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Turboprop aircraft

TCAS advisory involving Bombardier DHC-8-315, VH-SBG

What happened

On 6 November 2012 at about 1250 Eastern Standard Time[1], a Bombardier DHC-8-315 aircraft, registered VH-SBG (SBG) was conducting a visual day circling approach, for a landing on runway 01 at Brisbane airport, Queensland. At the same time, a Eurocopter EC120B, registered VH-EHA (EHA) was preparing to depart from Doomben racecourse, which was located near to the expected base intercept position for the approach to runway 01.

VH-SBG

Source: George Canciani – courtesy Airliners.net

Prior to departing Doomben, a Brisbane Tower air traffic controller advised the pilot of EHA that a 2 to 3 minute delay for departure was expected, due to inbound aircraft. The pilot of EHA advised the controller that he therefore expected to take-off in 2 minutes.

About 50 seconds later, the controller advised the pilot of EHA that SBG was approaching from the north-west and that aircraft was required to be visually identified. The helicopter pilot confirmed sighting SBG and was subsequently issued a clearance to depart Doomben and track direct for the Brisbane central business district (CBD) at an altitude not above 1,000 ft, with a condition to maintain visual separation with SBG.

Shortly after the issuing the departure clearance to the pilot of EHA, the controller advised the flight crew of SBG that the helicopter was getting airborne at Doomben to track direct to the CBD and that the pilot would maintain separation. Upon receiving the traffic information, the flight crew of SBG visually identified that the helicopter was on the ground at Doomben, before they lost sight of it beneath the aircraft's nose. The flight crew reported that as they had confirmed the helicopter's relative position, the risk of conflict was considered unlikely and a descent to intercept a base position for runway 01 was continued. In addition to visually identifying EHA, the flight crew of SBG also had the helicopter identified on the aircraft's Traffic Collision Avoidance System (TCAS)[2] as a Traffic Advisory (TA)[3]. No action was required to be taken in response to a TCAS TA.

A short time after the TCAS TA, the flight crew of SBG received a TCAS Resolution Advisory (RA)[4], as a result of the helicopter commencing a take-off and climbing during its departure from Doomben. Radar information and recorded aircraft flight data showed that SBG descended to an altitude of about 1,200 ft as it approached the Doomben area, while at the same time EHA climbed to an altitude of about 800 ft. That was also about the time the flight crew of SBG initiated a climb in response to the TCAS RA. The lateral distance between the two aircraft was about 0.3 NM (555 m).

The first officer, who was the pilot flying (PF), responded to the TCAS RA by increasing the aircraft's engine power and climbing until advised by the aircraft's TCAS system that they were 'clear of conflict'. Once clear of the conflict, the PF reduced the rate of climb and looked to the Captain for confirmation to continue or discontinue the approach to land.

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

2 Traffic Collision Avoidance System (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.

3 Traffic Collision Avoidance System Traffic Advisory, when a TA is issued, pilots are instructed to initiate a visual search for the traffic causing the TA.

4 Traffic Collision Avoidance System Resolution Advisory, 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.

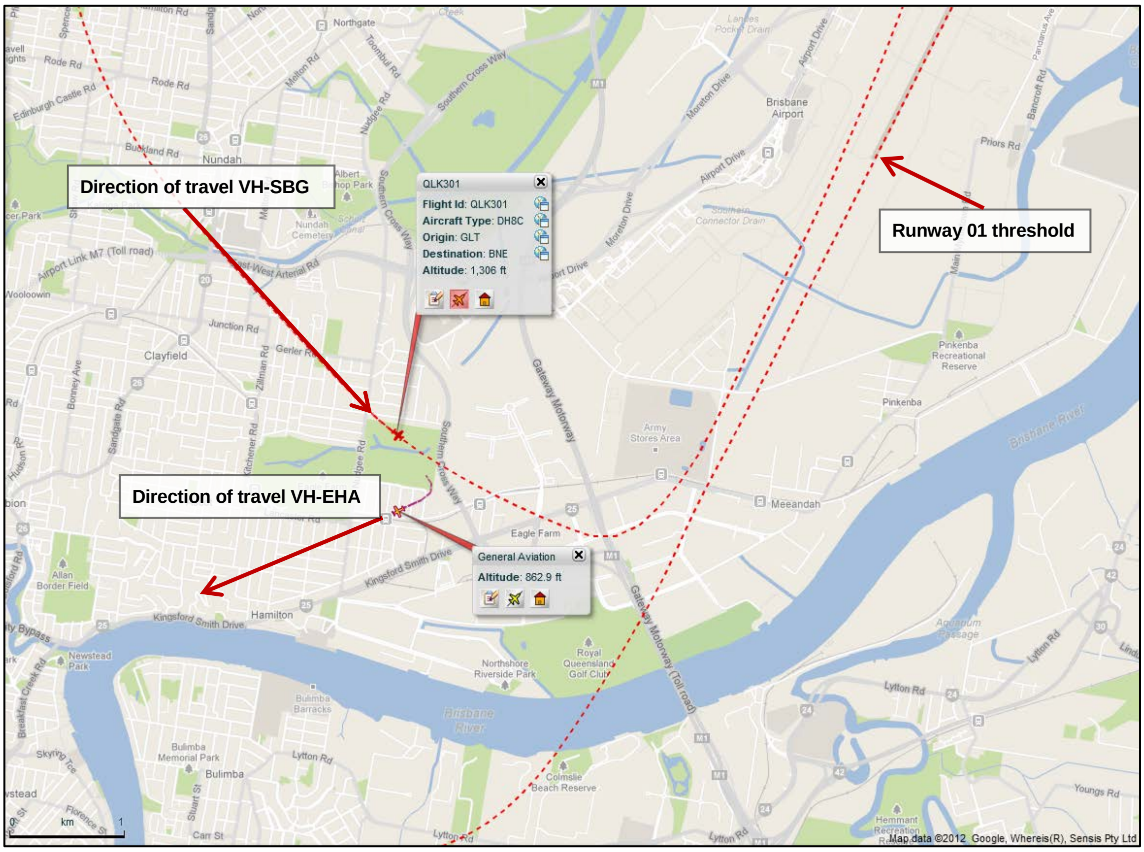
The PF was monitoring the aircraft radios and heard the Captain announce the TCAS RA to the Brisbane Tower along with his intention to discontinue the approach and conduct another circuit. As a result of the radio communication, the PF discontinued the approach and initiated a climb.

The crew stated that they were experiencing a higher than normal workload because of the unexpected TCAS RA. The Captain therefore assumed the role of PF and called for a go-around to be conducted. As a result, the first officer assumed the role of pilot monitoring (PM) which included performing the required action items in response to the PF's commands, managing the radios, and conducting other tasks associated with the PM role.

The requirement by the flight crew of SBG to conduct another circuit meant that the controller had to accommodate SBG into the existing landing sequence for runway 01. Approximately 4 minutes after the TCAS RA was announced, the Tower controller decided that to facilitate the sequencing of arrivals for runway 01, all departures were temporarily suspended.

The flight crew of SBG conducted a left circuit and landed on runway 01 without further incident.

Figure 1: Aircraft flight paths



Source: *Airservices Australia*

ATSB comment

In this occurrence the approaching aircraft's defence systems activated and alerted the flight crew of the potential traffic conflict. The flight crew took appropriate action in response to the resulting TCAS RA despite the assurance by the pilot of EHA that he was maintaining visual separation with SBG.

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, Airservices Australia has advised the ATSB that they are taking the following safety actions:

Update to the Manual of Air Traffic Standards

The Manual of Air Traffic Standards (MATS) was updated on 15 November 2012. The update requires air traffic controllers to provide additional consideration of performance characteristics prior to assigning visual separation to the pilot.

Specifically, MATS 10-50-221 (d) requires the controller to consider the possibility of a TCAS Resolution Advisory due to closer proximity of operation prior to assigning visual separation.

Safety message

Pilots and air traffic controllers should be mindful that although a timely departure may be desirable, a resolution advisory may be triggered on TCAS equipped aircraft despite visual separation being maintained. Consideration therefore should be given to the potential activation of a TCAS RA and the subsequent operational effects that may have.

General details

Occurrence details

Occurrence category	Incident	
Primary occurrence type:	TCAS advisory	
Location:	1.6 NM (3 km) south west of Brisbane Airport, Queensland	
	S 27° 23.05'	E 153° 07.05'

VH-SBG

Manufacturer and model:	Bombardier DHC-8-315
Registration:	VH-SBG
Operator:	Qantaslink
Type of operation:	Regular public transport
Damage:	None

VH-EHA

Manufacturer and model:	Eurocopter EC120B
Registration:	VH-EHA
Type of operation:	Charter
Damage:	None

Airspace related event involving Kingair, VH-VAH and Ag-Cat, VH- IFE

What happened

On 21 November 2012, at about 0942 Eastern Daylight-saving Time[1], a Beech 200 Kingair aircraft, registered VH-VAH (VAH), was on an aero-medical flight from Mildura to Swan Hill aerodrome, Victoria. On-board were the pilot and a paramedic. During descent, the pilot reported arranging separation with an outbound aircraft, prior to broadcasting that they were joining the circuit for runway 26. Turning onto the base leg, the pilot again broadcast as he configured the aircraft for landing. He advised that he received no response and did not hear any other aircraft operating on the Common Traffic Advisory Frequency (CTAF)[2]. Apart from the outbound aircraft, there was no traffic visible on the Traffic Collision and Avoidance System (TCAS)[3].

At about the same time, an Ag-Cat aircraft, registered VH-IFE (IFE), was approaching the circuit at Swan Hill after completing crop spraying at Robinvale, New South Wales. IFE (Figure 1) was tracking south-easterly and maintaining about 100 ft above ground level. The pilot conducted a look-out for other aircraft operating in the circuit area and specifically checked, but did not see any aircraft on final approach for runway 26. IFE commenced a right descending turn, about 500 m from the runway 26 threshold.

At the same time, VAH (Figure 2) was about 1.5 NM from the same runway threshold, about 400 ft above the ground and configured for landing, when the pilot noticed IFE at low-level. He immediately made a radio broadcast, but did not receive a response. The pilot of VAH then elected to continue the approach and monitor the agricultural aircraft.

The pilot of IFE continued a right descending oval approach (Figure 3) and landed short, on the grass to the right of the sealed section of runway 26. The aircraft then turned right and taxied back to the threshold, remaining close to the runway gable markers. At this point, the pilot of IFE then saw the lights of VAH on short final for runway 26. He manoeuvred to keep IFE as close to the northern gable markers as possible.

The pilot of VAH conducted a later than normal touchdown to stay clear of IFE.

Pilot comments – VAH

The pilot of VAH had not expected any aircraft in the circuit area, as there had been no response to his CTAF calls and since the departing aircraft, no other traffic in the aerodrome vicinity on the TCAS display.

The pilot believed the aircraft was landing on runway 22 and would be clear of VAH, as he had observed IFE arriving from the north-west, then commence a curved approach. However, he was unable to establish communication with IFE to confirm this expectation. He was surprised when IFE continued the turn and landed on the grass on the right side of runway 26. At this stage, he felt it was safer to continue the approach and land further down the runway.

The pilot commented on the need for pilots of smaller and slower aircraft to be appreciative of the scope of the flight envelope of high performance aircraft. In addition, they need to be mindful of the workload required to reconfigure a high performance aircraft, particularly in single-pilot operations.

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

2 Prescribed frequency for all aircraft to use in the vicinity of a non-controlled airport

3 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.

Pilot comments – IFE

IFE is a single-seat bi-plane aircraft that was not fitted with a radio. The pilot normally maintained a listening watch on a hand-held radio device. However, to avoid damage from the weather and chemicals he removed the hand-held radio when the aircraft was not flying. On this occasion, the pilot had inadvertently left the radio at home.

The pilot reported conducting a thorough check of the runway 26 approach as he joined the circuit, but had not seen VAH.

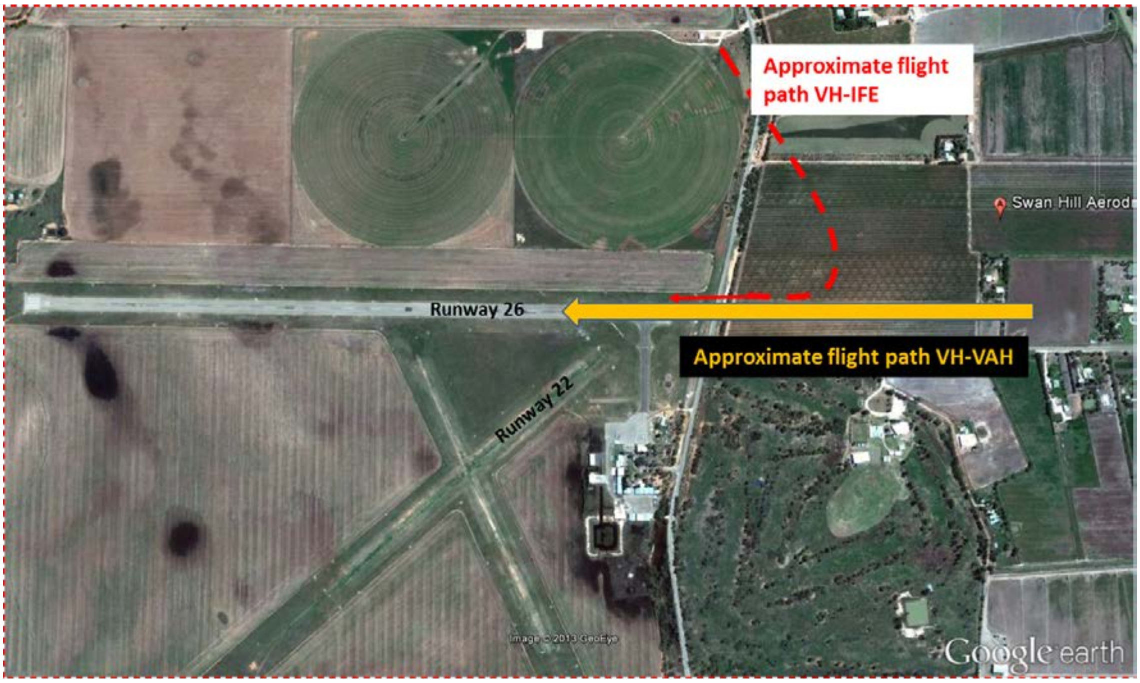
Figure 1: VH-IFE

Source: Phil Vabre

Figure 2: VH-VAH

Source: George Canciani

Figure 3: Approximate flight path of both aircraft at Swan Hill Aerodrome



Source: Google earth

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-IFE

As a result of this occurrence, the operator of VH-IFE has advised the ATSB that, as a result of this occurrence they will be fitting the aircraft with a radio.

Safety message

Research into safety at non-towered aerodromes conducted by the ATSB found that of 709 safety occurrences at non-towered aerodromes during 2003-08, 388 were attributed to a breakdown in communication. It notes that some other challenges facing pilots operating in a CTAF include:

- the mixture of aircraft types, performance levels, and operation types
- the need to continually deal with threats and hazards that may be encountered, such as unannounced traffic, or unexpected manoeuvres by nearby aircraft.

The Aviation Research and Analysis Report: *A pilot's guide to staying safe in the vicinity of non-towered aerodromes* can be found at:

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

The ATSB's Safety Watch initiative highlights safety around non-towered aerodromes as one of the major safety concerns that arise from investigation findings and from the occurrence data reported by industry. Safety Watch can be found at:

www.atsb.gov.au/safetywatch.aspx

General details

Occurrence details

Primary occurrence type:	Airspace related event	
Occurrence category:	Serious incident	
Location:	Swan Hill Aerodrome, Victoria	
	Latitude: S 35° 22.55'	Longitude E 143° 31.97'

King Air, VH-VAH

Manufacturer and model:	Hawker Beechcraft Corporation B200C	
Registration:	VH-VAH	
Type of operation:	Aerial Work – Air Ambulance	
Persons on board:	Crew – 1	Passengers – 1
Injuries:	Crew – Nil	Passengers – Nil
Damage:	None	

Ag-Cat, VH-IFE

Manufacturer and model:	Schweizer Aircraft Corporation, G-164B	
Registration:	VH-IFE	
Type of operation:	Aerial Work – Aerial Agriculture	
Persons on board:	Crew – 1	Passengers – Nil
Injuries:	Crew – Nil	Passengers – Nil
Damage:	None	

Piston aircraft

Runway excursion involving Cessna 210N, VH-WPD

What happened

On 23 August 2012 at 1733 Central Standard Time,[1] a Cessna 210N, registered VH-WPD (WPD), departed Numbulwar for Urapunga, Northern Territory, on a charter passenger flight with the pilot and two passengers on-board. The pilot reported intermittent sun glare during descent to Urapunga, when at 3 NM for runway 28. On late final, the pilot stated that the sun, which had previously been obscured by the surrounding terrain, created sun glare on the windscreen greatly restricting visibility. The pilot reported that he could identify the runway and what he believed to be the runway centreline, so continued the approach. The approach at this stage was a little high to ensure enough clearance between the aircraft and trees located near the runway edge. During the flare,[2] the pilot identified a runway edge marker in line with the nose of the aircraft. The pilot manoeuvred the aircraft back in line with the centre of the runway and the aircraft continued to float down above the runway.

The pilot stated that sun glare increasingly restricted visibility during the landing and he was unsure the amount of runway used. The aircraft touched down and the pilot applied heavy braking in short bursts. The pilot reported that the aircraft only slowed a little on the runway gravel surface and then the aircraft departed the end of the runway and travelled through two fences before coming to a stop. The aircraft came to rest on the right side of the fuselage, right wing and right horizontal stabiliser. The pilot secured the aircraft and the pilot and two passengers evacuated the aircraft. The pilot received minor injuries while evacuating the aircraft from barbed wire that had become entangled around the front of the aircraft (Figure 1). The two passengers were uninjured.

Figure 1: Accident site

Source: Aircraft operator

Pilot comments

The pilot reported that he selected runway 28 as it was the most aligned with the approach direction and into wind.

Due to the poor visibility created from the sun glare, the pilot stated he was over cautious with avoiding trees near the edge of the runway and therefore was slightly higher than normal over the threshold.

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

2 The flare is the final nose-up pitch of landing the aircraft to reduce the rate of descent to about zero at touch-down.

The pilot reported that he was wearing non-polarised sun glasses and that they made only a slight difference to his ability to see. The aircraft was equipped with sun visors, but they were not effective because the sun was so low on the horizon.

The windscreen was in good condition and clean.

Operator inspection

The operator inspected the runway, which was in good condition with a hard surface. The inspection found that the touchdown point was over half way down the runway. A runway edge marker had been run over by the left main landing gear tyre, before the aircraft came back onto the runway and then exited the end of the runway. The operator determined that the distance from the runway end to the second fence line was about 80 m. The flaps were observed to be at the full flap setting.

Safety action

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:

Pilot training

- During training greater emphasis will be placed on go-around procedures and identify situations when it would be used.
- Particularly during training increase awareness to consider the planning of circuit entry and ensure a backup is considered if conditions are not what was expected.
- Go-around procedures are practiced during in command under supervision (ICUS) training.

Safety message

A study[3] conducted by the US Federal Aviation Administration found that 85 per cent of accidents where glare from natural sunlight was considered among the reasons for the accident, occurred in clear weather and optimal visual conditions and 55 per cent were during the approach/landing and take-off/departure phase of the flight.

Identification of approach and landing hazards, decision making when a hazard becomes evident, recognition of a destabilised approach, being go-around prepared and go-around minded are among the safety issues identified by the Flight Safety Foundation[4] (FSF).

The FSF formed an approach–and–landing accident reduction (ALAR) task force that focused on accidents involving passenger and cargo operations of aircraft weighing 5,700 kg or more from 1980–1998. Although the study excludes most general aviation operations, lessons are transferable. The task force found that runway excursion and runway overruns equated to 20 per cent of the occurrences studied[5] and that failure to recognise the need for and to execute a go-around when appropriate was a primary reason of approach and landing accidents. The FSF

3 The study *Natural sunlight and its association to aviation accidents: frequency and prevention* identified 130 accidents from 1988 through 1998 in the US National Transport Safety Board database where glare from natural sunlight was considered among the reasons for the accident www.faa.gov/data_research/research/med_humanfacs/oamtechreports/2000s/media/0306.pdf.

4 The Flight Safety Foundation (FSF) is an independent international organisation that was formed in 1947 to pursue the continuous improvement of global aviation safety through research, auditing, education, advocacy and publishing.

5 FSF ALAR task force detailed study of 76 approach and landing accidents and serious incidents worldwide from 1984–1997.

developed briefing notes to assist in reducing the occurrence of approach and landing accidents. FSF briefing note 5.1 – *Approach hazards overview* contains an approach and landing risk awareness tool to help identify factors that can increase the risk of an accident during the approach and landing. The briefing note also contains the approach and landing risk reduction guide that is designed to help prevent approach and landing accidents. The briefing note is available at www.flightsafety.org/files/alar_bn5-1-apprhazard.pdf.

Other relevant FSF briefing notes include:

- FSF ALAR briefing note 6.1 – *Being prepare to go around* considers the importance of being go-around-prepared and being go-around-minded. The briefing note is available at www.flightsafety.org/files/alar_bn6-1-goaroundprep.pdf.
- FSF ALAR briefing note 8.1 – *Runway excursion and runway overruns* explores the factors involved in runway overruns and the strategies and lines of defence to mitigate such occurrences. The briefing note is available at www.flightsafety.org/files/alar_bn8-1-excursions.pdf.
- FSF ALAR briefing note 8.3 – *Landing distances* explores the factors that may affect the landing distance. The task force found that runway overruns were involved in 12 per cent of the 76 approach and landing occurrences studied. The briefing note is available at www.flightsafety.org/files/alar_bn8-3-distances.pdf.

The ATSB published two research reports into runway excursions in 2009, A worldwide review of commercial jet aircraft runway excursions and Minimising the likelihood and consequences of runway excursions, An Australian perspective. They are avialable at:

- www.atsb.gov.au/publications/2009/ar2008018_1.aspx
- www.atsb.gov.au/publications/2009/ar2008018_2.aspx.

General details

Manufacturer and model:	Cessna Aircraft Company 210N	
Registration:	VH-WPD	
Type of operation:	Charter – passenger	
Occurrence category:	Accident	
Primary occurrence type:	Runway excursion	
Location:	Urapunga (ALA), Northern Territory	
	Latitude: S 14° 42.65'	Longitude: E 134° 34.00'
Persons on board:	Crew – 1	Passengers – 2
Injuries:	Crew – 1 (minor)	Passengers – Nil
Damage:	Substantial	

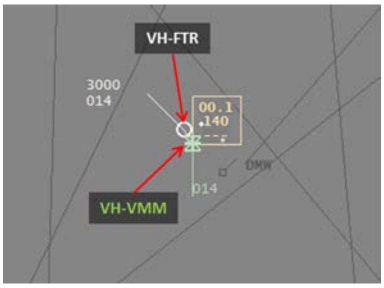
Aircraft proximity event involving a Cessna 172S, VH-VMM and a Schweizer 269C-1, VH-FTR

What happened

On 1 September 2012, the flight instructor and student pilot of a Schweizer 269C-1 helicopter, registered VH-FTR (FTR), were conducting a training flight from Parafield, South Australia and return, via the ‘Dam Wall’, a visual flight rules (VFR) approach point (Figure 1).

At about 1629 Central Standard Time[13], the instructor of FTR advised Adelaide Centre air traffic control (ATC) that he was south-west of the South Para Reservoir on descent to 1,500 ft, inbound for the Dam Wall. Adelaide Centre advised the instructor that there was an aircraft above and to the left at 2,500 ft inbound and two other aircraft 3 NM behind (Figure 2). The instructor became concerned with the aircraft behind as he could not sight them. The instructor also stated that, soon after, he received a traffic warning on the helicopter’s traffic warning system (TWS) for an aircraft 1 NM behind, at the same altitude.

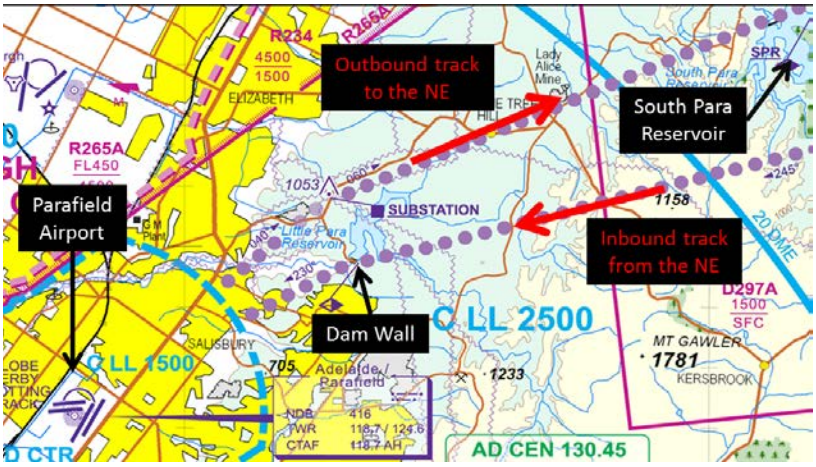
Aircraft positions at 1634:04



Source: Airservices Australia

At about the same time, a Cessna 172 aircraft, registered VH-VMM (VMM) was being operated on a solo training flight from Parafield and return, via the Dam Wall. When about 3-4 NM from the Dam Wall, at about 1,500 ft, the pilot was attempting to sight the Dam Wall when he observed a helicopter (FTR) in his 1 o’clock[14] position on a converging track. As a precaution, he reported conducting a 20° left turn and descending 100-200 ft. The turn could not be verified by Airservices Australia surveillance data. The pilot then temporarily lost sight of the helicopter as he became preoccupied with sighting the Dam Wall and preparing his inbound broadcast to Parafield Tower.

Figure 1: Inbound from the Dam Wall



Source: Airservices Australia

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

14 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.

Table 1 provides a summary of the subsequent events based on pilot recollections, and Airservices Australia data between the time 1633 and 1634.

Table 1: Summary of events between 1633 and 1634

Time	VH-FTR	VH-VMM	Separation
1633:18	FTR was maintaining 1,500 ft.	The pilot broadcast his inbound call to Parafield Tower, maintaining 1,500 ft, and received instructions to join downwind for runway 03 Right (R). He was advised of traffic in his 1 o'clock position at the same level. The pilot responded 'copy traffic'. Parafield Tower also advised that the aircraft's transponder had not yet been changed to the appropriate code (Figure 3). The pilot reported initially tracking for the base leg of the runway 21 Left circuit, but soon after, changed heading to track downwind for runway 03R.	Lateral separation was 0.7 NM; vertical separation was 0 ft.
1633:31	As the instructor could not sight the traffic behind, he advised the student to descend to 1,400 ft.	VMM was maintaining 1,500 ft.	Lateral separation reduced to 0.5 NM (Figure 4); vertical separation was 100 ft.
1633:51	FTR was maintaining 1,400 ft.	VMM was observed descending through 1,400 ft.	Lateral separation reduced to 0.2 NM; vertical separation was 0 ft.
1633:56	The instructor advised Parafield Tower that FTR was the traffic passed on to VMM [1633:18].	VMM was observed maintaining 1,300 ft.	Lateral separation reduced to 0.1 NM; vertical separation was 100 ft.
1634:04	Parafield Tower provided FTR with circuit joining instructions. FTR was maintaining 1,400 ft. The instructor and student observed VMM pass overhead.	VMM was observed climbing through 1,400 ft.	Vertical separation was less than 50 ft (Figure 5).
1634:18	The instructor advised Parafield Tower of the incident.		

Figure 2: Aircraft positions at 1629:00

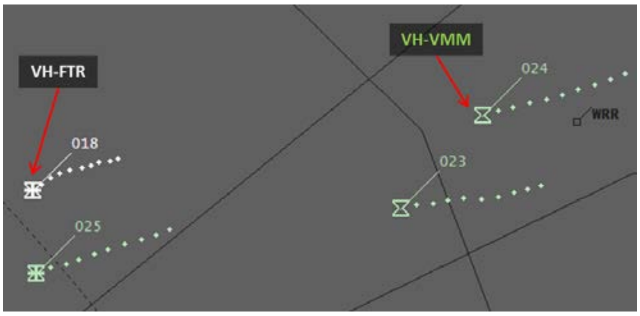


Figure 3: Aircraft positions at 1633:18

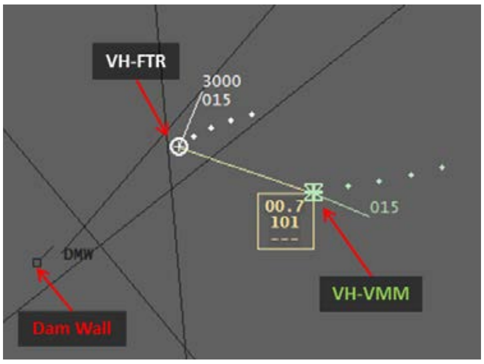


Figure 4: Aircraft positions at 1633:31

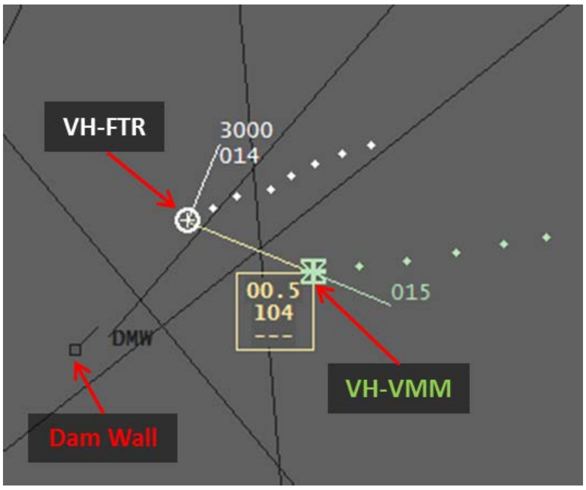
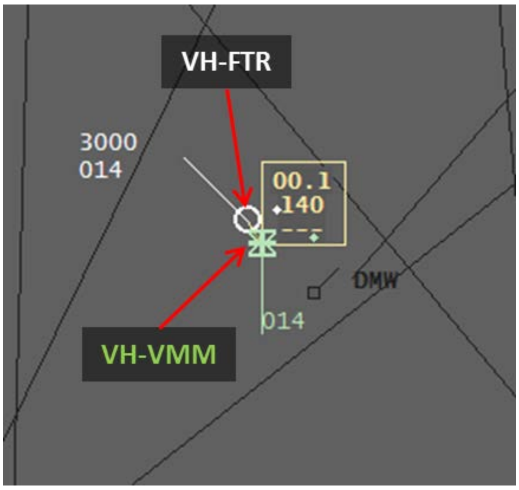


Figure 5: Aircraft positions at 1634:04



Source: Airservices Australia

Instructor comments (VH-FTR)

The instructor of FTR provided the following comments:

- **Approach points:** all aircraft inbound to Parafield from the north-east track via, and report at the Dam Wall, maintaining 1,500 ft. Consequently, all aircraft are directed to the same point at the same altitude.
- **Visibility:** when approaching the Dam Wall, it may be difficult to sight a helicopter as it may be obscured against the background of the suburbs and Parafield Airport below.
- **Radio frequency:** as pilots are required to change radio frequency near, or at the Dam Wall, aircraft operating in the vicinity may be on different frequencies, such as Adelaide Centre, the Parafield automatic terminal information service (ATIS) or Parafield Tower.
- **Speed disparity:** the typical cruising speed of a Cessna 172 type aircraft, such as VMM was nearly twice that of a helicopter such as FTR. Consequently, if a Cessna 172 was following a slower moving helicopter, and both were tracking for the same location at the same altitude, it is likely that the Cessna 172 may catch up with, or overtake the helicopter.
- **Blind spot:** the instructor commented that it is not only important to be aware of your operating environment, but to also be seen. Pilots need to take into account the respective blind spots of fixed-wing aircraft (below the nose) and helicopters (in the 6 o'clock position), particlarly when on the same track.

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 have taken the following safety action:

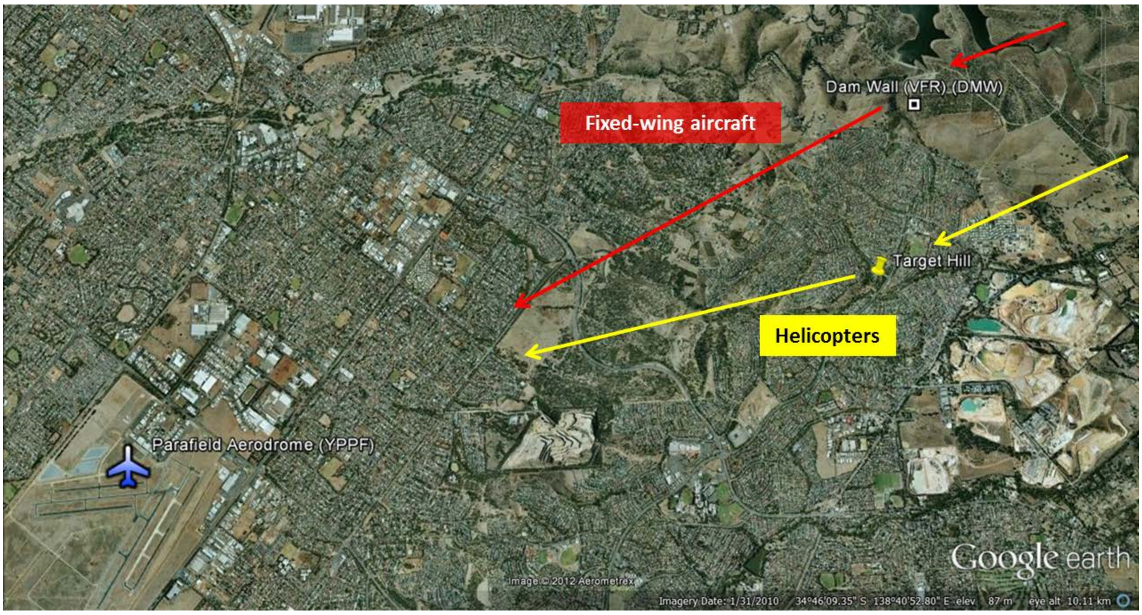
Proposed inbound track change

On 26 September 2012, the helicopter operator attended the South Australian Regional Airspace and Procedures Advisory Committee (RAPAC)[1] meeting and submitted a proposal to amend the Parafield Airport north-east inbound track for helicopters.

It was proposed that the inbound procedure for fixed-wing aircraft remain the same (Dam Wall), while helicopters track to a new VFR approach point, 'Target Hill' (Figure 4). This would provide for lateral separation between inbound fixed-wing aircraft and helicopters, and enhance pilot visibility[2]. Additionally, both would converge while operating on the same radio frequency within Class D airspace[3].

The Committee agreed in principle and forwarded the proposal to the Parafield Airport Users Group for consideration.

Figure 6: Proposed inbound track change



Source: Google earth/Helicopter operator

Safety message

VFR approach points, which are prominent landmarks, assist pilots with visual navigation and provide an orderly path for aircraft entering the circuit. When operating in and around high traffic

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1 RAPACs are primarily state-based forums for discussion of all matters relating to airspace and related procedures in Australia, and specifically, in their areas of responsibility. Membership is open to all significant airspace users through their major industry associations/organisations or independently.

2 Helicopter pilots are seated in the right seat, while fixed-wing pilots are positioned in the left seat.

3 Class D: all aircraft must obtain an airways clearance and communicate with ATC. Instrument flight rules (IFR) aircraft are positively separated from other IFR aircraft and are provided with traffic information on all VFR aircraft. VFR aircraft are provided with traffic information on all other aircraft.

density areas such as VFR approach points, it is crucial that pilots maintain a heightened level of situation awareness.

The Civil Aviation Safety Authority (CASA) states that good SA begins with having focused attention. This focus is directed at a pilot's surroundings, and being aware of what does and does not belong. In flight, a pilot has to be several minutes ahead of the aircraft to perceive what's going on and anticipate how things will change. The following safety publications provide additional information on situation awareness and are available for purchase from CASA, at http://casa.cart.net.au/store/safety-publications/:

- 'Look out! Situational awareness' DVD and booklet'
- 'Safety Behaviours: Human Factors for Pilots'

General details

Occurrence details

Occurrence category:	Serious incident	
Primary occurrence type:	Aircraft proximity event	
Location:	9 km NE of Parafield Airport, South Australia	
	Latitude: 34°44.95' S	Longitude: 138°43.13' E

Schweizer 269C-1, VH-FTR

Registration:	VH-FTR	
Manufacturer and model:	Schweizer Aircraft Corp 269C-1	
Type of operation:	Flying training – dual	
Persons on board:	Crew – 2	Passengers – Nil
Injuries:	Crew – Nil	Passengers – Nil
Damage:	Nil	

Cessna 172S, VH-VMM

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

Collision with terrain involving Cessna 172N, VH-JGR

What happened

VH-JGR

Source: Queensland Police Service

On 7 November 2012, at about 1000 Eastern Standard Time[1] a Cessna 172N registered VH-JGR (JGR) departed Archerfield Airport, Queensland on a training flight. The purpose of the flight was to conduct solo pre-test revision, prior to the pilot performing the Private Pilot Licence (PPL) flight test. The aircraft was booked for 2 hours. During the flight, the aircraft impacted terrain and was substantially damaged (Figure 1).

The pilot reported that he had very little memory of the flight, but did recall that he intended to fly to the southern training area, to practice holding heading and altitude for his upcoming flight test. The pilot stated that his usual practise was to track via Jimboomba, Beaudesert and Boonah before returning to Archerfield via Jimboomba. The pilot had not submitted a flight plan or left a flight note with a responsible person or lodged a Search and Rescue Time (SARTIME) with the Airservices Australia.

Following the accident, the pilot recalled regaining consciousness and crawling to JGR to broadcast a distress call on the aircraft radio. The aircraft was fitted with a personal locator beacon (PLB) but the pilot was unable to locate it after the accident to activate it.

At about 1330, an aircraft in the area reported hearing two mayday calls on the Brisbane Centre Frequency, the calls were very faint and not heard by Brisbane Centre. The area controller requested the pilot of another aircraft in the area to track south from Kagaru to investigate. At about 1410, a Cessna 172 was sighted in a paddock in uneven tussock strewn country about 2.5 Km south of Kagaru airplane landing area (ALA) on the runway heading.

The pilot was the only person on board and suffered severe injuries as a result of the accident and at about 1500, he was airlifted to hospital.

Weather

The weather was reported as fine, with light winds from the north-east.

Pilot experience

The pilot held a student pilots licence and had passed a General Flying Progress Test (GFPT), on 1 November 2008. At the time of the accident, the pilot had a total of 100.5 hours, 17 of which were logged as solo. On 15 February 2012, the pilot completed a PPL pre-test review. During the review, a number of areas were identified as requiring improvement. The pilot did not fly again until 25 October, when he completed a 90-day check ride of 1.5 hours duration. The pilot's next flight was the accident flight on 7 November.

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

Insurance report

A representative of the insurer attended the accident site and examined the wreckage. The insurer concluded that JGR collided with the ground at about 50-60 knots at about 60°left wing down and about 20°nose down, at a high rate of vertical descent with the engine at idle power.

Flying training school

The training school procedures required a student pilot to have a flight authorised by an instructor. On the day of the accident, the student pilot departed in the aircraft without the flight being appropriately authorised by an instructor, consequently the details of the flight were not recorded or monitored for search and rescue purposes.

Figure 1: VH-JGR

Source: Queensland Police Service

ATSB comment

The aircraft activated air switch indicated that the aircraft was airborne for approximately 45 minutes prior to the accident, placing the time of the accident at approximately 1100 or 3 hours prior to the aircraft being located.

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.

Flying School

In response to this accident, the flying school has amended their procedures so that a student pilot is not provided with the aircraft keys prior to the flight being appropriately authorised.

Safety message

This accident highlights the importance of lodging a Search and Rescue Time (SARTIME), Flight Plan or Flight Note with a responsible person, to eliminate any major delays in commencing a search. Failure to do this means that you are relying on being able to get an emergency call out, using your Emergency Locator Transmitter (ELT) to alert the Rescue Coordination Centre Australia (RCC) or relying on someone noticing that you have gone missing.

The possibility of an emergency situation should be considered by all pilots before take-off. Basic safety preparation before each flight could save your life and, at the very least, speed up your rescue. The chances of surviving the initial accident decrease rapidly with time. Knowing that someone is aware of your situation and a search is being initiated, provides a major morale boost and greatly improves your chances of survival.

For further reading on aviation search and rescue and improving your chances of survival is available from:

- www.amsa.gov.au/publications/documents/AviationSearchandRescue.pdf

General details

Manufacturer and model:	Cessna 172N	
Registration:	VH-JGR	
Type of operation:	Private	
Primary occurrence type:	Collision with terrain	
Location:	Near Kagaru ALA, Queensland	
	Latitude: S 27° 51.21’	Longitude: E 152° 55.50’
Persons on board:	Crew – 1	Passengers – 0
Injuries:	Crew – 1 Serious	Passengers – 0
Damage:	Substantial	

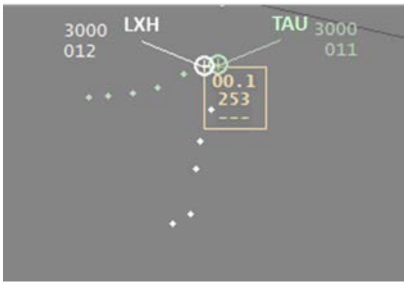
Aircraft proximity event between two Piper PA-28 aircraft, VH-LXH and VH-TAU

What happened

On 26 November 2012, a flight instructor and student flight instructor of a Piper PA-28 (Warrior) registered VH-LXH (LXH) were conducting circuits on runway 17 Left (L) at Moorabbin Airport, Victoria.

When on the final approach leg of the circuit, at 1523 Eastern Daylight-saving Time,[1] LXH received a clearance from Moorabbin Tower air traffic control (ATC) to conduct a touch-and-go.

Incident



Source: Airservices Australia

At 1526, the flight instructor and student pilot of another Warrior, registered VH-TAU (TAU), taxied to the holding point for runway 17L and advised ATC that they were ready to commence circuits. ATC advised TAU that they were cleared for takeoff and to follow the 'Cherokee' (LXH) that was currently on the runway.

LXH completed the touch-and-go and, shortly after, TAU commenced the takeoff on runway 17L.

At 1528, TAU was observed commencing the turn onto crosswind, at 700 feet above mean sea level (AMSL)[2]. At that time, LXH was on mid-crosswind, maintaining 1,100 feet (Figure1). The instructor of TAU noted that the turn was commenced at an earlier than normal position and advised the student to conduct the turn later on the next circuit. At that time, the instructor of LXH also observed TAU turn onto crosswind early and continued to monitor the aircraft. A review of the radar data indicated that the turn occurred earlier than other aircraft in the circuit.

LXH made a broadcast advising that they had turned onto downwind. Separation between LXH and TAU reduced to 0.3 NM laterally and 100 feet vertically (Figure 2).

Figure 1: Aircraft position at 1528

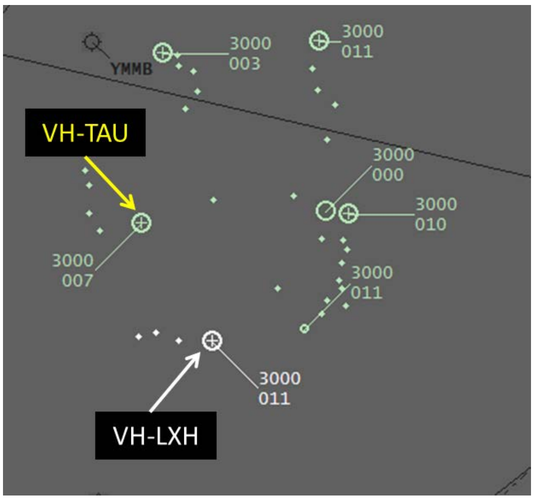
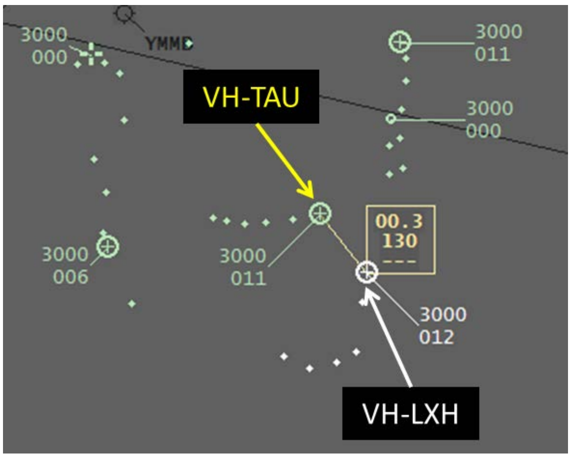


Figure 2: LXH on downwind



Source: Airservices Australia

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1 Eastern Daylight-savings Time was Universal Coordinated Time (UTC) +11 hours.

2 Moorabbin Airport is at 50 ft AMSL

Soon after, TAU commenced the turn onto downwind. The instructor of LXH continued to monitor the location of TAU and at 1529, observed TAU pass 100 feet below (Figure 3). TAU then advised ATC that they had turned onto downwind, however, the end of the broadcast was partially over-transmitted. At that time, separation had reduced 0.1 NM laterally, with both aircraft at 1,100 feet. Air traffic control then advised another aircraft, VH-TAX (TAX)[3] to follow the 'Cherokee' on mid-downwind. The pilot of TAX acknowledged the call.

About 30 seconds later, the instructor of TAU observed LXH to the left and incorrectly advised ATC that they had traffic in their '3 o'clock'[4] position and asked if they were to be following that aircraft (Figure 4). LXH then advised ATC that TAU had cut them off. ATC confirmed that TAU was to follow LXH and that they should widen their circuit to ensure separation.

Both aircraft continued without further incident.

Figure 3: TAU passes underneath LXH

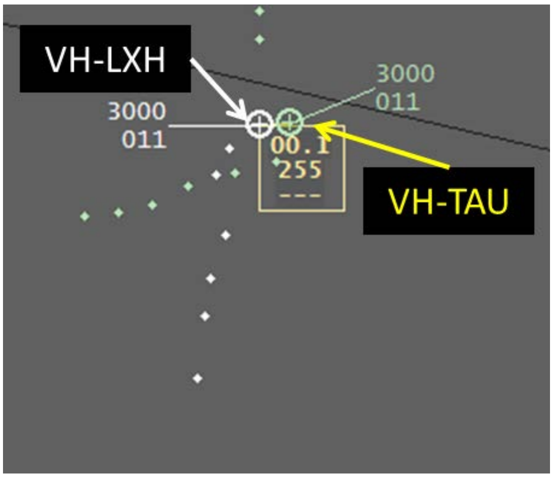
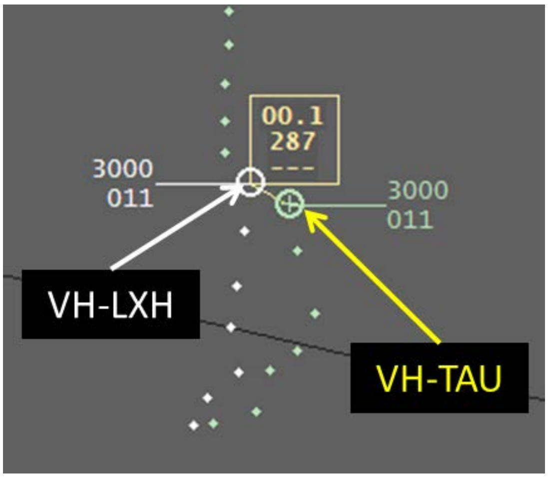


Figure 4: TAU sighted LXH



Source: Airservices Australia

Pilot comments

The instructor of TAU noted that he had not seen LXH and believed that he was meant to be following another Warrior, which was on late downwind.

The instructor of LXH commented that he had sighted TAU and recognised it was going to cross their flight path. He believed that it was better to remain predictable by maintaining a standard circuit than to carry out any avoiding actions. He also stated that he wanted to keep TAU in sight, and that carrying out an avoiding action may have hindered this. The instructor was confident that TAU would miss LXH.

Both pilots noted that there were a number of fixed-wing aircraft and helicopters operating in the circuit, and that, at times, it was busy on the Tower frequency.

Safety message

While ATC provides visual flight rules (VFR) aircraft with traffic information on other VFR aircraft in Class D[5] airspace, such as at Moorabbin, it is ultimately the pilot's responsibility to sight and maintain separation.

When operating in an area of high traffic density, it is crucial that pilots utilise both alerted and unalerted see-and-avoid techniques. Also, pilots should be mindful that when the circuit area is

3 TAX was another Piper PA-28 Warrior in the circuit that was ahead of LXH and TAU, on downwind.

4 The instructor advised that he realised he should have correctly stated the traffic was in the '9 o'clock' position.

5 Class D: all aircraft must obtain an airways clearance and communicate with ATC. Instrument flight rules (IFR) aircraft are positively separated from other IFR aircraft and are provided with traffic information on all VFR aircraft. VFR aircraft are provided with traffic information on all other aircraft.

busy, it is important to conform to the circuit pattern being employed at the time to ensure sufficient separation with preceding and following aircraft.

Further information on the limitations of the see-and-avoid principle is available at:

- www.atsb.gov.au/publications/1991/limit_see_avoid.aspx

Further information on Class D airspace and Moorabbin Airport, is available from the Civil Aviation Safety Authority at

- www.casa.gov.au/scripts/nc.dll?WCMS:STANDARD::pc=PC_93379
- www.casa.gov.au/scripts/nc.dll?WCMS:STANDARD::pc=PC_90007

General details

Occurrence details

Primary occurrence type:	Airprox	
Occurrence category:	Serious incident	
Location:	Moorabbin Airport, Victoria	
	Latitude: S 37º 58.55'	Longitude: E 145º 06.13'

VH-LXH

Manufacturer and model:	Piper PA-28-161	
Registration:	VH-LXH	
Type of operation:	Flying training	
Persons on board:	Crew – 2	Passengers – Nil
Injuries:	Crew – Nil	Passengers – Nil
Damage:	None	

VH-TAU

Manufacturer and model:	Piper PA-28-161	
Registration:	VH-TAU	
Type of operation:	Flying training	
Persons on board:	Crew – 2	Passengers – Nil
Injuries:	Crew – Nil	Passengers – Nil
Damage:	None	

Runway excursion involving Cessna T210, VH-DQI

What happened

On 30 December 2012, a Cessna 210 aircraft registered VH-DQI (DQI), was one of two aircraft being used to conduct scenic flights from Broome to Cape Leveque, Western Australia. On board DQI were the pilot and five passengers. DQI was the first aircraft to land at Cape Leveque and reported an uneventful landing on runway 13. After backtracking to park near the runway threshold, the passengers disembarked for a scenic tour.

During the 3 hours the passengers were away, the pilot allocated time to re-check the aircraft for the return flight to Broome.

VH-DQI

Source: Pilot

At about 1125 Western Standard Time[1], DQI was the first aircraft to depart. Early in the take-off run on runway 13, at a speed of about 20 knots, DQI veered to the left. The pilot applied right rudder to straighten the aircraft and continued with the takeoff. DQI was now about 1 m left of the runway centreline. About half way down the runway and at about 45 knots, DQI veered sharply to the left again. The pilot tried to correct the veer with full right rudder, but the aircraft did not respond. He then retarded the throttle and applied the brakes. The left wing of the aircraft clipped trees along the edge of the airstrip and DQI swung almost 90°, striking the right wing on the ground. The nose-wheel collapsed in the soft sand on the edge of the airstrip, resulting in the propeller striking the ground.

The pilot ensured the aircraft was safely shut down, and then assisted the passengers. One passenger received minor injuries and the aircraft sustained substantial damage.

Cape Leveque Aerodrome

Cape Leveque is an unlicenced airfield. Runway directions are 13/31 and the strip is compacted soil, 972 m long and 40 m wide.[2]

Aerodrome serviceability and local weather was checked daily by the local tourist operator staff. This information was then emailed to the aircraft operator in Broome. If the strip was unserviceable, a non-serviceable marker (white cross on the ground) was placed at the windsock. On the day of the accident, the operator reported that the airstrip was deemed operational, and no warnings were issued.

Weather

On the morning of the accident, there had been an early rain shower. The pilot reported that there had been rain in the area for the last few days. At the time of the accident, the weather was fine with a light easterly wind.

PIC comments

The pilot had almost 200 hours total time, with about 29 hours on the aircraft type. All his commercial experience had been with the same operator. He had planned the flight and

[1] Western Standard Time (WST) was Coordinated Universal Time (UTC) + 8.0 hours
[2] Information sourced from the *National Airfield Directory*, Aircraft Owners and Pilots Association of Australia 2012.

conducted a passenger safety brief covering all appropriate items including aircraft emergency equipment location.

Operator Comments

It was company policy that all new pilots are checked into Cape Leveque. The training records supplied to the ATSB indicated the pilot had initially been to the airstrip as an observational pilot, followed by almost 20 hours of ICUS[3]. This was the pilot's fourth command flight on this aircraft type, and his third as pilot in command to Cape Leveque.

After the accident, the pilot of the second aircraft inspected the airstrip and reported substantial washout on the edge of the strip inside the cone markers (Figure 2).

Figure 1: Right wing and nose gear damage

Figure 2: Washout on edge of airstrip

Source: Pilot

[3] In command under the supervision of a check pilot

Safety action

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

Aircraft Operator

The Chief Pilot has used the occurrence as an educational opportunity for all staff pilots. He re-focussed pilot attention on the following items:

- to keep the nosewheel on the centreline of the runway at all times
- to use right rudder during takeoff
- where possible, to avoid loose dirt and rough areas on the side of the runway
- if the takeoff needs to be rejected - close the throttle immediately
- to always use the checklist
- not to rush

Cape Leveque management

The aircraft operator reported that Cape Leveque management closed the airstrip the day after the accident to grade the surface and repair the washouts.

General details

Manufacturer and model:	Cessna T210N	
Registration:	VH-DQI	
Type of operation:	Charter - Passenger	
Primary occurrence type:	Runway Excursion	
Occurrence category:	Accident	
Location:	Cape Leveque airstrip	
	Latitude: S 16° 24.03'	Longitude: E 122° 55.88'
Persons on board:	Crew – 1	Passengers – 5
Injuries:	Crew – Nil	Passengers – 1 - minor
Damage:	Substantial	

Helicopters

Hard landing involving Robinson R44 VH-HYR

What happened

On 7 September 2012 at 0930 Western Standard Time[1], a Robinson R44 Raven II helicopter registered VH-HYR departed Broome airport, Western Australia on a charter flight to a pearl farm, located north of Broome. On board the helicopter were the pilot and three passengers.

Shortly after departing Broome Airport, the pilot reported that the engine and rotor tachometer were indicating that the engine and rotor revolutions per minute (RPM) were at the upper limit of the operating range.[2] The pilot also advised that the engine and rotor sounded like it was overspeeding.

VH-HYR

Source: Operator

The pilot stated that he attempted to override the governor[3] by manually rolling off the throttle, however he was unable to reduce the engine and rotor RPM. The pilot reported that he switched the governor off and was able to reduce the engine and rotor RPM, however the low RPM light and horn activated. The pilot flared[4] the helicopter slightly to increase the rotor RPM and lowered the collective[5]. The pilot attempted to re-join the engine and rotor RPM by manipulating the throttle, however this was unsuccessful.

At about 200 feet above ground level and a speed of 60-70 knots, the pilot was unable to re-establish control of the engine RPM and he elected to perform a precautionary landing on a road and entered an autorotation[6] by lowering the collective completely.

The pilot planned on performing a power recovery[7] and terminated the autorotation at about 10 feet above the ground with 0 knots groundspeed,[8] at the same time winding on throttle to increase the engine RPM, however the engine did not respond. The low rotor RPM light and horn activated and the pilot increased the collective lever in attempt to utilise the remaining rotor RPM to cushion the landing. However, the helicopter landed heavily and the main rotor severed the tail boom. All occupants exited the helicopter without injury.

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

2 Low rotor RPM does not produce sufficient lift, and high rotor RPM may cause structural damage, therefore rotor RPM limitations have minimum and maximum values. A green arc depicts the normal operating range with red lines showing the minimum and maximum values.

3 The governor is designed to assist in keeping the rotor RPM constant. The governor maintains the engine RPM by sensing changes and applying corrective throttle inputs through a friction clutch which can be overridden by the pilot. The governor is only active at about 80% engine RPM and can be switched on or off using a toggle switch on the end of the right seat collective.

4 The flare is used to reduce airspeed and rate of descent prior to landing. During autorotation the flare also increases rotor RPM.

5 A primary helicopter flight control that simultaneously affects the pitch of all blades of a lifting rotor. Collective input is the main control for vertical velocity.

6 Descent with power off, air flowing in reverse direction upwards through lifting rotor(s) causing it to continue to rotate at approximately cruise RPM. Pilot preserves usual control functions through pedals, cyclic and collective. The rate of descent is reduced just before ground impact by an increase in collective pitch; this increases lift, trading stored kinetic energy for increased aerodynamic reaction of the blades, and should result in a gentle touchdown.

7 Usually used during training to terminate an autorotation at a height above ground level, by restoring full engine power, resulting in the helicopter coming to a hover above the ground.

8 Aircraft's speed relative to the ground

Pilot Information and Comments

The pilot held a Commercial Pilots Licence (Helicopter) with a total time of 191 hours with 84 hours on the Robinson R44.

The pilot reported that when the RPM was first increased prior to take-off, he noticed that the rotor and engine tachometer were both indicating erratically for a few seconds, before stabilising.

Helicopter Information

The helicopter had a total of 880 hours at the time of the accident. The left magneto had been replaced on 5 September 2012. The helicopter's maintenance release noted that the right magneto was to be retained in service until 881.3 hours due to "inability to fit serviceable item".

Governor

The governor is designed to assist in controlling RPM under normal conditions. The governor maintains engine RPM by sensing changes and applies corrective throttle inputs through a friction clutch that can be overridden by the pilot.

The governor controller senses RPM via tachometer points in the engine's right magneto and provides a corrective signal to the governor assembly. The governor assembly is attached to the collective stick assembly. When activated by the governor controller, the governor gear-motor and attached worm gear drive a friction clutch connected to the throttle.

The Pilots Operating Handbook provides that in the event of a governor malfunction;

> *If the engine RPM governor malfunctions, grip throttle firmly to override governor, then switch governor off. Complete flight using manual throttle control.*

The Robinson R44 Maintenance Manual provides in relation to the Governor:

> *Governor Troubleshooting*
>
> *Erratic operation is usually indicative of wiring damage or tachometer point problems. Wiring damage may be evidenced by crushing, pinching, or abrasion, all of which can result in grounding of one or both centre wire conductor(s) to the shielding or to structure. Tachometer point problems may be caused by contamination (due to over-lubrication of magneto cam follower felt), oxidation (such as from an obstructed vent plug or leaking magneto drive seal), or loose contact(s), in addition to installation or assembly errors.*

Figure 1: VH-HYR

Source: *Operator*

ATSB comment

The ATSB did not attend the accident site or examine the aircraft and the reason for the accident could not be conclusively established. A malfunction within the governor assembly was not able to be ruled out. However, it is considered likely that the engine's right magneto may have malfunctioned by providing an incorrect signal to the governor assembly which manifested as a governor failure.

Safety message

For further reading of a similar accident involving a governor malfunction in an R44 refer to:

South African Civil Aviation Authority Investigation - CA18/2/3/8694

- www.caa.co.za/resource%20center/accidents%20&%20incid/reports/2009/8694.pdf

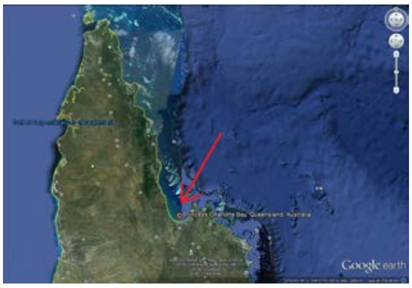
General details

Manufacturer and model:	Robinson R44 Raven II	
Registration:	VH-HYR	
Type of operation:	Charter (passenger)	
Occurrence type:	Accident	
Primary occurrence type:	Hard landing	
Location:	15 km north Broome Airport, Western Australia	
	Latitude:122°16'45 E	Longitude: 17°43'57 S
Persons on board:	Crew – 1	Passengers – 3
Injuries:	Crew – Nil	Passengers – Nil
Damage:	Substantial	

Loss of control involving Robinson R22, VH-HTD

What happened

Princess Charlotte Bay



Source: Google Earth

On 9 December 2012 at about 1700 Eastern Standard Time[1], a Robinson R22 helicopter, registered VH-HTD, departed a fishing camp situated on the mouth of the Normandy River, Queensland, on a private flight. The pilot was the only person on board.

The pilot was tracking north-west along the coastline at about 600 ft above ground level (AGL) when he sighted an object in the water, about 100 m from the coast. The pilot turned the helicopter towards the object and descended to have a closer look.

As the pilot approached the object, he initiated a flare[2] to reduce the airspeed and rate of descent. During the flare, the tail rotor contacted the water and the helicopter began to rotate to the right about the yaw axis. The pilot attempted to manoeuvre closer to the shoreline, however the helicopter began to rotate faster and the pilot was unable to regain control. The pilot closed the throttle and the helicopter settled into the water and rolled over to the right. The pilot exited through the passenger door without injury and swam to shore.

The pilot then walked towards the mouth of the Normandy River, to the fishing camp that he had departed from. After reaching the fishing camp, the pilot and two fishermen walked about 6 km across a clay pan in search of water and towards a base camp from which they had been conducting mustering operations earlier that day.

The Australian Maritime Safety Authority (AMSA) was alerted to the accident by the aircraft's Emergency Locater Transmitter (ELT), which had activated during the accident sequence. A rescue helicopter was dispatched from Cairns and the pilot and two fishermen were located, at about 0600 the following day, 1.8 km from the accident site.

Figure 1: VH-HTD

Source: Australian Maritime Safety Authority

[1] Eastern Standard Time (EST) was Coordinated Universal Time (UTC) + 10 hours
[2] Final nose up pitch, to reduce rate of descent and airspeed prior to touchdown.

Weather

The pilot reported that wind was about 20 knots, with a high smoke haze in the area and flat light[3] conditions.

Safety message

Robinson Helicopter Company issued Safety Notice SN-19 in regard to the hazards of low level flight over water; particularly the lack of depth perception. Even choppy water with its constantly varying surface may interfere with normal depth perception and cause a pilot to misjudge their height above water.

For further information on the hazards of low level flight over water please see:

- Robinson Safety Notice – SN-19: *Flying Low Over Water is Very Hazadous*
  www.robinsonheli.com/srvclib/rchsn19.pdf

For further information on flying in flat light conditions please see;

- FAA – *Flying in flat light and white out conditions*
  www.faasafety.gov/gslac/ALC/libview_normal.aspx?id=6844

General details

Manufacturer and model:	Robinson R22 Beta II	
Registration:	VH-HTD	
Type of operation:	Private	
Occurrence category:	Accident	
Primary occurrence type:	Loss of Control	
Location:	Princess Charlotte Bay, Queensland	
	Latitude: 14°26’36	Longitude:144°06’.03
Persons on board:	Crew – 1	Passengers – 0
Injuries:	Crew – 0	Passengers – 0
Damage:	Destroyed	

3 Flat light is an optical illusion, also known as "sector or partial white out." It is not as severe as "white out" but the condition causes pilots to lose their depth-of-field and contrast in vision. Flat light conditions are usually accompanied by overcast skies inhibiting any good visual clues. Such conditions can occur anywhere in the world, primarily in snow covered areas but can occur in dust, sand, mud flats, or on glassy water. Flat light can completely obscure features of the terrain, creating an inability to distinguish distances and closure rates. As a result of this reflected light, it can give pilots the illusion of ascending or descending when actually flying level.

Unmanned aerial systems

Airspace incursion involving unmanned airship, Airship 11

What happened

Airship 11

Source: Airship operator

On 28 October 2012, at about 1410 Eastern Daylight-saving Time[1], an unmanned airship[2] (callsign Airship 11) departed Keysborough, Victoria on a 30 minute test flight. The remote crew of the airship consisted of a pilot in command (PIC), an observer and a software engineer. The PIC used a portable radio-controlled transmitter as the data link to operate the airship.

The purpose of the flight was to assess the airship's centre of gravity and manoeuvrability characteristics with a new tail configuration. As a facility to conduct tethered flight[3] was not available, the crew planned to operate the flight below 200 ft above ground level (AGL) and within 100-200 m of their location, with the airship remaining clear of the Moorabbin Class D control area[4].

Shortly after takeoff, the crew noticed that the airship's centre of gravity was rearward, resulting in a nose-up attitude. The PIC corrected the attitude by adjusting the elevator trim setting.

About one minute later, when at about 130 ft, the PIC realised that he could not turn the airship to the left, but there were no restrictions with right turns.

The PIC elected to land the airship, however, the rearward centre of gravity resulted in the airship climbing. The PIC also noted that the airship's elevator controls were not responding. When climbing through 200 ft, the PIC determined that control of the airship had been lost although the data link was still functioning. The PIC reduced engine power to the idle position (the flight termination procedure[5]), but the airship continued to climb and track in a north-westerly direction toward the Moorabbin control area (Figure 1).

The PIC attempted to contact the Moorabbin control tower via radio to advise of the situation, but was unsuccessful. The PIC and software engineer then transferred the portable radio-controlled transmitter for Airship 11 to a support vehicle and followed the airship by road. The observer remained at Keysborough and contacted the Moorabbin control tower and emergency services via telephone[6].

At about 1428, the air traffic controllers at Moorabbin observed the airship about 2 NM to the south-east at about 1,000 ft. This was also confirmed by the pilot of an aircraft operating in the Moorabbin circuit.

1 Eastern Daylight Saving Time was Coordinated Universal Time (UTC) + 11 hours.

2 The airship was classified as an unmanned aircraft system (UAS), where the aircraft and its associated elements are operated with no pilot on board.

3 Refers to a flight that it is flown within limits imposed by a restraining device, which attaches the airship to the surface.

4 In Class D airspace, all aircraft must obtain an airways clearance and communicate with air traffic control. Instrument flight rules (IFR) aircraft are positively separated from other IFR aircraft and are provided with traffic information on all visual flight rules (VFR) aircraft. VFR aircraft are provided with traffic information on all other aircraft. Moorabbin Airport was about 3 NM from the operating area.

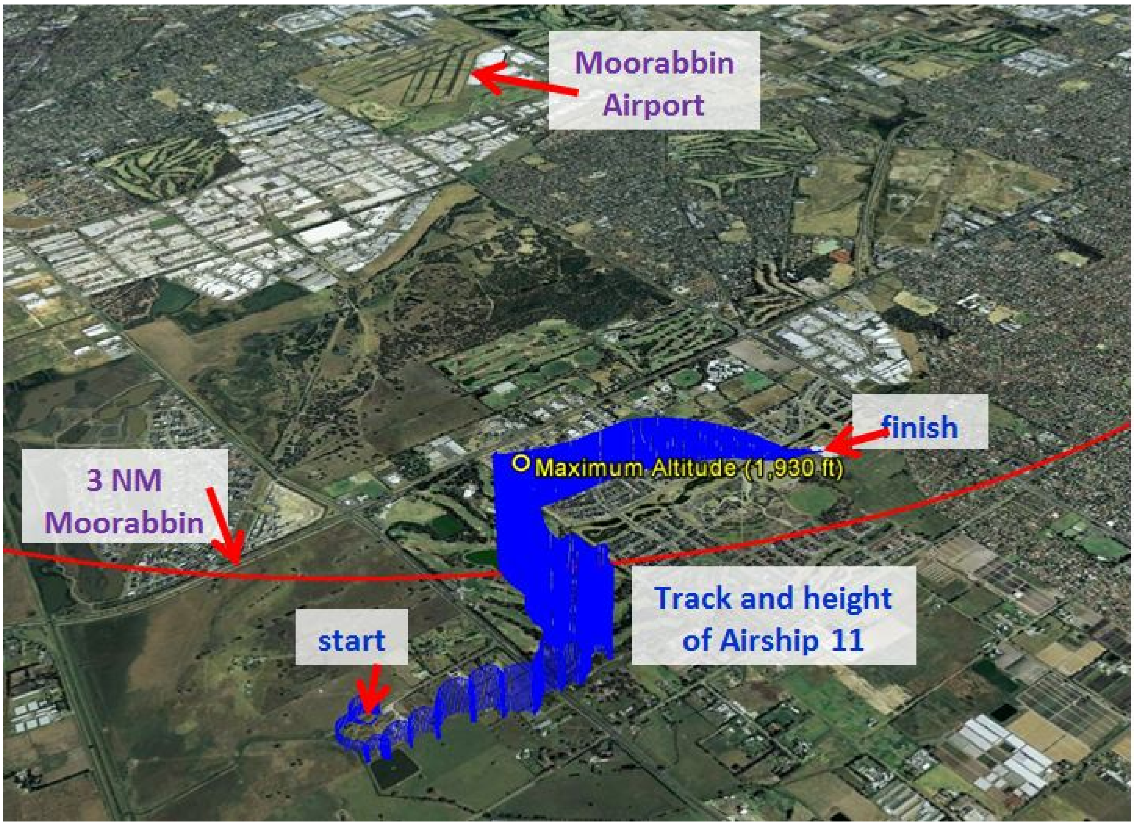
5 Reducing engine power to idle was intended to cause the airship to lose height and land.

6 The observer reported that it took some time to establish contact with the Moorabbin control tower as he did not have a contact number.

At about 1500, the airship landed on the roof of a commercial building. The airship sustained minor damage.

Data provided to the ATSB by the airship operator indicated that the airship reached an altitude of 1,930 ft and, at its closest, was 2.7 NM from Moorabbin Airport.

Figure 1: Track and height of Airship 11



Source: Google Earth and Airship operator

Airship information

The airship consisted of a 10 m long envelope (balloon), a gondola suspended below the envelope, and the tail surfaces. The envelope and gondola were manufactured in China and together weighed less than 7.6 kg. The airship's two piston engines were attached to the gondola, which also contained the autopilot, a payload box, batteries and the fuel tank. The airship was controlled by the PIC using a portable radio-controlled transmitter and was not fitted with a transponder, nor was one required.

The tail surfaces of the airship had been recently changed from a cruciform (+) to an X configuration.

Pre-flight preparations

Ground testing

Ground testing had been conducted prior to the flight, with all control surfaces responding correctly. However, the placement of the gondola on the envelope and the resulting centre of gravity could not be accurately determined prior to the test flight. In addition, the manoeuvrability characteristics of the X-tail were not known.

Documentation and training

A pre-flight checklist had not been completed as it had not been developed at the time. Furthermore, the manufacturer of the airship had provided the operator with basic documentation and no training.

Operating area

Flight testing with other airships had been conducted by the operator at a more remote location away from controlled airspace. However, on this occasion the operator decided to conduct the flight closer to the company's workshop.

Airservices Australia notification

While not required, on the morning of the flight, the PIC went to Moorabbin control tower with the intention of providing the air traffic controllers with details of the proposed test flight. The PIC reported that the controllers were not concerned with the proposed flight as it was intended to remain outside controlled airspace.

Operator investigation

The airship operator conducted an investigation into the incident and identified the following:

- **Control rod failure**: The loss of control was due to one of the tail-fin control rods becoming detached from a ball link. The rod had been incorrectly threaded into the housing when installed. A quality assurance check of the installation was not conducted.
- **Centre of gravity:** The crew had insufficient experience in setting up the airship and the manufacturer did not provide documentation for centre of gravity calculations.

Applicability of civil aviation regulations

The Civil Aviation Safety Regulations (CASRs) Part 101 *Unmanned aircraft and rockets*[7] (CASR 101) sets out the requirements for the operation of unmanned aircraft (including airships). As the envelope capacity of the airship of 36 cubic metres was less than 100 cubic metres, registration of the airship was not required and the airship was not subject to the airworthiness and flight crew qualification requirements of the Civil Aviation Regulations 1988 (CARs).

The Civil Aviation Safety Authority (CASA) advised the ATSB that the unmanned aircraft was allowed to operate below 400 ft, not in controlled airspace, not over a populous area and not within 3 NM of an airport without CASA approval. The remote crew of Airship 11 had intended to comply with these requirements.

In July 2011, CASA commenced a project to provide more comprehensive guidance on the regulatory requirements and approval processes for the commercial operation of unmanned aircraft systems (UAS) in Australia. The guidance will consider the long term integration of UAS into normal aviation operations in all classes of airspace. However, CASA advised that this particular operation type would still need to meet the requirements of CASR 101 and the intention of the project is to provide enhanced guidance material on all UAS flying related matters, including test flight activities.

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.

Airship operator

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

- source an airship from another manufacturer that will provide training and documentation;
- develop a safe method for tethered air testing;

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7 See Volume 3 of the Civil Aviation Safety Regulations 1998.

- develop a simulator for a small X-tail airship;
- locate a suitable site for flight testing away from populated areas;
- install the ground control station in the support vehicle;
- develop a pre-flight checklist; and
- develop a change management process to consider risks when changes are made to hardware or processes.

General details

Manufacturer and model:	China Advertising Balloons Co Ltd	
Type of operation:	Other	
Occurrence category	Incident	
Primary occurrence type:	Airspace incursion	
Location:	2.7 NM east of Moorabbin Airport, Victoria	
	Latitude: S 38° 00.50'	Longitude: E 145° 14.50'
Damage:	Minor	

Australian Transport Safety Bureau

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

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

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

Purpose of safety investigations

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

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

About this Bulletin

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

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

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

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

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

Conducting these Short investigations has a number of benefits:

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

ATSB Transport Safety Report

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