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Australian Transport Safety Bureau

# Aviation Short Investigations Bulletin

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Investigation

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# Jet aircraft

# Cargo hold smoke event involving a Boeing 737, DQ-FJH

## What happened

On 26 April 2014, a passenger checked in four bags for a Fiji Airways flight from Melbourne, Victoria, to Nadi, Fiji, on a Boeing 737 aircraft, registered DQ-FJH. The passenger was a certified remotely piloted aircraft (RPA) operator in Australia. The passenger stated during check-in that there were no batteries in the checked bags, but declared 8 lithium batteries being carried as hand luggage. The bags were screened in accordance with the Aviation Transport Security Regulations.

At about 2230 Eastern Standard Time (EST), the aircraft was at Gate D8 at Melbourne Airport and the passengers' bags were being loaded. The cabin crew members were on board preparing the aircraft prior to boarding of passengers, and the first officer was in the cockpit conducting pre-flight checks. The captain was on the tarmac, conducting an external inspection of the aircraft. A ground engineer observed smoke emanating from the aft cargo hold, alerted the captain and notified the aerodrome rescue and firefighting (ARFF) service. The captain saw white heavy smoke billowing from the hold and immediately called the first officer to advise him. The first officer observed that the aft cargo fire warning light was illuminated. The captain directed the first officer to activate the aft cargo hold fire suppression system, shut down the auxiliary power unit and order an evacuation of the aircraft. The first officer advised air traffic control and declared 'Mayday'.[1]

The ARFF arrived and a smouldering hard-plastic case was removed to a safe location and cooled with a fine water spray. The passenger who had checked in the case was located and was asked whether any batteries were in it, to which the passenger responded there were none. The ARFF and Australian Federal Police inspected all four of the bags checked in by the passenger and found 19 batteries intact and additional 6-8 batteries that had been destroyed by fire.

An initial investigation revealed that several lithium-ion polymer batteries and an RPA controller were contained in the case. An electrical short circuit involving the batteries resulted in the initiation of a fire, destroying the contents and damaging the case (Figures 1, 2 and 3). An RPA controller containing other, similar, lithium-ion polymer batteries was found in one of the passenger's other checked-in bags. The fire-damaged case had been screened through the oversized luggage point at Melbourne Airport.

1 Mayday is an internationally recognised radio call for urgent assistance.

**Figure 1: Fire-damaged bag and contents**

Source: CASA

**Figure 2: Batteries found in the case**

Source: CASA

**Figure 3: Battery balancers**


Source: CASA

### *Fiji Airways investigation*

An analysis conducted by Fiji Airways found that the post-incident images indicated a Lithium-ion Polymer battery fire involving high capacity – high discharge batteries. The battery balancers (shown in Figure 3), are used for charging heavy duty batteries.

## Safety Action

As a result of this occurrence, Fiji Airways has issued an Airport Operations Standing Order: *Lithium Metal & Lithium Ion Cells Batteries* advising check-in staff to ask every passenger whether their baggage contains lithium batteries and to check batteries are carried in accordance with regulations. Any passenger carrying undeclared lithium batteries that are discovered prior to departure will be offloaded and refused carriage.

## Safety message

This incident highlights the hazards associated with transporting lithium-ion batteries. Batteries operate via a controlled chemical reaction that generates current and transmits power through the battery terminals. This process generates heat. Rapid increase in temperature and pressure in the battery cells may result in fire. Information regarding carriage of batteries and battery-powered equipment is provided by the *International Civil Aviation Organization (ICAO) Technical Instructions for the Safe Transport of Dangerous Goods by Air, Part 8,* www.icao.int/safety/DangerousGoods/Pages/technical-instructions.aspx.

It is important for safety that all batteries be individually protected so as to prevent short circuits. This can be achieved by placement of the batteries in the original retail packaging or by otherwise insulating the terminals, wires or fittings, e.g. by taping over exposed terminals with an electrical insulating tape or placing each battery in a separate plastic bag or protective pouch. When batteries are contained in personal electronic devices, measures must be taken to prevent unintentional activation.

Information regarding carriage of batteries and battery-powered equipment may be requested from CASA by e-mail to: DG@casa.gov.au or from the CASA website:

www.casa.gov.au/SCRIPTS/NC.DLL?WCMS:STANDARD::pc=PC_100484

www.casa.gov.au/dg

## General details

### *Occurrence details*

| | | |
|---|---|---|
| Date and time: | 26 April 2014 – 2220 EST | |
| Occurrence category: | Serious incident | |
| Primary occurrence type: | Fumes, Smoke, Fire - Smoke | |
| Location: | Melbourne Airport, Victoria | |
| | Latitude: 37° 40.40' S | Longitude: 144° 50.60' E |

## *Aircraft details*

| | | |
|---|---|---|
| Manufacturer and model: | The Boeing Company 737-8X2 | |
| Registration: | DQ-FJH | |
| Operator: | Fiji Airways | |
| Serial number: | 29969 | |
| Type of operation: | Air transport high capacity – passenger | |
| Persons on board: | Crew – 5 | Passengers – Nil |
| Injuries: | Crew – Nil | Passengers – Nil |
| Damage: | Nil | |

# Loading issue involving a Boeing 737, VH-VZO

## What happened

On 9 May 2014, a Qantas Boeing 737 aircraft, registered VH-VZO, operating a flight from Canberra, Australian Capital Territory, to Perth, Western Australia, was prepared for departure. On board the aircraft were the crew and 150 passengers, including a group of 87 primary school children. The group of children was seated together at the rear of the cabin and all had been assigned the standard adult weight of 87 kg during check-in.

The captain and first officer conducted the pre-flight checks and waited some time for the final load sheet to be delivered. The captain contacted ground staff, who advised the crew to expect a short delay due to an issue with the baggage. The load sheet was then uploaded by ground staff via the aircraft communications addressing and reporting system (ACARS). The load sheet stated the take-off weight as 76,800 kg and the stabiliser trim figure as 5.5 units. The crew checked the load sheet and selected the assigned stabiliser trim setting, verifying the setting entered into the flight management guidance computer (FMGC) with that on the load sheet. The value of 5.5 units was in the normal stabiliser trim range.

Due to the relatively heavy weight of the aircraft, the elevation of Canberra Airport and high terrain surrounding it, the 'Flap 1' setting was selected for take-off. As 'Flap 5' was the normal flap setting for take-off, the company standard operating procedure when using Flap 1 was that the captain conducted the take-off. As this was a less commonly used take-off configuration, the captain and first officer took extra precaution with the pre-take-off checks and briefing.

During the take-off, the aircraft appeared nose-heavy. To rotate the aircraft and lift off from the runway, the captain found that significant back pressure was required on the control column. Conscious of the potential of striking the aircraft tail on the runway if too much back pressure was applied to the controls, the captain maintained steady back pressure to ease the aircraft into the air. The aircraft exceeded the calculated take-off safety speed ($V_2$)[1] by about 25 kt. At $V_2$ + 25 kt, an exceedance was later detected during analysis of the aircraft quick access reference (QAR) data (Figure 1). The aircraft climbed at a higher initial climb speed than normal, which resulted in a slightly reduced climb gradient, but the crew did not receive any terrain or other warnings.

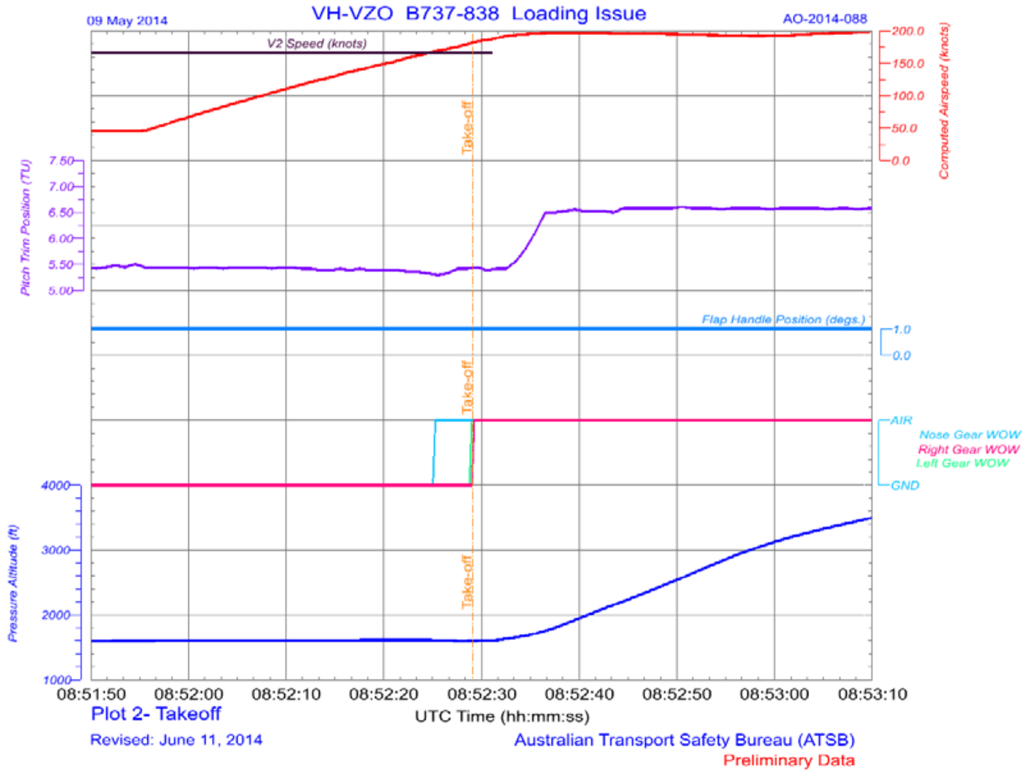
As the aircraft became airborne, the captain trimmed the stabiliser to relieve some of the back pressure. He advised the first officer that a fair bit of back pressure had been required for the take-off, and the first officer suggested it may have been due to the Flap 1 setting and that the group of children may have contributed. The crew did not experience any further issues during the flight.

A post-flight review determined that the final load sheet overstated the aircraft take-off weight by about 3.5 to 5 tonnes and the take-off stabiliser trim was out by about 1 unit. The captain reported that the weight discrepancy, if known, may have required a change in the electronically generated approach speed based on the load sheet weight, of about 1-2 kt, and no issues or abnormal indications occurred during the approach.

---

1 $V_2$ is the minimum speed at which a transport category aircraft complies with those handling criteria associated with climb, following an engine failure. It is the take-off safety speed and is normally obtained by factoring the stalling speed or minimum control (airborne) speed, whichever is the greater, to provide a safe margin.

**Figure 1: Flight data for the take-off phase**




Source: ATSB

## *Group check-in procedures*

A 'name template' had been completed by a travel agent on behalf of the school group, and used by Qantas Group Sales to record all data for passengers travelling in the group. The name template field titled 'Gender Description' was marked as mandatory, however the template was completed and uploaded with that field blank The options to complete that field were 'Adult', 'Child', or 'Infant'. A Qantas Group Sales Agent uploaded the information from the template into the booking system passenger name record (PNR) and emailed the Group Movement Advice (GMA) to Customer Service staff in both Perth and Canberra. The email did not include the weights of the children travelling in the group however it stated that the average age of the group was 12 years.

The group had been travelling from Perth to Canberra and return. Two days prior to the Perth-Canberra flight, in accordance with company procedures, a customer service agent (CSA) in Perth 'advance accepted' the group into the booking system, using the GMA email. The Group Sales procedure stated that the ages of the children were to be recorded in the PNR, and for children up to age 11 years 'CHD' was to be entered in the passenger name field, and young passengers between 12-15 years were to have 'YNGP' entered in the PNR. However as the fields for recording the number of children and young passengers in the group were blank, the CSA assumed the passengers were adults. All 95 passengers in that group (87 children and 8 adults) were advance accepted as adults and assigned the standard adult weight of 87 kg. The standard child weight (2-11 years), which was not assigned to any of the group, was 32 kg and the adult weight applied for children aged over 11 years.

A customer service agent (CSA) printed the group's boarding passes and assigned them seating together at the rear of the cabin, in accordance with Qantas procedures. On 5 May 2014, the group travelled from Perth to Canberra on a Boeing 737 aircraft and the flight crew did not experience any loading related issues during the flight.

On 7 May 2014, two days prior to the return flight, a CSA in Canberra again ‘advance accepted’ the group as adults, and assigned boarding passes and seating together at the rear of the cabin.

On 9 May 2014, the group was checked in by two CSAs at Canberra Airport. They recorded the actual weight of each bag to speed up the check-in process and then attempted to convert the pre-checked baggage weight from 20 kg per bag to the actual weight, in the customer management (CM) module. They were unable to complete that task due to a system error. The customer service supervisor contacted Load Control and advised the load control officer of the adjustment to the baggage weight of 759 kg. The officer manually adjusted the baggage in the aircraft and the load sheet accordingly, which caused the delay in delivering the final load sheet to the flight crew.

It was also found that similar to the system error obtained in the CM, it was not possible to manually adjust passenger weights in the facilities management (FM) module. Hence, if the ages of children travelling were not submitted into CM through the booking process and/or manually at check-in, weight and balance discrepancies would remain.

## 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:

#### *Interim safety notice*

A New Procedure Notification has been issued to check-in staff. The notice reminds staff to ensure that when a Group Movement Advice (GMA) refers to children, they must also be accepted in the Customer Management (CM) system as children. Tour leaders are to confirm if any children travelling are under the age of 12, in which case they are to be reflected in CM as a child. The aircraft weight and balance will then be based on an accurate passenger type. This change will be reflected in the revised Airport Product and Service Manual.

### *Civil Aviation Safety Authority (CASA)*

CASA is working on a proposed Civil Aviation Safety Regulation (CASR) Part 121, which is expected to consider standard passenger and baggage weights. Currently, Civil Aviation Advisory Publication (CAAP) 235-1(1) provides guidance on adolescent and child weights. A new classification of ‘adolescent’ (13 to 16 years old) has been identified in the CAAP table. The CAAP is available from the CASA website at http://casa.gov.au/wcmswr/_assets/main/download/caaps/ops/235_1.pdf

## Safety message

The ATSB SafetyWatch highlights the broad safety concerns that come out of our investigation findings and from the occurrence data reported to us by industry. One of the safety concerns is data input errors www.atsb.gov.au/safetywatch/data-input-errors.aspx. In this incident, the crew entered and checked the data supplied to them, however the original passenger weight data at check-in was not accurate.

Determining accurate weight and balance is required for all aircraft prior to flight. Use of an incorrect trim setting for the aircraft’s actual weight and balance may adversely affect the aircraft’s controllability during flight. In larger aircraft, automated systems have been designed to replace manual processes for calculating the aircraft's weight and balance. Validation of the data entered into these systems is essential to ensure accurate loading information is provided to flight crew.

Examples of other aircraft loading occurrences are:

- GWH Van Es (2007) *Analysis of aircraft weight and balance related safety occurrences* (NRL-TP-2007-153), p 17, National Aerospace Laboratory: www.skybrary.aero/bookshelf/books/1149.pdf
- ATSB transport safety investigation report 200405064 – Weight and balance event, Airbus A330-301, Changi, Singapore, VH-QPC
- ATSB transport safety investigation report 200100596 – Boeing Co 767-338ER, VH-OGU

# General details

## *Occurrence details*

| | | |
|---|---|---|
| Date and time: | 9 May 2014 – 2245 EST | |
| Occurrence category: | Incident | |
| Primary occurrence type: | Loading issue | |
| Location: | Canberra Airport, Australian Capital Territory | |
| | Latitude: 35° 18.42' S | Longitude: 149° 11.70' E |

## *Aircraft details*

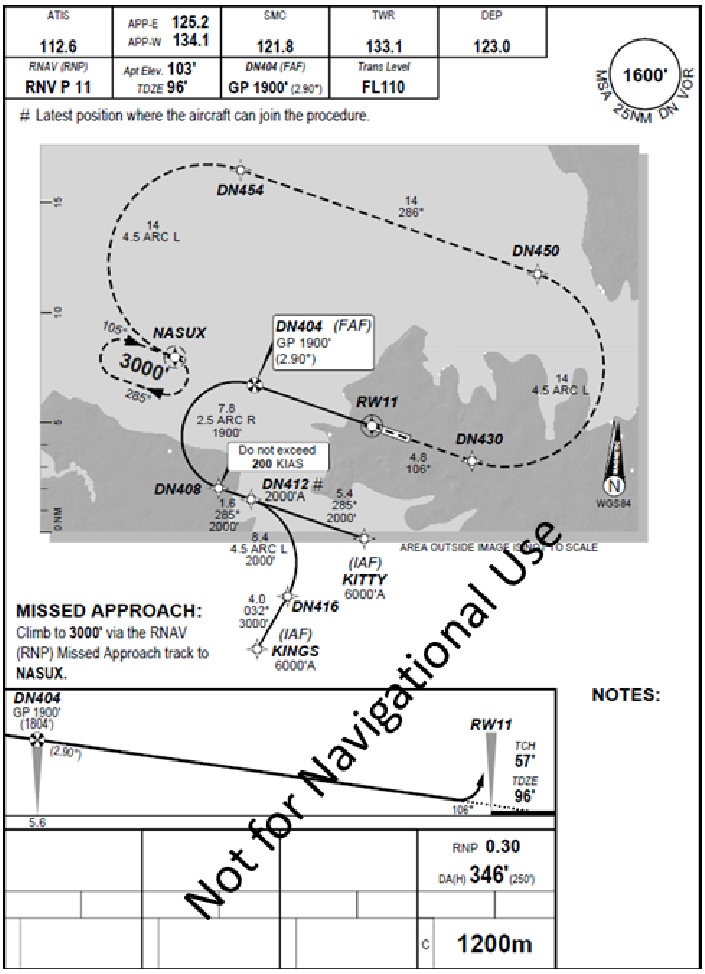
| | | |
|---|---|---|
| Manufacturer and model: | The Boeing Company 737-838 | |
| Registration: | VH-VZO | |
| Operator: | Qantas Airways Limited | |
| Serial number: | 34191 | |
| Type of operation: | Air transport high capacity – passenger | |
| Persons on board: | Crew – Unknown | Passengers – 150 |
| Injuries: | Crew – Nil | Passengers – Nil |
| Damage: | Nil | |

# Loss of separation assurance involving a Boeing 737, VH-XZA and a Fairchild SA227, VH-ANW

## What happened

On 2 June 2014, at about 1200 Central Standard Time (CST), the approach controller at Darwin Airport, Northern Territory, was processing the arrival of a Qantas Boeing 737 aircraft, registered VH-XZA (XZA), and an Airnorth Fairchild SA227, registered VH-ANW (ANW). When about 34 NM south-east of Darwin on a standard arrival route (STAR), XZA was cleared by the approach controller to descend to 3,000 ft and to conduct an Area Navigation ‘P’ (RNAV-P) approach to runway 11, via the ‘KITTY’ initial approach fix (IAF) (Figure 1).

**Figure 1: Darwin RNAV-P (RNP) RWY 11**[1]




Source: Airservices Australia

[1] Figure 1 is an excerpt from the Airservices Australia RNAV – P (RNP) runway 11 approach chart. The crew involved in this incident were using a chart provided by Jeppesen, but relevant details are identical.

About 40 seconds after the clearance was issued to XZA, ANW was tracking direct to Darwin on the 245 radial,[2] south-west of Darwin passing about 14,000 ft on descent and was cleared to descend to 7,000 ft. About 2 minutes later, when about 34 NM from Darwin, ANW was cleared by the approach controller to descend to 3,000 ft. This resulted in a loss of separation assurance[3] as both aircraft were at a similar distance from the runway, tracking for runway 11, assigned the same altitude, with no assurance that vertical or radar separation would be maintained.

The approach controller then conducted a handover, using a standard checklist, to an incoming controller. During the handover, the approach controller explained that both aircraft (ANW and XZA) were on descent to 3,000 ft. The approach controller advised the incoming controller to monitor the situation, particularly as XZA would slow during the base leg turn for runway 11 and thereby potentially increase the closure rate between the two aircraft. The incoming controller accepted the handover, took over the approach controller position and the outgoing controller exited the control room.

The approach controller observed that XZA was sequenced, and had been coordinated to Darwin tower, as the first aircraft to arrive; and anticipated that it would arrive before ANW. As XZA was tracking via the RNAV-P approach, the controller identified the potential confliction point between it and ANW to be at the base turning point (at about DN408 in Figure 1). The controller then monitored both aircraft as they approached the potential confliction point. As ANW was tracking direct to the airfield via an inbound radial, the controller anticipated that the pilot of ANW would be required to sight and follow XZA.

About 1 minute after taking over as approach controller, the controller observed ANW maintaining a higher speed than anticipated. When ANW was about 19 NM from the airfield, the controller instructed the pilot to turn left onto a heading of 360°. As the pilot did not immediately read back the instruction, the controller repeated the turn direction and heading and the pilot subsequently read back 'Left 360'. About 20 seconds later, the controller advised the pilot of ANW that relevant traffic was a Qantas 737, currently in his 12 o'clock[4] position and at about 6 NM, and to report sighting that aircraft. The pilot replied that he was looking for the aircraft.

The controller then received a 'predicted conflict alert' (PCA)[5] on the situation data display. Just as the controller commenced transmitting an instruction to ANW to turn further left onto a heading of 320°, the pilot of ANW reported having the 737 in sight. The controller then instructed the pilot of ANW to follow the 737 and cleared ANW for a visual approach to runway 11.

When the PCA sounded, the Air Traffic Control supervisor checked that the approach controller had separation standards in place, and heard the pilot of ANW report sighting XZA and the controller issue the instruction to sight and follow that aircraft. At that time, about 1,300 ft of vertical separation and 4.5 NM laterally existed between the two aircraft. As the radar separation standard of 3 NM laterally and 1,000 ft vertically applied at the time, a loss of separation between the aircraft did not occur.

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2 A radial is a magnetic bearing line extending from a point-source navaid such as a VOR (VHF Omni Directional Radio Range).

3 A separation standard existed; however, ATC planning, or ATC or flight crew execution of those plans, did not ensure that separation could be guaranteed.

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

5 The Australian Defence Air Traffic System (ADATS) is equipped with conflict alerting functionality for aircraft under radar surveillance, in the form of Predicted Conflict Alert (PCA) and Conflict Alert (CA) functions. The parameters and enablement of these alert functions vary between military ATS locations. The PCA, when enabled, is generally set to activate 30 seconds prior to the proximity between aircraft reducing to within 2.8 NM and/or 750 ft.

## Controller comments

### Incoming approach controller

The incoming approach controller provided the following comments:

- The controller expected ANW to approach at a slower speed than it did.
- The controllers were taught to apply tactical separation assurance fairly rigidly and, if there was ever any consideration of a confliction, to ensure either vertical separation was in place, or to assign a heading to avoid the confliction. Separation assurance was very important and considered compulsory.
- The controller assumed that the plan in place would guarantee separation based on the expected speed of the two aircraft; however ANW reached the point of confliction faster than anticipated.
- The controller was surprised when the PCA sounded, because the controller was confident separation had been maintained between the aircraft and that 3 NM would not be infringed. However, the PCA was based on the predicted track, and ANW then turned to follow the 737.

### Outgoing approach controller

The outgoing approach controller provided the following comments:

- The controller would have had separation assurance if they had cleared ANW via the waypoint 'NASUX' (9 NM west of the field), however the controller omitted to do that. As XZA was turning a 5 NM final, the direct inbound track of ANW was going to cross the predicted path of XZA. Redirecting ANW via NASUX would have ensured it remained clear of that path.
- Due to speed requirements for predicted tracking, XZA would have been not above 250 kt and reducing in the turn; ANW was required to be not above 250 kt below 10,000 ft.
- The flight progress strips for the two aircraft were towards the bottom of the strip bay, with XZA number one in the sequence and ANW number two. Box 4 about half way along each strip contained the assigned levels, with '3000' entered for each aircraft.
- When the PCA sounds, if a separation standard is not in place, the controller immediately commences compromised separation recovery actions. If a standard is in place, the controller states 'sight and follow', or 'vertical' or 'traffic', or whichever is in place, so when the supervisor hears the audible tone, they know which standard it is.
- Because the complexity and workload was low, the controller allowed the situation to continue; however the controller should have immediately put something in place after accepting the handover, to establish separation assurance.

## Separation Assurance

According to the Manual of Air Traffic Services (MATS) Version 28, 10.1.2.2, tactical separation assurance places greater emphasis on traffic planning and conflict avoidance rather than conflict resolution and requires that controllers: a) be proactive in applying separation to avoid rather than resolve conflicts; b) plan traffic to guarantee rather than achieve separation; c) execute the plan so as to guarantee separation; and d) monitor the situation to ensure that plan and execution are effective.

A compromised separation situation can be detected before there is a loss of separation either through controller or pilot observation, or through ATC systems alert such as the PCA, or within the aircraft (such as the traffic collision avoidance system – TCAS).

## Department of Defence investigation

The Department of Defence conducted an internal investigation into the incident and found that it highlighted how experience may sometimes negatively influence controllers from putting in timely safeguards to provide separation assurance based on expectation of aircraft performance. They also found the following:

- Separation was maintained throughout the incident, however there was no separation assurance. The controllers reported the incident as they believed there was educational value in its investigation.
- Both controllers were aware that assignment of the same level had created a conflict and elected to monitor the situation rather implement a plan to guarantee separation.
- The tactical separation applied was reactive, and the solution implemented by the controller may potentially not have maintained radar standard. As the controller commenced a subsequent transmission to adjust the aircraft (ANW) heading, the pilot transmitted reporting the traffic in sight. The situation was assessed as being stressful for the controller and may have appeared haphazard and unplanned from the pilot's perspective.
- Controllers were required to adopt practices that assure separation.

## Safety action

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

### *Department of Defence*

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

#### *Safety awareness poster*

A safety awareness poster was created with the facts and learning points from the incident. It has been displayed in prominent locations for Darwin based controllers to view.

## Safety message

This incident highlights the importance of having tactical separation assurance in place. In this incident where two aircraft were on converging tracks, applying vertical separation or altering the heading, and therefore the track, of the second aircraft may have guaranteed separation between them. When taking over from another controller, if the oncoming controller is concerned that separation assurance may not exist, they may request that the controller establishes separation assurance prior to accepting the handover.

The Australian Transport Safety Bureau (ATSB) research report AR-2012-032 titled *Loss of separation between aircraft in Australian airspace January 2008 to June 2012* found that aircraft separation is a complex operation with many levels of defences to avoid errors and to safely manage the results of errors made by air traffic controllers and pilots. The report is available at www.atsb.gov.au/publications/2012/ar-2012-034.aspx.

In this LOSA incident, the timely activation of the PCA and the controller technique used ensured that the separation standards were not infringed.

# General details

## Occurrence details

| | | |
|---|---|---|
| Date and time: | 2 June 2014– 1138 CST | |
| Occurrence category: | Incident | |
| Primary occurrence type: | Loss of separation assurance | |
| Location: | near Darwin Airport, Northern Territory | |
| | Latitude: 12° 31.58' S | Longitude: 130° 44.98' E |

## Aircraft details: VH-ANW

| | | |
|---|---|---|
| Manufacturer and model: | Fairchild Industries SA227-DC | |
| Registration: | VH-ANW | |
| Operator: | Air North | |
| Serial number: | DC-873B | |
| Type of operation: | Air transport low capacity | |
| Persons on board: | Crew – Unknown | Passengers – Unknown |
| Injuries: | Crew – Nil | Passengers – Nil |
| Damage: | Nil | |

## Aircraft details: VH-XZA

| | | |
|---|---|---|
| Manufacturer and model: | The Boeing Company 737-838 | |
| Registration: | VH-XZA | |
| Operator: | Qantas Airways Limited | |
| Serial number: | 39367 | |
| Type of operation: | Air transport high capacity | |
| Persons on board: | Crew – Unknown | Passengers – Unknown |
| Injuries: | Crew – Nil | Passengers – Nil |
| Damage: | Nil | |

# Turboprop aircraft

# Near collision involving a B200 Kingair VH SBM, and a Piper Saratoga, VH XKS

## What happened

**Piper Saratoga, VH-XKS**


Source: Craig Murray: Airliners.net

On 4 March 2014, at about 0809 EST, a Piper Saratoga aircraft, registered VH-XKS (XKS), departed Mareeba Airport on a private flight to Normanton Airport, Queensland. The direct flight was planned under the visual flight rules, and the pilot was the sole person on board.

The Saratoga was fitted with two very high frequency (VHF) radio systems: Comm 1, which was available through the Garmin 300 GPS; and Comm 2, a KX165 Nav/Comm set. The pilot broadcast his taxying, backtracking and departure calls at Mareeba, using Comm 2[1]. The aircraft remained outside controlled airspace (OCTA) for the flight, but the pilot continued to maintain a listening watch on the relevant area frequencies. At about 11.5 NM from Normanton, the pilot used Comm 2 to broadcast on the local common traffic advisory frequency (CTAF), and advised that XKS was inbound. At Normanton, he positioned XKS to overfly the runway and join the circuit on crosswind for runway 14 (Figure 1).

At about the same time, an Beech 200 Kingair aircraft, registered VH-SBM (SBM) was inbound to Normanton from nearby Karumba, under the instrument flight rules (IFR) [2] from the north-west. This charter flight had two flight crew and one passenger on board. The crew made all required broadcasts when departing Karumba, and also when inbound to Normanton. They were advised by Brisbane Centre that there was no reported IFR traffic in the area. The pilot of a VFR Piper Navajo, also inbound to Normanton, responded to the crew of SBM's broadcast, and advised them that his aircraft was due at Normanton about five minutes after SBM.

After obtaining the Normanton automatic weather information service (AWIS[3]) information, which reported the wind at Normanton as predominantly crosswind, the crew elected to make a straight in approach to runway 14 (Figure 1). With about 10 NM to run, and at 3,000 ft, SBM was established on the approach. At 5 NM with the aircraft configured for landing, and all external lighting operating, including landing lights and strobes, the pilot made another broadcast on the Normanton CTAF. At 3 NM from the runway threshold he again broadcast on the CTAF. He received AFRU beepbacks[4] for both of these calls.

Descending through 800 ft, the PIC was looking at the flap lever and decided to delay taking the last stage of flap for another few seconds, when he noticed movement in his left periphery below him. He then saw the Saratoga in a left turn onto final for runway 14. The Saratoga was partly

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[1] It is common for aircraft to have two VHF radios fitted. They are known as Comm 1 and Comm 2, and a combination of either or both radios can be selected by the pilot. Often this requires moving a rotating selector switch and also making a push button selection.

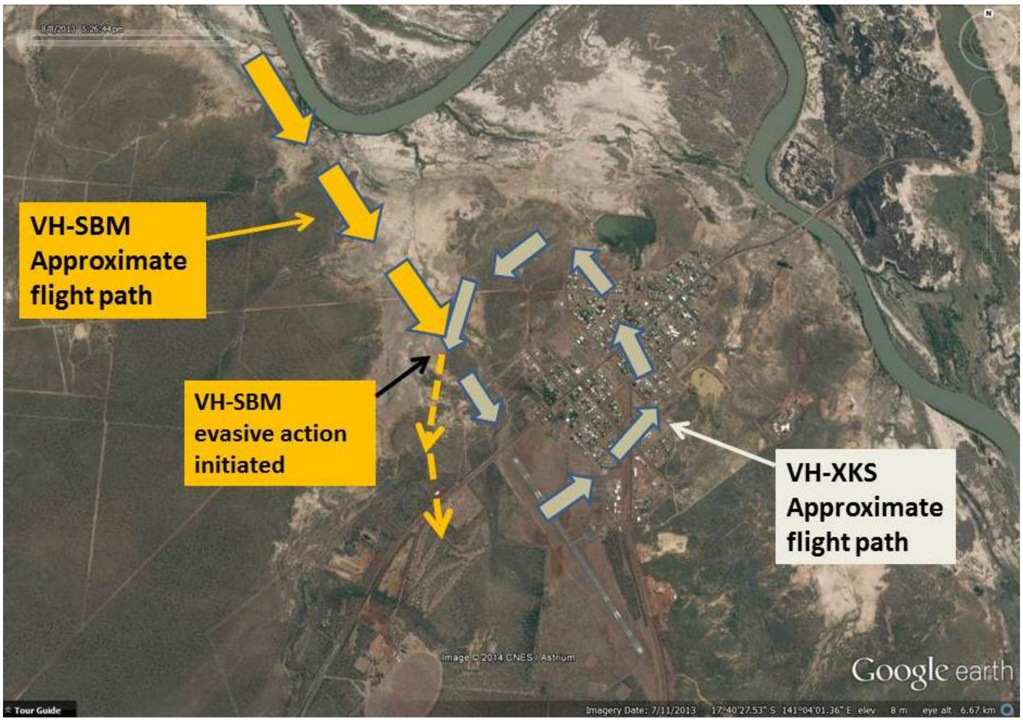
[2] Instrument flight rules permit an aircraft to operate in instrument meteorological conditions (IMC), which have much lower weather minimums than visual flight rules.

[3] The aerodrome weather information service (AWIS) provides actual weather conditions, via telephone or radio broadcast, from Bureau of Meteorology automatic weather stations.

[4] To assist pilot's awareness of inadvertent selection of an incorrect VHF frequency when operating into non-towered aerodromes, an Aerodrome Frequency Response Unit may be installed. An AFRU will provide an automatic response when pilots transmit on the CTAF for the aerodrome at which it is installed.  AIP Gen 3.4 para 3.4.1

obscured by SBM's engine nacelles, but was on a converging track about 50 ft below, and less than 50 m laterally.

**Figure 1: Flight paths approaching RWY 14 at Normanton**




Source: Google earth

Given the rate of descent and airspeed of the Kingair, the pilot quickly assessed that, without immediate evasive action, a collision was imminent. He initiated a climbing right turn, keeping the Saratoga in sight. He was aware that the Navajo that was approaching from the south was also due in the circuit, so he called the pilot of that aircraft to and advise of the conflict and his new intentions. He tried to make contact with the pilot of the Saratoga, but did not receive a response.

The Saratoga landed on runway 14. The Navajo, followed by the Kingair, subsequently landed on runway 32.

## *VH-SBM: Pilot experience and comments*

The pilot in command had about 4,750 hours total time with over 2,000 hours on the Kingair. He also held the position of Fleet Captain and Check and Training Captain on this aircraft type for his company.

He reported it was the movement of the Saratoga turning onto final approach which caught his eye, as the aircraft's fawn colour (see inset) blended in with the muddy flood waters that were widespread around Normanton at the time.

## *VH-SBM: Pilot in command, recollection of events*

- After landing, he and his co-pilot approached the pilot of XKS.
- They asked the pilot of XKS if he was aware of the near collision, and were advised he was not.
- The pilot of XKS advised the crew of SBM this was his first flight in the aircraft, and he was not familiar with the radio set up in it.
- The pilot of XKS was apologetic in regard to incident, and accepted assistance offered by the crew to sort out his radio issues; he made no mention of a radio failure. He advised that once the aircraft was refuelled he was departing for Borroloola.

- The pilot of XKS advised the crew of SBM he had joined at 1500 ft overhead Normanton to check the windsock. When the pilot in command of SBM advised him the weather information was available on the AWIS on 133.1 mHz, he seemed unfamiliar with AWIS installations and their capability.
- The transponder in XKS was not set to 7600, and Comm 2 was on an incorrect frequency. Comm 1 was selected on the audio panel but the G300 GPS unit was switched off. The pilot of XKS revealed the GPS had not been turned on for the flight from Mareeba.
- The pilot of XKS insisted that Nav2/Com 2 was in fact Com 1 and Com 2. The PIC of SBM explained the differences between the frequency ranges, and physically proved that Nav 2 could not be Comm 2.
- After about 20 minutes of troubleshooting, and making numerous test calls between XKS and SBM, Comm 1 was found to be operating correctly. It appeared the only issue was that it had not been selected during the flight from Mareeba. However Comm 2 did have a fault, it was transmitting but not receiving.
- The pilot of XKS did not appear to understand the principle of operation of an AFRU or the importance of listening for a beepback.

### *VH-SBM: Co-pilot comments*

The co-pilot was also involved in assisting the pilot of XKS with the radio issues. He concurs with all the comments the Pilot in Command has made above. He also felt the PIC of XKS did not understand the avionics set up in the aircraft, nor was he aware of the AFRU or AWIS capabilities.

### *VH-XKS: Pilot experience and comments*

The pilot had almost 4,000 flying hours, including rotary wing time. Much of this flight experience had been gained in Papua New Guinea.

At no time during the approach into Normanton did he sight SBM, and due to the radio issues was not aware of any other traffic. He advised that all external lighting, including navigation and strobe lights were on during the circuit entry and approach and landing.

His last flight had been two weeks prior, and he had been quite sick in the intervening period. He had not flown this aircraft before, except in the circuit at Mareeba.

### *VH-XKS: Pilot in command recollection of events*

- He reported he was aware Comm 2 had failed when he first called on the Normanton CTAF.
- After checking the frequency, volume and selector switches, he unsuccessfully tried to broadcast several more times.
- He then attempted to broadcast on Comm 1, but was not successful, and thought it had been affected by the Comm 2 failure.
- He maintained an altitude of 1,500 ft over the airfield, before joining a left circuit for runway 14 and elected to fly a standard circuit due to the radio failure.
- He had no time to troubleshoot any further, as he needed to land due to fuel requirements.
- He reported that he did however, as per radio failure procedures, check the Visual Flight Guide (VFG)[5] and selected code 7600 on the transponder, and continued to transmit blind[6] all required radio calls, in case it was possible for another station to hear him.

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[5] Visual Flight Rules Guide is available online on the CASA website. Section 5 – Emergency procedures includes radio failure procedures

[6] Part of radio failure procedures. Pilot continues to transmit all calls on the radio in case the radio failure is isolated to the receiver not the transmitter.

### CTAF recordings

The ATSB obtained the CTAF recordings from both Mareeba and Normanton and established that the pilot of XKS had made all the mandatory calls on the Mareeba CTAF, but there were no transmissions from this aircraft on the Normanton CTAF. The crew of SBM had made all mandatory calls at both Karumba and Normanton.

### VH-XKS – Comm 2

The ATSB contacted the radio technician who repaired Comm 2, and confirmed that it had failed. It required a replacement capacitor. In his opinion there would be no link between the unserviceability of Comm 2 and the operation of Comm 1.

## Safety Message

Pre-flight preparation is an essential part of safe flying operations. This incident highlights the importance of reviewing all available information appropriate to the intended operation, including having a thorough knowledge of aircraft systems.

The Civil Aviation Authority *Flight Planning Kit*, available at

http://shop.casa.gov.au/ provides resources to assist pilots in flight planning.

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

An ATSB research report identified over 200 occurrences between 2003 and 2008 where pilots flying within 10NM of a non-towered aerodrome may not have been broadcasting or maintaining a continuous listening watch on the CTAF. This included instances of where the incorrect radio frequency had been selected, the radio volume had been turned down, there was faulty radio equipment, pilots had not made broadcasts, or as a result of distractions.

Broadcasting and monitoring the CTAF, and maintaining a good lookout are useful strategies to improve safety at non-towered aerodromes. The publication, *Staying safe in the vicinity of non-towered aerodromes*, is available from the ATSB website at www.atsb.gov.au/publications/2--8/ar-2008-044(1).aspx

## General details

### Occurrence details

| | | |
|---|---|---|
| Date and time: | 4 March 2014 – 0956 EST | |
| Occurrence category: | Serious incident | |
| Primary occurrence type: | Near collision | |
| Location: | Normanton Airport, Queensland | |
| | Latitude: 17° 41.10’ S | Longitude: 141° 04.22’ E |

## Aircraft details: VH-SBM

| | | |
|---|---|---|
| Manufacturer and model: | Beechcraft Aircraft Corporation B200 | |
| Registration: | VH-SBM | |
| Serial number: | BB-964 | |
| Type of operation: | Charter - Passenger | |
| Persons on board: | Crew – 2 | Passengers – 1 |
| Injuries: | Crew – Nil | Passengers – Nil |
| Damage: | None | |

## Aircraft details: VH-XKS

| | | |
|---|---|---|
| Manufacturer and model: | PA-32R-301T | |
| Registration: | VH-XKS | |
| Serial number: | 32R-8629001 | |
| Type of operation: | Private | |
| Persons on board: | Crew – 1 | Passengers – Nil |
| Injuries: | Crew – Nil | Passengers – Nil |
| Damage: | None | |

# Piston aircraft

# Engine failure involving a Piper PA 46, VH-TSV

## What happened

On 12 June 2014, at about 1530 Eastern Standard Time (EST), a Piper PA-46 aircraft, registered VH-TSV, departed Dubbo, New South Wales for a private flight to the Sunshine Coast, Queensland with a pilot and one passenger on board. The planned route was to track via Moree and Toowoomba at 13,500 ft above mean sea level (AMSL). The pilot had operated the aircraft from Sunshine Coast to Lightning Ridge, Brewarrina and Dubbo earlier that day and reported that all engine indications were normal on those flights.

About 1 hour after departing Dubbo, when about 26 NM south of Narrabri, at about 13,500 ft AMSL, the pilot observed the engine manifold pressure gauge indicating 25 inches Hg, when the throttle position selected would normally have produced about 28 inches Hg. The pilot selected the alternate air[1] which did not result in any increase in power. He then elected to descend to 10,000 ft, and at that power setting when normally the engine would have produced about 29 inches Hg, the gauge still indicated only about 25 inches Hg. He turned the aircraft towards Narrabri in an attempt to fly clear of the Pilliga State Forest.

The pilot assessed that the aircraft had a partial engine failure and performed troubleshooting checks. As the aircraft descended through about 8,000 ft, he observed the oil pressure gauge indicating decreasing pressure. When passing about 6,500 ft, the oil pressure gauge indicated zero and the pilot heard two loud bangs and observed the cowling lift momentarily from above the engine. The passenger observed a puff of smoke emanating from the engine and momentarily a small amount of smoke in the cockpit.

The pilot established the aircraft in a glide at about 90 kt, secured the engine and completed the emergency checklist. He broadcast a 'Mayday'[2] call on Brisbane Centre radio frequency advising of an engine failure and forced landing.

The pilot looked for a clear area below in which to conduct a forced landing and also requested the passenger to assist in identifying any cleared areas suitable to land. Both only identified heavily treed areas. The pilot extended the landing gear and selected 10º of flap and, when at about 1,000 ft, the pilot shut the fuel off, deployed the emergency beacon then switched off the electrical system.

As the aircraft entered the tree tops, he flared to stall[3] the aircraft. On impact, the pilot was seriously injured and lost consciousness. The passenger reported the wings impacted with trees and the aircraft slid about 10 m before coming to rest. The passenger checked for any evidence of fuel leak or fire and administered basic first aid to the pilot.

The aircraft sustained substantial damage (Figure 1).

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1 In the ALTERNATE position, the induction air bypasses the induction system filter and is to be selected if induction system icing is suspected.
2 Mayday is an internationally recognised radio call for urgent assistance.
3 Term used when a wing is no longer producing enough lift to support an aircraft's weight.

**Figure 1: Damage to VH-TSV**

Source: Insurance assessor

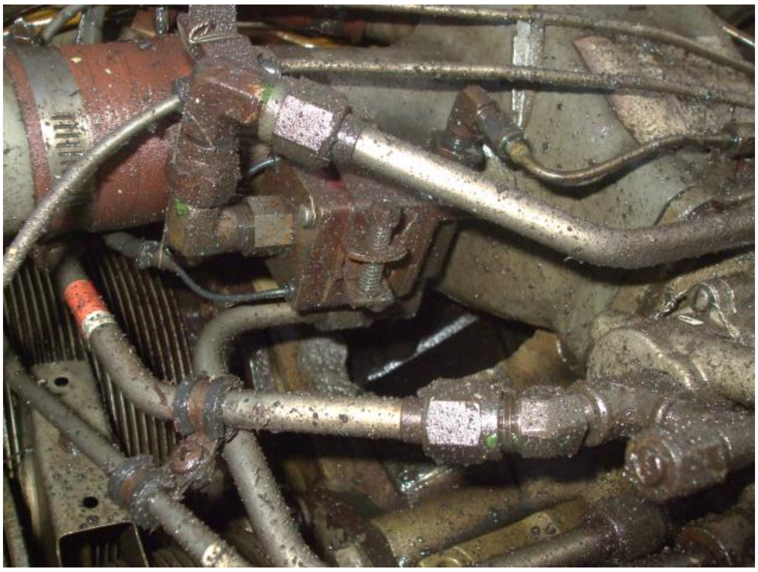
## *Pilot comments*

The pilot reported that the manifold pressure had dropped to 24 inches Hg previously when it was cold, however had increased when the aircraft descended to about 10,000 ft. On this day at 13,500 ft, the outside air temperature was about 3 °C and as the aircraft descended to 10, 000 ft, the manifold pressure did not increase as he had anticipated it would.

## *Engineering inspection*

A preliminary post-accident inspection of the engine found a hole in the right side of the crankcase, indicating an internal mechanical failure (Figure 2).

**Figure 2: Hole in upper crankcase**



Source: Insurance assessor

# General details

## Occurrence details

| | | |
|---|---|---|
| Date and time: | 12 June 2014 – 1630 EST | |
| Occurrence category: | Accident | |
| Primary occurrence type: | Engine failure or malfunction | |
| Location: | 46 km SW Narrabri aerodrome, New South Wales | |
| | Latitude: 30° 33.17' S | Longitude: 149° 25.65' E |

## Aircraft details

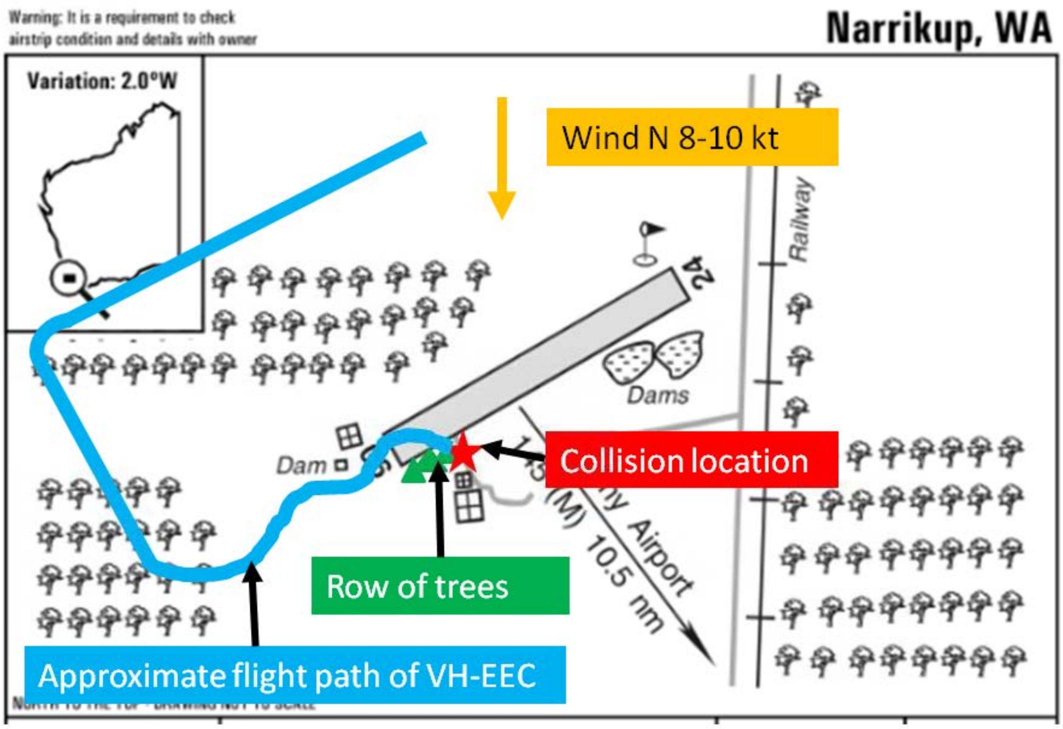
| | | |
|---|---|---|
| Manufacturer and model: | Piper Aircraft Corporation PA-46 | |
| Registration: | VH-TSV | |
| Serial number: | 46-8408022 | |
| Type of operation: | Private | |
| Persons on board: | Crew – 1 | Passengers – 1 |
| Injuries: | Crew – Serious | Passengers – Minor |
| Damage: | Substantial | |

# Collision with a tree involving a Cessna 172, VH-EEC

## What happened

On 13 July 2014, the pilot of a Cessna 172 aircraft, registered VH-EEC (EEC), conducted a private flight from The Lily to Narrikup aeroplane landing areas (ALA), Western Australia (Figure 1), with two passengers on board.

**Figure 1: Narrikup – excerpt from The Country Guide**




**Source: Flightace and witness recollection**

At about 1320 Western Standard Time (WST), the pilot broadcast an 'inbound' call when about 10 NM north-east of Narrikup at about 6,500 ft above mean sea level (AMSL). He elected to conduct an approach to runway 06 and overflew the runway at about 1,900 ft AMSL. He observed the windsock which did not indicate any significant crosswind. The aircraft then descended to circuit height and joined on the crosswind leg for runway 06.

When established on final for runway 06, the pilot reported that he had selected two stages of flap and had the aircraft stabilised at about 65 kt. When about 50 ft above ground level, the pilot reported that the aircraft encountered a wind gust which carried the aircraft about 30 m to the right. The pilot moved the aileron controls into wind and applied full power to commence a go-around; however the aircraft's right wing collided with trees on the right side of the landing area. The pilot reported that the right wing may have stalled as he applied full right aileron. The aircraft fell to the ground resulting in substantial damage (Figure 2).

**Figure 2: Accident site**


Source: Brian Holman

### *Meteorological information*

The Bureau of Meteorology's weather observations at Albany aerodrome, about 19 km from Narrikup indicated that the wind between 1320 and 1340 WST was 8-10 kt from the north.

### *Witness comments*

In a report provided to the ATSB, witnesses to the accident provided the following comments:

- The aircraft appeared to be in a high angle of bank, nose down attitude when turning onto a close base leg.
- When on final, the aircraft appeared to overshoot the runway centreline to the right, turn sharply to the left to regain the centreline and then turn sharply to the right.
- As the aircraft crossed the threshold, it entered a right bank of about 30° and turned to the right with a high nose up attitude. As the wings began to roll level, the right wing struck a tree.
- The engine noise indicated full throttle had been applied, and the aircraft struck another tree, rolled nose down and cartwheeled through a second row of trees to the ground.
- The pilots of two other aircraft that had arrived at Narrikup prior to EEC had both conducted a go-around after their first approach was considered unsuitable for landing. Both aircraft had landed safely on the second attempt.

## Safety message

The ATSB SafetyWatch highlights the broad safety concerns that come out of our investigation findings and from the occurrence data reported to us by industry. One of the safety concerns is that general aviation pilots continue to be involved in accidents that are mostly avoidable www.atsb.gov.au/safetywatch/ga-pilots.aspx. A range of procedures and requirements exist to enable pilots to manage the hazards associated with common avoidable accident types.

A go-around, the procedure for discontinuing an approach to land, is a standard manoeuvre performed when a pilot is not completely satisfied that the requirements for a safe landing have been met. The need to conduct a go-around may occur at any point in the approach and landing phase, but according to the United States Federal Aviation Administration (FAA), the most critical go-around is one initiated when very close to the ground. Consequently the sooner a condition that warrants a go-around is recognised, the safer the manoeuvre will be.

The following provide useful information on go-arounds:

- Aviation safety explained – Go-arounds: www.casa.gov.au/scripts/nc.dll?WCMS:STANDARD:1001:pc=PC_91481
- FAA Airplane Flying Handbook, Chapter 8, Approaches and Landings: www.faa.gov/regulations_policies/handbooks_manuals/aircraft/airplane_handbook/media/faa-h-8083-3b.pdf

# General details

## Occurrence details

| | | |
|---|---|---|
| Date and time: | 13 July 2014 – 1330 WST | |
| Occurrence category: | Accident | |
| Primary occurrence type: | Collision with terrain | |
| Location: | 19 km NNW Albany aerodrome, Western Australia (Narrikup ALA) | |
| | Latitude: 34° 47.23' S | Longitude: 117° 43.38' E |

## Aircraft details

| | | |
|---|---|---|
| Manufacturer and model: | Cessna Aircraft Company 172R | |
| Registration: | VH-EEC | |
| Serial number: | 17280077 | |
| Type of operation: | Private | |
| Persons on board: | Crew – 1 | Passengers – 2 |
| Injuries: | Crew – Nil | Passengers – 1 (Minor) |
| Damage: | Substantial | |

# Helicopters

# Collision with terrain involving Robinson R22, VH-HEP

## What happened

On 13 May 2014, the pilot of a Robinson R22 helicopter, registered VH-HEP, was conducting aerial mustering operations on a property about 40 km north-east of Hughenden, Queensland.

At about 1500 Eastern Standard Time, as the pilot was mustering a herd of cattle, he noticed a number of the cattle retreat to a protected area beneath trees. The pilot manoeuvred the helicopter in a manner that he hoped would keep the cattle moving, but they remained beneath the trees.

In a further attempt to keep the cattle moving, the pilot descended in what appeared to be a clear area adjacent to the trees under which the cattle had retreated. During descent, the attention of the pilot was focussed to his right, on the cattle beneath the trees. As the aircraft descended, the main rotor blade struck a dead tree to the left of the helicopter's nose, in about the pilot's 10 o'clock position.[1] The pilot later commented that the dead tree struck by the rotor blade was about 10 m tall, and that the initial blade strike was about three quarters of the way up from the base of the tree.

The pilot commented that he had not noticed that particular tree during descent, probably because his attention was focussed in a different direction, on the cattle beneath other trees. Additionally, the dead tree was less prominent than other surrounding trees covered with foliage. The pilot's view of the dead tree may also have been obscured to some extent by the cockpit frame, and the helicopter's instrument panel and centre console.

The pilot was immediately aware of the blade strike, and could feel vibration through the helicopter cyclic control. Concerned about the extent of damage to the helicopter and possible loss of control, the pilot elected to make a controlled descent to the ground immediately beneath. The pilot believed that there may have been additional blade strikes on the same tree as the helicopter descended.

After the helicopter settled on the ground, the pilot applied control friction, unstrapped, and stepped onto the skid to assess the damage. At about that moment, he became aware of a fire in the grass beneath the engine behind the cockpit area. The pilot commented that the fire appeared to be growing rapidly. He vacated the helicopter and retreated to a safe area, as the flames spread quickly up the side of the helicopter and into the cockpit area. The helicopter was subsequently destroyed by the fire (Figure 1).

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

**Figure 1: Accident site showing long, dry grass and 'gidgee' trees in the background**

Source: Helicopter operator

### *Pilot comments*

The pilot made a number of comments in relation to the accident:

- The initial blade strike appeared to have been less than a third of a metre from the blade tip.
- Following the blade strike, the pilot elected to land immediately rather than risk flying to a clear area, given uncertainty regarding the extent of damage to the helicopter.
- Following the accident, the pilot assessed that, apart from the dead tree that the blade struck, there was sufficient space in which to descend.
- The grass that caught fire beneath the helicopter after landing was probably slightly less than a metre tall.
- The pilot was surprised at how rapidly the fire spread, leaving no opportunity to safely retrieve the fire extinguisher from the cockpit.

## Safety message

This incident highlights the importance of continuous awareness of obstacles during aerial mustering operations, particularly when manoeuvring in relatively confined areas.

Although the pilot had little choice on this occasion, this accident serves as a reminder of the fire hazard associated with landing in long grass. The Robinson R22 pilot operating handbook includes the following safety tip:

> *Never land in tall dry grass. The exhaust is low to the ground and very hot; a grass fire may be ignited.*

# General details

## *Occurrence details*

| | | |
|---|---|---|
| Date and time: | 13 May 2014 – 1500 EST | |
| Occurrence category: | Accident | |
| Primary occurrence type: | Collision with terrain | |
| Location: | 40 km NE of Hughenden, Queensland | |
| | Latitude: 20° 34.18' S | Longitude: 144° 30.43' E |

## *Aircraft details*

| | | |
|---|---|---|
| Manufacturer and model: | Robinson Helicopter Company R22 Beta | |
| Registration: | VH-HEP | |
| Serial number: | 3255 | |
| Type of operation: | Aerial Work | |
| Persons on board: | Crew – 1 | Passengers – Nil |
| Injuries: | Crew – Nil | Passengers – Nil |
| Damage: | Destroyed | |

# Collision with terrain involving a Bell 206, VH-KSV

## What happened

On 13 June 2014, at about 0810 Western Standard Time, the pilot of a Bell 206 helicopter, registered VH-KSV, conducted a flight from Mitchell Plateau campground, Western Australia, to a remote site about 30 NM away to collect passengers.

Approaching the pick-up location, the pilot sighted the passengers and conducted an orbit of the area at about 300 ft above ground level (AGL) to assess the landing site. The site was located in the lee of a hill, and the wind was a south-easterly at about 20 kt. The pilot elected to approach the landing site from the south-west for best forward visibility during the approach.

**VH-KSV at the landing site**


Source: Operator

As the helicopter descended over trees, the pilot observed that the helicopter was slightly higher than optimal for the approach, but still within limits for a safe approach. From a high hover, at about 10 ft AGL, the pilot continued to lower the helicopter slowly, and assess the landing area. The passengers were standing immediately behind the tree line, and the pilot elected to land towards the rear of a rocky sandstone platform to remain clear of the passengers. Behind the platform the ground sloped away, and from the air, during the approach, the pilot did not observe the slope to be overly steep (Figure 1).

**Figure 1: Landing site and KSV**


Source: Operator

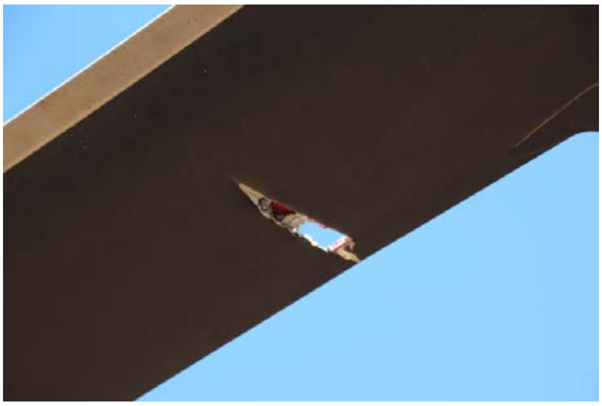
As the pilot lowered the helicopter, he looked out of the pilot side window to select the best position to touch down on the sandstone platform. The right landing skid touched down first, which the pilot noted was unusual, and he was then concerned about the suitability of the landing site. Only the front portion of the landing skids was in contact with the ground and the right skid was sitting on a rock. He then attempted to raise the helicopter back into the air to relocate to a better landing position, however as he raised the collective,[18] he felt the helicopter start to roll. He

[18] The collective pitch control, or collective, is a primary flight control used to change the pitch angle of the main rotor blades. Collective input is the main control for vertical velocity.

assessed that this may have been an incipient dynamic roll, consequently he lowered the collective. The helicopter tipped backwards off the edge of the rocky platform and slid about 2 m down the slope before coming to a halt.

The pilot opened the door, observed that the helicopter was on backwards sloping ground and did not see any damage to the helicopter. He then confirmed that there were no abnormal indications, vibrations or oscillations and he slowly raised the helicopter back up into the hover, moved it forwards a few metres and landed on a more level surface. After shutting down the engine, the pilot inspected the helicopter and found substantial damage to the landing skid, a hole in the main rotor blade (Figure 2) where it had struck the wirestrike cutter (Figure 3), and damage to the tail boom.

**Figure 2: Hole in the main rotor blade**



Source: Operator

**Figure 3: Main rotor and wire cutter**

Source*:* Operator

### *Pilot comments*

The pilot of KSV provided the following comments:

- The night prior to the flight, the pilot had been given the GPS coordinates of the proposed landing site, and used Google earth to do an initial assessment of the suitability for landing.
- He probably lowered too much collective too quickly, resulting in the helicopter tilting back and sliding rearwards.
- If he had conducted a less steep approach, he may have had better visibility of the landing site and the sloping ground.
- The trees on the approach were higher than he expected, resulting in the helicopter being higher than in a normal approach.

## Safety action

As a result of this occurrence, the operator of KSV has advised the ATSB that they have conducted base proficiency check flights with company flight crew and assessed confined area approach and landing techniques.

## Safety message

This incident highlights the importance of assessing a landing site thoroughly and conducting the approach to land so as to optimize the opportunity of sighting any potential hazards. The operator highlighted the need to visually superimpose the skid position on the touchdown surface but primarily, when landing the helicopter to ‘feel’ the helicopter onto the landing surface by slowly lowering the collective and treat every landing (and lift off) as a slope landing.

# General details

## *Occurrence details*

| | | |
|---|---|---|
| Date and time: | 13 June 2014 – 0830 WST | |
| Occurrence category: | Accident | |
| Primary occurrence type: | Collision with terrain | |
| Location: | 200 km SW Kalumburu, Western Australia | |
| | Latitude: 15° 06.52' S | Longitude: 124° 58.57' E |

## *Aircraft details*

| | | |
|---|---|---|
| Manufacturer and model: | Bell Helicopter Company | |
| Registration: | VH-KSV | |
| Serial number: | 45387 | |
| Type of operation: | Charter | |
| Persons on board: | Crew – 1 | Passengers – Nil |
| Injuries: | Crew – Nil | Passengers – Nil |
| Damage: | Substantial | |

# Collision with terrain involving a Bell 206, VH-NKW

## What happened

**Magnetic bag runner**

Source: Operator

On 20 June 2014, at about 1500 Eastern Standard Time (EST), the pilot of a Bell 206 helicopter, registered VH-NKW, was tasked to drop equipment bags for seismic operations about 6 NM east of Taroom, Queensland. The task was to be accomplished by using a magnetic bag runner connected to the helicopter by a 100 ft long-line.

The helicopter lifted off with seven bags loaded on the runner. During the flight of about 2 NM, at about 1,500 ft above ground level (AGL), the pilot observed that the bag lanyards, which were about 1.5 m in length, became tangled. The pilot flew the helicopter about 500 m beyond the drop site and turned into wind, commencing the approach from about 500 ft AGL. The pilot manoeuvred the bags onto the ground and using dual switches on the cyclic control, released the two solenoids to drop the first bag. The lanyard was tangled around the others and when the pilot raised the helicopter higher, the released bag remained hanging and entangled with the other bags. The pilot then released the solenoids for the second bag and raised and lowered the helicopter in an attempt to make the bags drop. He then repeated this for six bags and eventually one bag remained connected to the runner with the other bags entangled and hanging from it. The pilot attempted to release the last remaining solenoid, however it had jammed.

Due to the risks associated with flying with an unsecured load and the bags potentially becoming free and falling, the pilot elected to land the helicopter to untangle the bags. The bags' initial drop had been at the top of a mound, and the slope was not suitable for landing. The pilot manoeuvred the helicopter backwards down the slope to land on a more suitable site, while ensuring the long-line was being laid out on the ground. When about 10 ft above the ground, he turned the helicopter about 90° to the right, with the long-line and load out to the left of the helicopter. He descended further, and started backing up slightly to manoeuvre the helicopter in such a way that the line came out the front of the helicopter between the landing skids.

Due to vegetation behind the helicopter, the pilot manoeuvred slightly further to the right, however when crabbing right to the selected landing area, the long-line became fully extended and went taut. As the line pulled taut it had moved to come directly out the left side of the helicopter from under the centre of the left skid. This created a hinge moment which caused the helicopter to roll to the right (Figure 1).

**Figure 1: Bags and accident site**

Source: Operator

The pilot immediately attempted to press the hook release switch for the long-line and applied right cyclic to fly the helicopter in the direction of the roll. However the main rotor blades contacted the ground before the pilot reached the switch. The helicopter rolled over and came to rest inverted. The pilot switched off the fuel and battery and activated the emergency beacon. He exited the helicopter and then detected a small grass fire burning under the engine exhaust and retrieved the fire extinguisher to put out the fire. The helicopter sustained substantial damage (Figure 2).

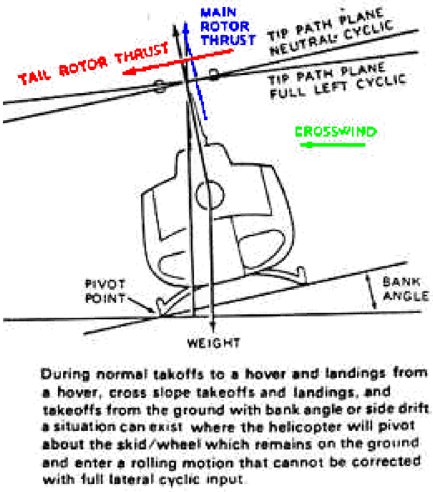
**Figure 2: Damage to VH-NKW**

Source: Operator

## *Dynamic rollover*

Dynamic rollover is usually the result of the helicopter pivoting about a skid which remains in contact with the ground. In this incident, the long-line pulled taut under the skid and became the support under the pivot point resulting in a dynamic roll over (Figure 3).

**Figure 3: Dynamic rollover**




Source: Operator

### *Pilot comments*

The pilot reported that, in hindsight, he would have lifted the bags up and moved them to a flat piece of grass to land and untangle them. Industry best practice is to use a carousel bag picker to drop the bags one at a time rather than the runner, as the lanyards are separated and the bags are unlikely to tangle. The runner is better suited for operations where the bags are picked up and then returned to a central location, where, if they become entangled, a member of the ground crew can assist in releasing them.

## 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*

#### *Review of standard operating procedures*

The operator has completed a review of the standard operating procedures for under-slung operations. A daily inspection and check of all sling equipment is to occur prior to commencing each day’s sling activities and be signed off. For any under-slung load, all terrain runner (ATR) or sling and carousel problems, the pilot must follow these procedures:

- All under-slung load related issues and problems are to be rectified at the staging area only. If the issue occurs in the field, the aircraft is to return to the staging area or an alternate safe location to have the problem fixed by ground crews.
- Aircraft may land in the field to fix sling equipment, ATR bag runner or carousel, by the pilot if the aircraft is shut down prior to the pilot exiting the aircraft.
- The pilot in command must remain at the controls of the aircraft at all times while rotors are turning and/or the engine/s are running.

#### *Use of the ATR bag runner*

The ATR bag runner is not to be used for bag layout operations. It is only to be used for bag retrieval/pick-up.

## Safety message

This incident demonstrates the importance of using equipment in accordance with the principles of best practice. It also provides a reminder to pilots to consider all factors in selecting a landing site and the additional requirements of an external load.

## General details

### *Occurrence details*

| | | |
|---|---|---|
| Date and time: | 20 June 2014 – 1530 EST | |
| Occurrence category: | Accident | |
| Primary occurrence type: | Collision with terrain | |
| Location: | 11 km E Taroom aerodrome, Queensland | |
| | Latitude: 25° 49.13' S | Longitude: 150° 00.52' E |

### *Helicopter details*

| | | |
|---|---|---|
| Manufacturer and model: | Bell Helicopter Company 206L-3 | |
| Registration: | VH-NKW | |
| Serial number: | 51463 | |
| Type of operation: | Aerial work | |
| Persons on board: | Crew – 1 | Passengers – Nil |
| Injuries: | Crew – Minor | Passengers – Nil |
| Damage: | Substantial | |

# Collision with terrain involving a Robinson R22, VH-ZZM

## What happened

On 12 July 2014, a pilot was undergoing training for mustering approval by a supervising pilot in a Robinson R22 helicopter, registered VH-ZZM. The day's flying commenced at about 0715 Eastern Standard Time (EST), and after completing about 7 hours of mustering, the helicopter was returning to a homestead near Dingo, Queensland.

At about 1500 EST, during the ferry flight, when about 1,000 ft above ground level (AGL) and at about 85-90 kt indicated airspeed, the supervising pilot instructed the pilot to conduct a practice autorotation[1] turning through 180°, which the pilot completed, increasing power when at about 5 ft AGL. During the subsequent climb, when at about 450 ft AGL and 40 kt indicated airspeed, the supervising pilot took control of the helicopter and initiated a second autorotation.

The supervising pilot initially observed the airspeed at about 65 kt, the rotor rpm in the green arc and the autorotation 'looking good', and assumed at this stage that he had handed control of the helicopter to the other pilot. At about 100 ft AGL, the other pilot detected the rotor rpm decaying and a rapid rate of descent, but assumed that the supervising pilot still had control of the helicopter. When at about 20-40 ft AGL, the supervising pilot observed the vertical speed increasing and the rotor rpm decreasing and rapidly lowered the collective[2] and increased the throttle. Just prior to the helicopter contacting the ground, the supervising pilot flared, then levelled the helicopter while increasing the throttle and raising the collective.

The helicopter landed hard, bounced once and rotated through about 180° before coming to rest. The supervising pilot turned off the master switch, activated the emergency beacon, selected the fuel to OFF and contacted emergency services. The pilot sustained serious injuries and the supervising pilot minor injuries. The helicopter was substantially damaged (Figure 1).

**Figure 1: Damage to VH-ZZM**

Source: Owner

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1 Autorotation is a condition of descending flight where, following engine failure or deliberate disengagement, the rotor blades are driven solely by aerodynamic forces resulting from rate of descent airflow through the rotor. The rate of descent is determined mainly by airspeed.

2 The collective pitch control, or collective, is a primary flight control used to make changes to the pitch angle of the main rotor blades. Collective input is the main control for vertical velocity.

### *Pilot comments*

The pilot under supervision provided the following comments:

- He thought that the supervising pilot was demonstrating the autorotation and had control of the helicopter as he had not stated 'your machine'.
- With the low height and speed at which the second practice autorotation was commenced, he believed that he would not have had a sufficient level of expertise to safely perform the manoeuvre.
- It took about 15 seconds from commencing the autorotation at about 450 ft AGL to contacting the ground.

## Safety message

This incident highlights the importance of good communication between a flight instructor and their student and the use of handover/takeover techniques to clarify who has control of the aircraft at any time. Clear instructions and demonstration of the sequence to be flown as well as continual assessment of the student's understanding and skill level are essential components of flight instruction. Instructors need to know when to take over and how far to allow a pilot to continue with a manoeuvre to ensure both the safety of the flight and the development of pilot skill.

The United States Federal Aviation Authority (FAA) reported that a high number of accidents were associated with practice autorotations with a power recovery. However, engine failure and the mishandling of subsequent autorotation often leads to accidents or serious incidents. The benefits of practice autorotations must be weighed against the risk of incidents during practice autorotations.

Successful performance of autorotative flight is required to be demonstrated by helicopter pilots for licencing purposes as defined in the Civil Aviation Safety Authority Day VFR Syllabus (www.casa.gov.au/wcmswr/_assets/main/fcl/download/vfrhsfull.pdf). Entry to and maintenance of autorotative flight and power recovery, termination and autorotative landing are skills to be executed as part of 'Advanced Manoeuvres and Procedures'. Management of abnormal and emergency situations including engine failure during level flight, take-off, final approach and hover must also be demonstrated.

The American Aircraft Owners and Pilots Association (AOPA) found that more accidents happen each year from practice autorotations than from actual engine failures. The following links provide information regarding practice autorotations:

- www.ainonline.com/aviation-news/hai-convention-news/2012-02-13/instructor-pilots-give-guidance-autorotation-training
- www.ainonline.com/aviation-news/aviation-international-news/2013-05-01/astar-accident-shines-light-autorotation-training
- www.aviationtoday.com/rw/training/specialty/Flight-Training-Tips-Dancing-With-the-Devil_13632.html
- http://blog.aopa.org/helicopter/?p=725
- www.faa.gov/documentLibrary/media/Advisory_Circular/AC_61-140.pdf
- www.faasafety.gov/files/gslac/library/documents/2011/Aug/56414/FAA%20P-8740-71%20Planning%20Autorotations%20[hi-res]%20branded.pdf

# General details

## Occurrence details

| | | |
|---|---|---|
| Date and time: | 12 July 2014 – 1513 EST | |
| Occurrence category: | Accident | |
| Primary occurrence type: | Collision with terrain | |
| Location: | 115 km W Rockhampton Airport, Queensland | |
| | Latitude: 23° 07.20' S | Longitude: 149° 23.27' E |

## Helicopter details

| | | |
|---|---|---|
| Manufacturer and model: | Robinson Helicopter Company R22 Beta | |
| Registration: | VH-ZZM | |
| Serial number: | 3499 | |
| Type of operation: | Mustering | |
| Persons on board: | Crew – 2 | Passengers – Nil |
| Injuries: | Crew – Nil | Passengers – Nil |
| Damage: | Substantial | |

# Australian Transport Safety Bureau

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

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

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

## Purpose of safety investigations

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

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

## About this Bulletin

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

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

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

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

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

Conducting these Short investigations has a number of benefits:

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

**Australian Transport Safety Bureau**

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Investigation

**ATSB Transport Safety Report**
Aviation Short Investigations

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