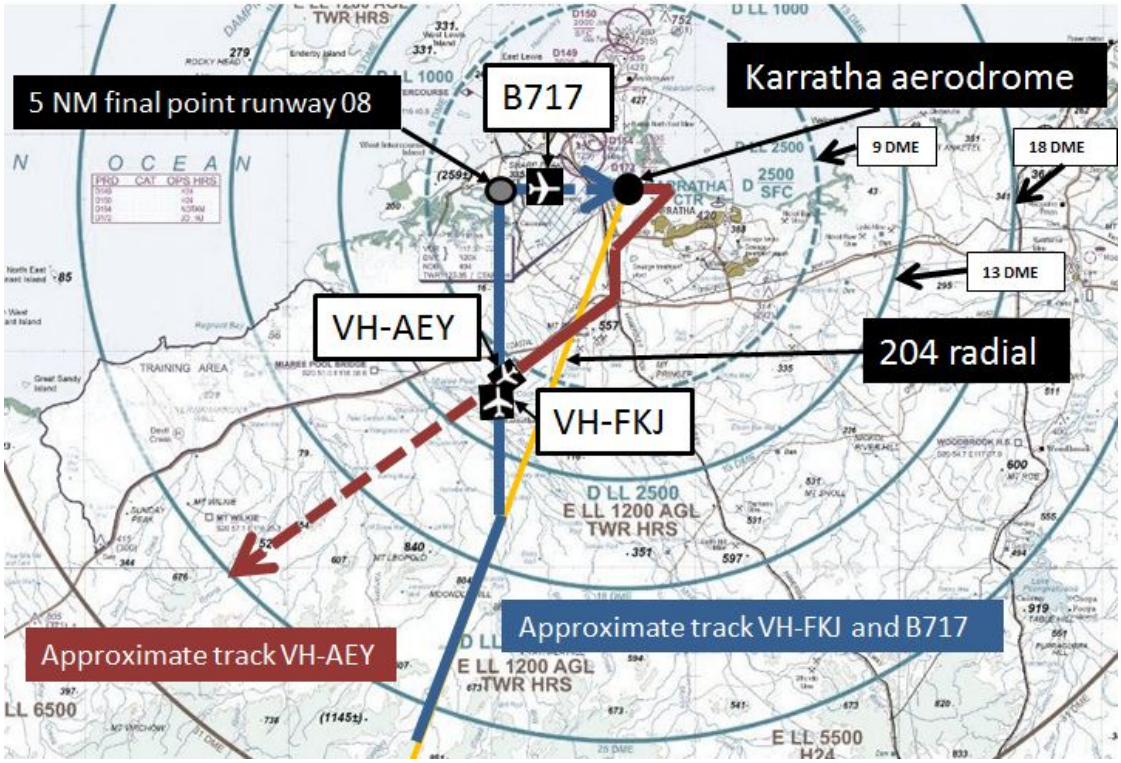
4 TCAS is an aircraft collision avoidance system. It monitors the airspace around an aircraft for other aircraft equipped with a corresponding active transponder and gives warning of possible collision risks.

5 When a TA is issued, pilots are instructed to initiate a visual search for the traffic causing the TA.

6 When an RA is issued pilots are expected to respond immediately to the RA unless doing so would jeopardize the safe operation of the flight.

At the time of the incident, there were two controllers in Karratha Tower; the second one was assisting by using binoculars to sight inbound aircraft. Karratha Tower had one radio with some over-transmissions at the time.

Figure 1: Approximate positions of the B717, VH-FKJ and VH-AEY at 0720



Source: Airservices Australia and pilot recollections

Pilot comments (VH-AEY)

The pilot reported that the B717 had been misidentified as the F100, resulting in believing that separation was being maintained. The pilot commented that if traffic information had been provided by ATC on the B717, the F100 may have been correctly identified.

Air traffic controller comments

The air traffic controllers provided the following comments:

- The traffic level at Karratha at the time of the incident was moderate and they were focused on separating the two instrument flight rules IFR aircraft.
- After instructing AEY to turn right to intercept the 180 radial, neither of the controllers saw AEY again to confirm its position.
- When the pilot of AEY advised that the traffic had been sighted in the 2 o'clock position, this fitted in with the controller's mental picture of where they expected FKJ to be, if AEY was established on the 180 radial.
- The controllers did not consider the B717 to be relevant traffic for AEY, as AEY was not in conflict with the B717. However, given the similar appearances of the F100 and B717, in hindsight, advising AEY that there was a second jet, the B717, on early right base may have enabled the pilot to distinguish between the two aircraft.
- ATC is only required to provide traffic information to VFR aircraft, but they try to offer additional service by keeping the IFR aircraft out of conflict with VFR aircraft.
- The controller stated that in future, rather than giving an instruction to pass behind the traffic, he would continue the aircraft outbound on the 180 radial and request the pilot to report at 10 NM before turning to intercept the track to Exmouth.

Safety action

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

Operator of VH-AEY

As a result of this occurrence, the operator of AEY advised the ATSB that they have asked their pilots conducting VFR flights from Karratha to request an ATC clearance to depart at 1,500 ft until 10 NM, before climbing and turning to intercept the planned track.

Operator of VH-FKJ

As a result of this occurrence, the operator of FKJ discussed with company pilots, the need to maintain see-and-avoid principles when approaching an airport. This will be reviewed regarding an upcoming company flight safety awareness publication.

Safety message

Traffic information should include relevant and sufficient information to enable pilots to identify the aircraft. The content of traffic information passed to an aircraft is based on a controller's judgement of what is relevant.

In this incident, the benefits of TCAS are highlighted as the jet aircraft involved had a TCAS and the other aircraft had an operational transponder. This demonstrates the importance of aircraft having operational transponders.

Pilots need to be aware of the limitations of the see-and-avoid principle, particularly when operating in Class D airspace. This incident highlights the importance of listening and communicating. The ATSB publication, *Limitations of the See-and-Avoid Principle* is available at: www.atsb.gov.au/publications/2009/see-and-avoid.aspx

Further information on Class D airspace, including the Class D airspace booklet and eLearning tutorials, is available from the Civil Aviation Safety Authority (CASA) at: www.casa.gov.au/scripts/nc.dll?WCMS:STANDARD:611458872:pc=PC_93379

General details

Occurrence details

Date and time:	22 May 2013 – 0720 WST	
Occurrence category:	Incident	
Primary occurrence type:	TCAS	
Location:	Karratha, Western Australia	
	Latitude: 20° 42.73' S	Longitude: 116° 46.40' E

Cessna 310, VH-AEY

Manufacturer and model:	Cessna Aircraft Company 310R	
Registration:	VH-AEY	
Type of operation:	Charter – passenger	
Persons on board:	Crew – 1	Passengers – Nil
Injuries:	Crew – Nil	Passengers – Nil
Damage:	Nil	

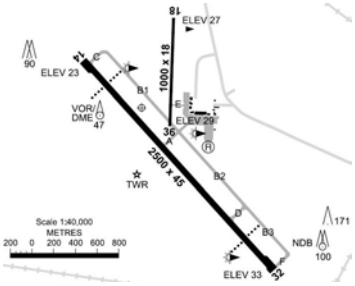
Fokker F28-100, VH-FKJ

Manufacturer and model:	Fokker F28-100	
Registration:	VH-FKJ	
Operator	Alliance Airlines	
Type of operation:	Air transport – high capacity	
Persons on board:	Crew – 4	Passengers – 78
Injuries:	Crew – Nil	Passengers – Nil
Damage:	Nil	

Runway incursion involving a Piper PA-31, VH-KLS and a vehicle

What happened

Port Hedland Airport



Source: Airservices Australia

On 27 May 2013 at 1512 Western Standard Time,[1] the pilot of a Piper PA-31 aircraft, registered VH-KLS (KLS), taxied for departure from runway 32 at Port Hedland for a flight to Karratha, Western Australia. The pilot made the necessary common traffic advisory frequency (CTAF) broadcast.

At about 1517, an aviation rescue and fire fighting (ARFF) vehicle that had been operating on the eastern side of the airport entered taxiway Bravo to return to the fire station on the western side. The fire crew made a CTAF broadcast at 1518, stating that they intended to cross runway 32 from taxiway Alpha. Hearing no response to the broadcast and seeing no aircraft on the runway, the fire vehicle crossed runway 32.

The pilot of KLS taxied onto the threshold of runway 32 and commenced the take-off roll and the pilot reported making the required CTAF broadcasts. At about 1518, as KLS became airborne, the pilot observed the fire vehicle crossing the runway about 500 m ahead (Figure 1). As the aircraft was airborne, the pilot assessed the safest action was to continue the takeoff and the aircraft passed over the intersection between runway 32 and taxiway Alpha between 300 and 400 ft above ground level. By the time KLS crossed the intersection the fire vehicle was clear of the runway.

The crew of the fire vehicle had not heard any CTAF broadcasts from KLS nor did they see the aircraft when they scanned the runway prior to crossing, possibly due to heat haze. The pilot of KLS had not heard the CTAF broadcast made by the crew of the fire vehicle.

Aerodrome frequency response unit

Some non-towered aerodromes[2] have a facility known as an aerodrome frequency response unit (AFRU)[3] installed. The purpose of an AFRU is to provide an automatic response to CTAF broadcasts to indicate to an operator that the correct radio frequency had been selected and to confirm the operation of the radio's transmitter and receiver, and the volume setting.

If a broadcast has not been made on the CTAF in the preceding 5 minutes, the AFRU will respond to the next transmission over 2 seconds in length with a voice identification, for example, 'Port Hedland CTAF'. If a broadcast has been made in the previous 5 minutes, a 300 millisecond tone or 'beep' is broadcast by the AFRU.

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

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

3 See Aeronautical Information Publication GEN 3.4 paragraph 3.4.

Figure 1: Port Hedland Airport showing the path of VH-KLS (green) and the fire vehicle (yellow)

Source: Google earth

CTAF recordings

The ATSB examined recordings of the transmissions broadcast on the Port Hedland CTAF. That examination revealed that between 1512 and 1521, a number of transmissions were made by the pilot of KLS and the crew of the fire vehicle. However, broadcasts reported by the pilot of KLS to have been made near the runway 32 threshold were not recorded.

The recordings showed that, following the taxi broadcast by the pilot of KLS, the ARFU voice identification was heard, indicating that no broadcasts had been made on the CTAF in the preceding 5 minutes. Following the broadcast by the crew of the fire vehicle, a 'beep' was heard, indicating that a broadcast had been made on the CTAF within the preceding 5 minutes.

Aviation rescue and fire fighting service

At the time of the incident, the Port Hedland ARFF service was in 'setup mode' in preparation for approval by the regulator. The crew of the fire vehicle were using a portable radio as the radio mounted in the vehicle had not been programmed to the correct frequency. An investigation by the Airservices Australia determined that the transmission power of the portable radios was lower than the radios mounted in the vehicle. The investigation also noted that a radio dead zone[4] may exist in the vicinity of the runway 32 threshold.

[4] Dead zone – an area within range of a radio transmitter in which the signal is not received.

Safety action

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

Airservices Australia

As a result of this occurrence, the Airservices Australia has advised the ATSB that they intend to take the following safety actions:

- Will release a national operational safety note advising ARFF operators of the efficient use of aviation radio communications when driving on an airfield.
- Will undertake a comprehensive review of aviation radio coverage at Port Hedland as part of radio commissioning works. Any identified radio coverage deficiences will be monitored by the service provider until resolution.

Safety message

As well as the intended purpose of an AFRU, the voice identification and 'beep' features can provide those that operate on a CTAF with an awareness of other operators. If the crew of the fire vehicle had been aware of the difference in AFRU responses, they may have delayed crossing runway 32 and made another broadcast on the CTAF to identify the operator that had broadcast within the preceding 5 minutes.

The ATSB SafetyWatch highlights the broad safety concerns that come out of our investigation findings and from the occurrence data reported to us by industry. Two reports relating to safety concerns around non-towered aerodromes, *Safety in the vicinity of non-towered aerodromes* and *A pilot's guide to staying safe in the vicinity of non-towered aerodromes*, are available at www.atsb.gov.au/publications/2008/ar-2008-044(2).aspx

General details

Occurrence details

Date and time:	27 May 2013 – 1520 WST	
Occurrence category:	Incident	
Primary occurrence type:	Runway incursion	
Location:	Port Hedland Airport, Western Australia	
	Latitude: 20° 22.67' S	Longitude: 118° 37.58' E

Aircraft details

Manufacturer and model:	Piper Aircraft Corporation PA-31	
Registration:	VH-KLS	
Type of operation:	Aerial work – test and ferry	
Persons on board:	Crew – 1	Passengers – Nil
Injuries:	Crew – Nil	Passengers – Nil
Damage:	Nil	

Airport fire vehicle details

Registration:	Tender 1	
Type of operation:	Aviation rescue and fire fighting	
Persons on board:	Crew – 2	Passengers – Nil
Injuries:	Crew – Nil	Passengers – Nil
Damage:	Nil	

Total power loss involving a Mooney M20J, VH-NFP

What happened

Canberra Airport

Source: Google earth

On 2 June 2013, the pilot of a Mooney M20J aircraft, registered VH-NFP (NFP), conducted his pre-flight checks at Canberra Airport, Australian Capital Territory for a private flight to Albury, New South Wales under the visual flight rules (VFR). The pilot was the sole person onboard.

The pilot had refuelled the aircraft in Albury on the previous flight and reported that the bowser had been surging, turning on and off and pumping air. As it had rained at Canberra Airport earlier in the morning, the pilot paid particular attention to conducting pre-flight fuel drains and checking for water, with none found.

During the take-off run, at about 1038 Eastern Standard Time,[1] the pilot reported that all cockpit indications were normal, the aircraft obtained full power and achieved the expected rotate speed followed by a positive rate of climb.

The pilot retracted the landing gear at about 100 ft above ground level. Within seconds of retracting the gear, the engine stopped. The pilot lowered the landing gear, switched fuel tanks and lowered the aircraft nose to increase airspeed. While he was conducting emergency checks, the aircraft descended and landed on the runway heavily on the left wing and landing gear, with the propeller striking the ground (Figure 1).

The aircraft rolled along the runway and stopped just past the intersection of the crossing runway. The aircraft was substantially damaged and the pilot sustained minor injuries.

An inspection of the aircraft and engine after the accident revealed water in the left wing fuel tank, fuel system and fuel injector lines. The pilot reported that he contacted the Mooney Service Centre and was advised that incorrect re-sealing of the M20 series aircraft fuel tanks could allow 1 to 2 litres of water to be retained in the wing, which could not be drained.

Figure 1: Left wing damage to VH-NFP

Source: Aircraft owner

[1] Eastern Standard Time (EST) was Coordinated Universal Time (UTC) + 10 hours.

Safety message

This incident highlights the importance of currency in emergency procedures training. A pre-takeoff safety briefing can remind the pilot of the procedure in event of an engine failure at low altitude. Controlling the aircraft at low altitude and maintaining airspeed can reduce the severity of these incidents.

The Australian Transport Safety Bureau publication *Avoidable Accidents No. 3 – Managing partial power loss after takeoff in single-engine aircraft,* available at www.atsb.gov.au/publications/2010/avoidable-3-ar-2010-055.aspx, provides advice on preparing for these incidents.

The Australian Mooney Pilots Association Newsletter August 2006, mooney.org.au/files/AMPA_Newsletter_Aug_2006.pdf has an article regarding fuel tank leaks and re-sealing.

The Civil Aviation Safety Authority *Flight Planning Kit*, available from the online store at www.thomaslogistics.com.au/casa/index.html, provides resources to assist pilots in flight planning.

General details

Occurrence details

Date and time:	2 June 2013 – 1038 EST	
Occurrence category:	Accident	
Primary occurrence type:	Total power loss	
Location:	Canberra Airport, Australian Capital Territory	
	Latitude: 35° 18.42' S	Longitude: 149° 11.70' E

Aircraft details

Manufacturer and model:	Mooney Aircraft Corporation M20J	
Registration:	VH-NFP	
Type of operation:	Private	
Persons on board:	Crew – 1	Passengers – Nil
Injuries:	Crew – 1 (Minor)	Passengers – Nil
Damage:	Substantial	

Aircraft proximity event between a Cessna 172, VH-WYG and a Cessna 185, VH-OZX

What happened

On 6 June 2013, a flight instructor and a student pilot of a Cessna 172 aircraft, registered VH-WYG (WYG), were conducting a navigation training flight from Bankstown to Goulburn, New South Wales. At 1325 Eastern Standard Time,[1] WYG was cleared to take-off from runway 29 Right (29R). Immediately after this, a Cessna 185 aircraft, registered VH-OZX (OZX), was cleared to line up on runway 29 Centre (29C). There was also active circuit traffic using runway 29 Left (29L) at the time.

Bankstown Airport

Source: Airservices Australia

The pilot of OZX was conducting a ferry flight from Bankstown to Moruya and was cleared for takeoff from 29C at 1326, just as WYG became airborne on runway 29R. Thirty seconds after this, the pilot of OZX was given WYG as traffic.

OZX then took off and as it climbed through about 600 ft, the pilot lost sight of WYG. When the tower controller asked him whether he still had the Cessna 172 in sight, the pilot of OZX replied in the negative and commenced looking for it to his right. In looking right, the pilot believed he may have rolled the aircraft to the right. OZX then crossed over and above WYG, which was maintaining a track slightly to the north of the extended centreline of runway 29R.

The pilot of OZX reported that he had already reached the departure altitude of 1,000 ft crossing the upwind threshold prior to losing sight of WYG. WYG appeared below him and to his left. The pilot of OZX continued to climb to 1,200 ft to ensure separation with WYG.

WYG was climbing through about 700 to 800 ft above ground level when the instructor sighted OZX above the right wing. He estimated that OZX was then about 30 ft above WYG and 15 m to his right.

At 1327, the tower controller gave OZX as traffic to the pilot of WYG, by which time OZX had passed over WYG.

Pilot comments (VH-WYG)

The flight instructor in WYG stated that he was aware of OZX and had instructed his student to maintain a heading to the right of the centreline of 29R to ensure separation from the aircraft on 29C. He believed that if there had been a short delay prior to the departure of OZX, it would have been easier for the pilots of the two aircraft to maintain visual separation.

Pilot comments (VH-OZX)

The pilot of OZX commented that he did consider staying low to keep WYG in sight but wanted to gain altitude in case of engine failure over the built up area. He believed that OZX would rapidly out climb and overtake WYG. As he had done a lot of formation flying, he did not consider that the aircraft were in an unsafe situation.

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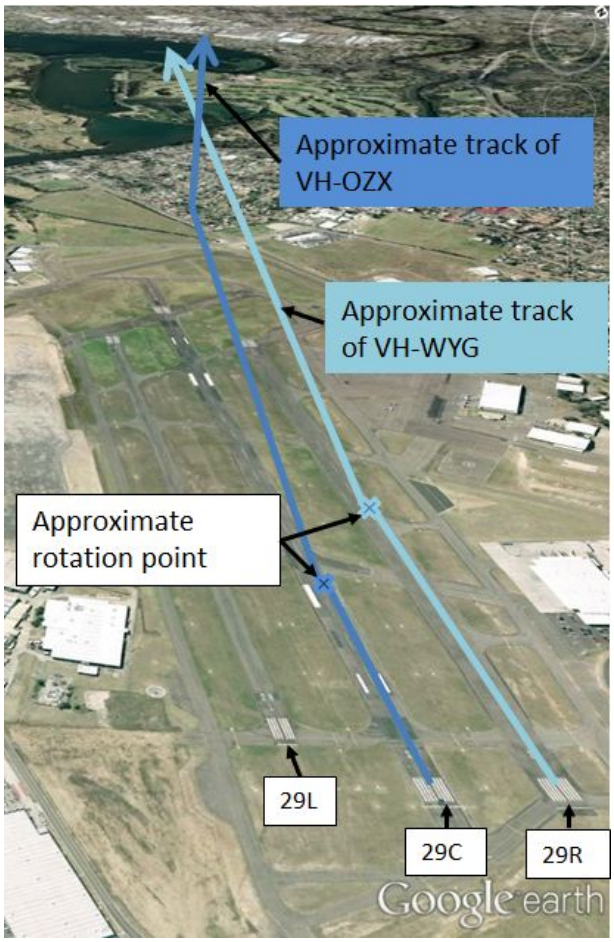
[1] Eastern Standard Time (EST) was Coordinated Universal Time (UTC) + 10 hours.

Figure 1: Bankstown Airport and approximate tracks of VH-WYG and VH-OZX



Source: Google earth

Safety message

In Class D airspace, pilots of visual flight rules (VFR) aircraft are responsible to maintain their separation from other aircraft. It is important to keep other aircraft in sight at all times, irrespective of the aircraft performance. The Class D airspace booklet is available at www.casa.gov.au/wcmswr/_assets/main/pilots/download/classd_booklet.pdf.

General details

Occurrence details

Date and time:	6 June 2013 – 1330 EST	
Occurrence category:	Serious incident	
Primary occurrence type:	Aircraft proximity event	
Location:	Near Bankstown Airport, New South Wales	
	Latitude: 33° 55.47' S	Longitude: 150° 59.30' E

Cessna 172, VH-WYG

Manufacturer and model:	Cessna Aircraft Company 172	
Registration:	VH-WYG	
Type of operation:	Flying training	
Persons on board:	Crew – 2	Passengers – Nil
Injuries:	Crew – Nil	Passengers – Nil
Damage:	Nil	

Cessna 185, VH-OZX

Manufacturer and model:	Cessna Aircraft Company 185	
Registration:	VH-OZX	
Type of operation:	Private	
Persons on board:	Crew – 1	Passengers – Nil
Injuries:	Crew – Nil	Passengers – Nil
Damage:	Nil	

Helicopters

Collision with terrain involving a Bell 412, VH-EMZ

What happened

On 13 June 2013, at about 1924 Eastern Standard Time,[1] a Bell 412 helicopter, registered VH-EMZ (EMZ), departed Horn Island, Queensland on a training flight to Prince of Wales Island, Torres Strait. On board the helicopter was the pilot flying (PF) who was under instruction, a training pilot, and a crewman. The purpose of the flight was to conduct several practice approaches using the 'Nightsun'[2], which was used to illuminate the ground below the helicopter. Each approach was to be conducted to about treetop height, from where a go-around was to be commenced.

VH-EMZ

Source: Helicopter operator

Earlier in the day, during daylight, the crew conducted a flight to the same location. There the training pilot demonstrated the planned Nightsun approach to the pilot under instruction (PUI). They also positioned a strobe light so the target location would be visible on the night flight.

It was a dark night with a small crescent moon and no discernible horizon. At about 1940, EMZ was flown over the strobe light at 2,000 ft and outbound for about 3.2 NM then turned inbound to conduct a practice approach. The crew commenced a 500 ft/min descent from 3 NM, at about 60 kt indicated air speed (IAS), to achieve a ground speed of 45 kt. The approach was reported as stable.

At 1,000 ft above ground level (AGL), the crewman opened and secured the cabin door. Due to the wind rush he did not look outside continuously until reaching about 400 ft AGL.

At 400 ft AGL, and about 0.6 NM from the targeted landing area, the training pilot noted that the IAS was 60 kt with a 500 ft/min rate of descent and the GPS showed a ground speed of 45 kt. The PF looked outside to confirm that the profile and sight picture were correct for a visual approach and adjusted the Nightsun beam onto the landing site. This required the PF to remove his hand from the collective control. He could see the strobe light, which was the target for the approach. The training pilot asked the PF if the sight picture looked correct and if he was okay to continue a visual approach, to which the PF responded that he was.

The training pilot looked out of the cockpit and confirmed that the profile and sight picture were correct to continue a visual approach. When the training pilot looked back inside the cockpit he observed a high rate of descent of about 800 ft/min and he called 'rate of descent'. The training pilot also observed that the IAS was below 35 kt and called 'go around'. The training pilot reported that there was no immediate response so he repeated the call to 'go around'.

The PF reported commencing a go-around and responded 'going around'. The training pilot reported that he felt the collective move. The crewman observed that the helicopter was descending rapidly and approaching the trees and called 'climb, climb, climb'. The descent continued and he again called 'we are going backwards, trees, climb, climb, climb'.

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1 Eastern Standard Time (EST) was Coordinated Universal Time (UTC) +10 hours.

2 The Nightsun is a 30 million candlepower search light used for visual searches at night or night approaches to non-illuminated areas. It is attached under the nose of the helicopter, and is remotely controlled from within the helicopter by a four way switch fitted to the pilot's cyclic control.

The training pilot reported that he took the controls to assist with the go-around and then became aware of the trees in his peripheral vision. The training pilot called ‘brace, brace, brace’ as the helicopter descended into the trees. The helicopter impacted the ground heavily and remained upright. The crew shut down the helicopter. To assist the rescuers in locating the helicopter, the crew discharged flares from the accident site. The crew were uninjured and the helicopter was substantially damaged.

Figure 1: Helicopter at accident site

Source: Helicopter operator

Pilot comments

The PF made the following comments:

- He had conducted Nightsun approaches in the past with a different operator.
- The pre-flight briefing was very comprehensive.
- Everything during the flight was normal until the training pilot called ‘rate of descent’ and then everything happened very quickly.
- On the ground when the flares were used, the smoke from the flares went up to about 200 ft AGL and then could be seen going toward the direction of the landing area. He believed that a tail wind had existed at this height and may have contributed to the accident.
- Night vision goggles may have assisted in conducting the approach.

The training pilot made the following comments:

- He believed that the PF lost situational awareness and as the training pilot, he did not take over control of the helicopter quickly enough.
- A Nightsun approach was demanding and required a high degree of precise flying. It was a two-crew procedure where the non-flying pilot would read the distance and altitude off the instruments every 500 ft and provide information to the flying pilot to maintain direction, a 500 ft/min rate of descent, and a 45 kt ground speed. The flying pilot would make the necessary adjustments to maintain a stabilised approach. A visual approach to the landing area would be commenced at about 500-400 ft AGL, with the non-flying pilot monitoring the instruments.

- The approach had been stable and it had deteriorated very quickly. He believed it was about 5 seconds from when the time he resumed his cockpit scan to being at tree height.
- The helicopter was maintaining about 60 kt IAS and a 45 kt ground speed up until 400 ft AGL and he believed that if a tailwind developed after this point it would not have been more than 5 kt.
- Night vision goggles may have assisted in conducting the approach.

The crewman's role was to provide instructions to guide the pilot to the landing area once the PF lost sight of the strobe beneath the helicopter. His role in providing guidance to the PF normally commenced closer to the landing area and below about 200 ft AGL.

The crewman reported that when he looked out at about 400 ft AGL, the picture did not appear correct. The trees and the ground appeared to be moving forward and to the left, indicating that the helicopter was moving back and to the right. When the go-around was commenced he reported that the backward movement of the helicopter was mostly arrested, but the sideways movement was not.

Operator investigation

The helicopter operator conducted an investigation and determined that:

- The pre-flight briefing was conducted using an uncontrolled and unapproved Standard Operating Procedure.
- The radio altimeter warning alert was not set.
- A combination of task fixation induced loss of situational awareness, a visual illusion effect and spatial disorientation occurred after the helicopter descended through 400 ft which resulted in a high rate of descent and decreasing indicated airspeed.
- The absence of visual aids such as night vision goggles (NVGs) reduced the pilot's ability to avoid the visual illusion effect and spatial disorientation.
- The high rate of descent and decreasing airspeed is hypothesised to have resulted in the onset of an incipient vortex ring state (VRS) in the final stages of flight.
- Due to task fixation induced loss of situational awareness, the pilot flying did not respond to the first go-around call.
- Due to degraded situational awareness, the training pilot did not assume control of the aircraft with sufficient time and height to effectively recover the aircraft from the incipient VRS it had entered.

Vortex ring state

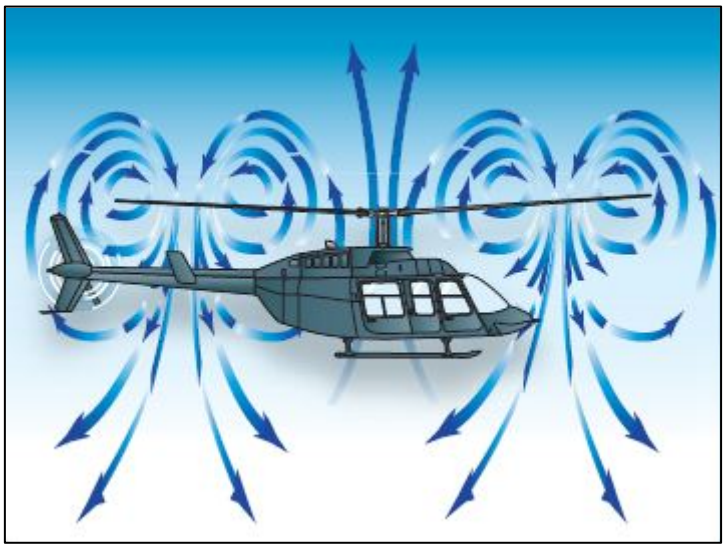
The FAA handbook www.faa.gov/regulations_policies/handbooks_manuals/ describes the vortex ring state or settling with power, as an aerodynamic condition in which a helicopter may be in a vertical descent with 20% to maximum power applied and little or no climb performance.

The following combination of conditions is likely to cause settling in a vortex ring state in any helicopter:

1. A vertical or nearly vertical descent of at least 300 fpm. The actual critical rate depends on the gross weight, rpm, density altitude, and other pertinent factors.
2. The rotor system must be using some of the available engine power, between 20 and100 per cent).
3. The horizontal velocity must be slower than effective translational lift.

A fully developed vortex ring state is characterized by an unstable condition in which the helicopter has uncommanded pitch and roll oscillations, little or no collective authority, and a descent rate that may approach 6,000 feet per minute (fpm), if allowed to develop (Figure 2).

Figure 2: Vortex ring state



Source: Helicopter operator

Safety action

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

Helicopter operator

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

- A Flight Safety Instruction (FSI) is under management review to prohibit unaided (non-night vision goggles) remote landings at night.

Safety message

In the ATSB investigation AO-2007-028, the pilot of the helicopter lost situational awareness during a night approach and allowed the forward speed of the helicopter to decrease to zero. The helicopter developed a high rate of descent and, during an attempt to arrest the rate of descent the helicopter was subjected to an over-torque condition. The investigation report is available at

www.atsb.gov.au/publications/investigation_reports/2007/aair/ao-2007-028.aspx

A selection of articles regarding night operations is collated in the Night Operations edition of the Canadian Directorate of Flight Safety On Target magazine and is available at:

publications.gc.ca/collections/collection_2010/forces/D12-14-2010-eng.pdf

Research conducted into situational awareness is available at:

pdars.arc.nasa.gov/publications/20051025102856_Newman_AvPsyc03.pdf

General details

Occurrence details

Date and time:	13 June 2013 – 1938 EST	
Occurrence category:	Accident	
Primary occurrence type:	Collision with terrain	
Location:	12 km WSW Horn Island Airport, Queensland	
	Latitude: 10° 37.55' S	Longitude: 142° 11.08'E

Aircraft details

Manufacturer and model:	Bell Helicopter Company 412	
Registration:	VH-EMZ	
Type of operation:	Flying training	
Persons on board:	Crew – 3	Passengers – Nil
Injuries:	Crew – Nil	Passengers – Nil
Damage:	Substantial	

Aircraft proximity event between a Janus glider, VH-IZI and a McDonnell Douglas 500N, VH-KXS

What happened

On 29 June 2013, a Janus glider, registered VH-IZI (IZI), departed runway 27 at the Bacchus Marsh aeroplane landing area (ALA) to conduct a local flight (Figure 1). During the flight, the wind direction at the ALA changed, resulting in runway 19 becoming the active runway.

At about the same time, the pilot of a McDonnell Douglas 500N helicopter, registered VH-KXS (KXS), was conducting circuits (Figure 1). He was on his fifth circuit and had reported broadcasting on the common traffic advisory frequency (CTAF) immediately prior to turning base for runway 19.[1]

Figure 1: VH-IZI and VH-KXS

Source: Faram Khambatta

At about 1430 Eastern Standard Time,[2] IZI joined the downwind leg of the circuit for runway 19. After ensuring the radio volume was turned up, the pilot reported broadcasting a downwind call on the CTAF. Towards the end of the downwind leg, while descending through about 500 ft, the passenger in the front seat of IZI observed a helicopter (KXS) in his 12 o'clock[3] position. The pilot then observed KXS below him, on a diagonal track for runway 19 (Figure 2). The pilot estimated that KXS passed about 100 ft below IZI. He further reported that he did not hear any calls from the pilot of KXS on the CTAF.

When established on late base, at 500 ft, the pilot of KXS reported sighting IZI on downwind, in his 10 o'clock position, about 100 ft above and 100 m away. The pilot stated that he did not believe there was any risk of a collision with IZI and continued with the circuit. He reported that he did not hear a downwind call from IZI.[4]

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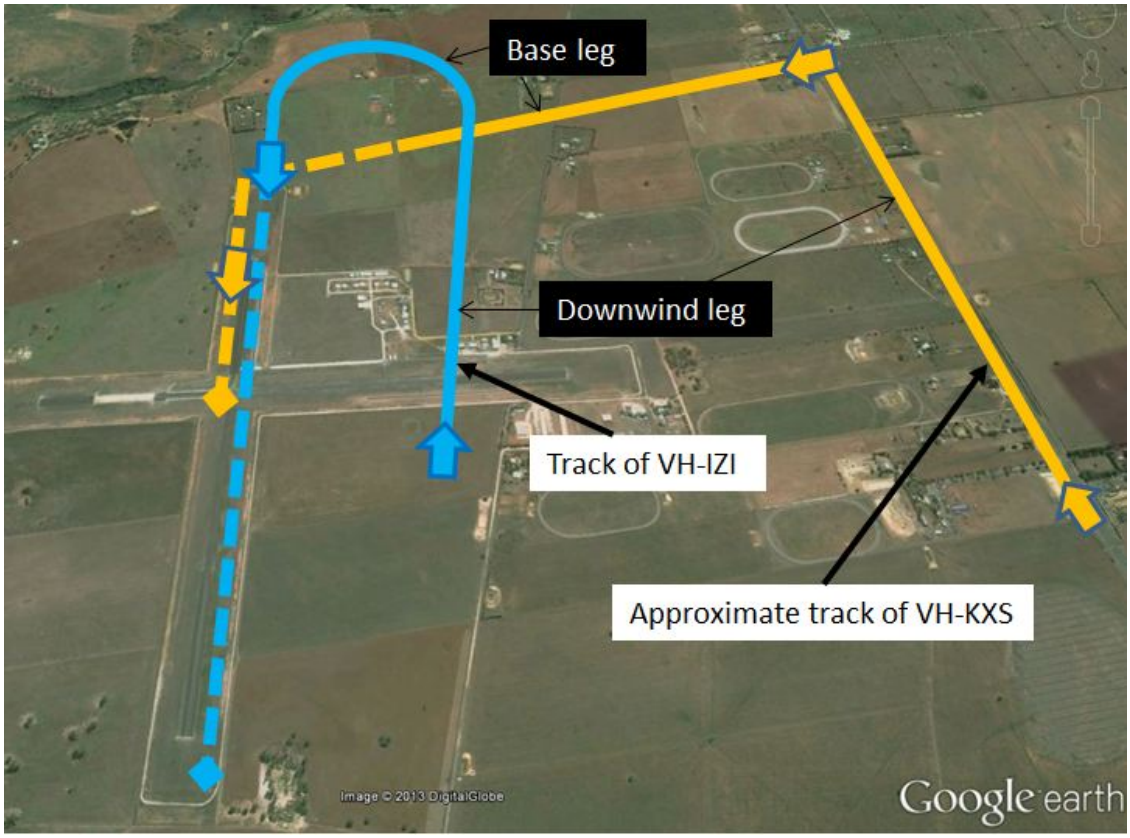
1 Any radio broadcasts made by the pilots could not be verified as transmissions at Bacchus Marsh were not recorded.

2 Eastern Standard Time (EST) was Coordinated Universal Time (UTC) + 10 hours.

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

4 The ATSB could not determine why neither pilot heard the broadcasts reportedly made by each other.

Figure 2: GPS track of VH-IZI and approximate track of VH-KXS



Source: Google earth; VH-IZI GPS data; VH-KXS pilot recollection

Bacchus Marsh gliding operations

Three gliding clubs operate at Bacchus Marsh (ALA). The En Route Supplement Australia (ERSA) for Bacchus Marsh indicated that gliding operations occur during hours of daylight. It also stated that gliders and tugs normally operate inside and below the standard 1,000 ft circuit, and when gliding operations are in progress, the active runway is the runway in use by the gliding operation.

Gliding Federation of Australia comments

The Gliding Federation of Australia identified that the limitations of unalerted see-and-avoid may have contributed to the incident as neither pilot heard any radio calls from the other. It also found that the limited forward and downward view from the rear seat due to the glider's natural blind spots and the large frame of the front seat occupant may have affected the pilot's ability to see KXS until it was in close proximity.

Safety message

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

The ATSB has issued a publication called *A pilot's guide to staying safe in the vicinity of non-towered aerodromes*, which outlines many of the common problems that occur at non-towered aerodromes, and offers useful strategies to keep yourself and other pilots safe. The report found that insufficient communication between pilots and breakdowns in situational awareness were the most common contributors to safety incidents in the vicinity of non-towered aerodromes.

In addition, issues associated with unalerted see-and-avoid have been detailed in the ATSB's research report *Limitations of the See-and-Avoid Principle*. The report highlights that unalerted see-and-avoid relies entirely on the pilot's ability to sight other aircraft. Broadcasting on the CTAF is known as radio-alerted see-and-avoid, and assists by supporting a pilot's visual lookout for traffic. An alerted traffic search is more likely to be successful as knowing where to look greatly increases the chances of sighting traffic. The report is available at www.atsb.gov.au/publications/2009/see-and-avoid.aspx.

The following publications provide information on operations at non-towered aerodromes:

- A pilot's guide to staying safe in the vicnity of non-towered aerodromes: www.atsb.gov.au/publications/2008/ar-2008-044(1).aspx
- Operations at non-towered aerodromes - Be heard, be seen, be safe: carry & use your radio: www.casa.gov.au/wcmswr/_assets/main/pilots/download/nta_booklet.pdf
- Civil Aviation Advisory Publication (CAAP) 166-1(1) – Operations in the vicinity of non-towered (non-controlled) aerodromes: www.casa.gov.au/wcmswr/_assets/main/download/caaps/ops/166-1.pdf

General details

Occurrence details

Date and time:	29 June 2013 – 1430 EST	
Occurrence category:	Serious incident	
Primary occurrence type:	Aircraft proximity event	
Location:	Bacchus Marsh (ALA), Victoria	
	Latitude: 37° 44.00' S	Longitude: 144° 25.33' E

Schempp-Hirth Flugzeugbau GMBH Janus, VH-IZI

Manufacturer and model:	Schempp-Hirth Flugzeugbau GMBH Janus	
Registration:	VH-IZI	
Type of operation:	Gliding	
Persons on board:	Crew – 1	Passengers – 1
Injuries:	Crew – Nil	Passengers – Nil
Damage:	Nil	

McDonnell Douglas 500N, VH-KXS

Manufacturer and model:	McDonnell Douglas 500N	
Registration:	VH-KXS	
Type of operation:	Private	
Persons on board:	Crew – 1	Passengers – Nil
Injuries:	Crew – Nil	Passengers – Nil
Damage:	Nil	

Australian Transport Safety Bureau

The Australian Transport Safety Bureau (ATSB) is an independent Commonwealth Government statutory agency. The Bureau is governed by a Commission and is entirely separate from transport regulators, policy makers and service providers. The ATSB's function is to improve safety and public confidence in the aviation, marine and rail modes of transport through excellence in: independent investigation of transport accidents and other safety occurrences; safety data recording, analysis and research; fostering safety awareness, knowledge and action.

The ATSB is responsible for investigating accidents and other transport safety matters involving civil aviation, marine and rail operations in Australia that fall within Commonwealth jurisdiction, as well as participating in overseas investigations involving Australian registered aircraft and ships. A primary concern is the safety of commercial transport, with particular regard to fare-paying passenger operations.

The ATSB performs its functions in accordance with the provisions of the *Transport Safety Investigation Act 2003* and Regulations and, where applicable, relevant international agreements.

Purpose of safety investigations

The object of a safety investigation is to identify and reduce safety-related risk. ATSB investigations determine and communicate the safety factors related to the transport safety matter being investigated. The terms the ATSB uses to refer to key safety and risk concepts are set out in the next section: Terminology Used in this Report.

It is not a function of the ATSB to apportion blame or determine liability. At the same time, an investigation report must include factual material of sufficient weight to support the analysis and findings. At all times the ATSB endeavours to balance the use of material that could imply adverse comment with the need to properly explain what happened, and why, in a fair and unbiased manner.

About this Bulletin

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

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

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

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

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

Conducting these Short investigations has a number of benefits:

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

Australian Transport Safety Bureau

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Investigation

ATSB Transport Safety Report
Aviation Short Investigations
Aviation Short Investigation Bulletin Issue 22
AB-2013-132
Final – 17 September 2013