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What happened

On the morning of 4 August 2016, Qantas Flight QF61, an Airbus A330 aircraft, registered VH-QPC, was prepared for departure from Brisbane Airport, Queensland, for a flight to Narita Airport, Tokyo, Japan.

The flight dispatcher, responsible for flight planning, started building the flight plan for QF61 at about 0800 Eastern Standard Time (EST) at the company integrated operations centre (IOC). In addition to the destination of Narita Airport, the flight plan included two destination alternate[1] airports, Haneda Airport, Tokyo, Japan and Saipan International Airport, Saipan (Figure 1). Saipan Airport was also the extended diversion time operations (EDTO)[2] alternate airport (see *Extended diversion time operations*).

During the process of building the flight plan, the flight dispatcher noticed one of the aircraft's two global positioning system (GPS) navigation units was recorded as an unserviceable item on the aircraft minimum equipment list (MEL).[3] The flight dispatcher also identified that two serviceable GPS units were required at dispatch, due to the forecast westerly winds, to allow the use of Saipan Airport runway 25 GPS approach as an alternate airport for destination and EDTO purposes. Therefore, they contacted the section of the IOC responsible for aircraft maintenance (maintenance watch) to check if the unserviceable MEL item (GPS 2) would be cleared before the aircraft's departure.

Maintenance watch indicated that the unit would be fixed and the unserviceability removed before the aircraft departed.[4] The flight dispatcher completed the flight planning documents with the GPS 2 unit listed as an unserviceable MEL[5] item – with the expectation that this would be removed before departure. However, the dispatcher did not make a note in the flight planning documents to advise the flight crew that this MEL item should be cleared before the flight departed. They then sent the documents to the flight crew about 85 minutes prior to the scheduled departure time.[6]

The captain for QF61 signed on for work at Brisbane Airport at 0945, after receiving an electronic copy of the flight plan and briefing package. After reviewing the package, the captain requested an additional 1,700 kg of fuel to allow for a second mainland Japan destination alternate airport (Nagoya in addition to Haneda) (Figure 1). They then discussed the implications of the unserviceable GPS 2 unit with the other two flight crewmembers.

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1 Alternate airport is the airport chosen in advance which the aircraft can divert to in the case that the destination airport has weather below the minimum conditions allowable for landing.

2 EDTO was previously called extended operations (ETOPS). For the purpose of this report EDTO will be used.

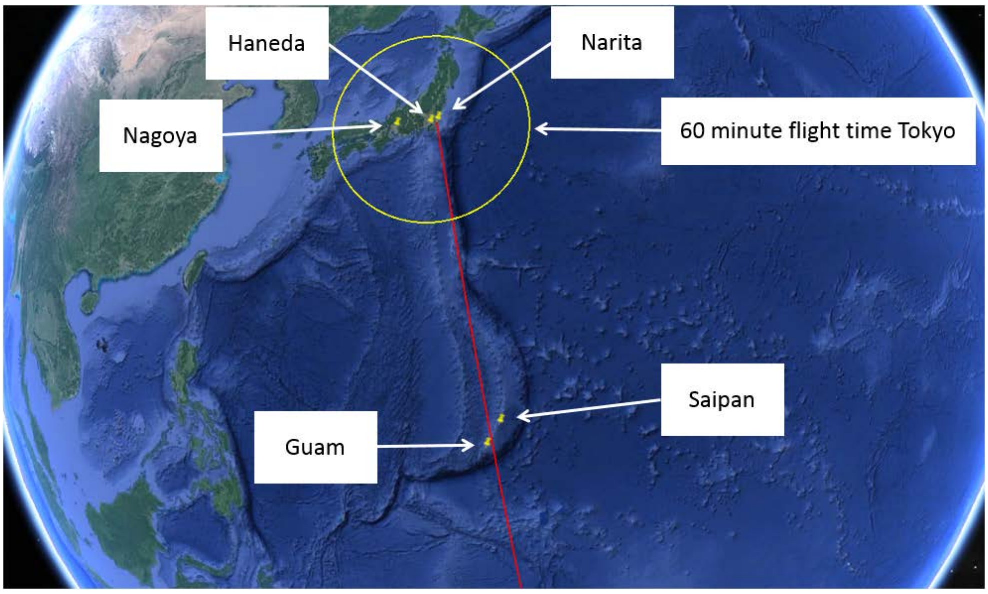
3 The MEL is a list of aircraft systems which are approved to be inoperative when the aircraft is dispatched.

4 The investigation was unable to determine who the flight dispatcher spoke to from the maintenance watch section.

5 The hardcopy Technical Log on board the aircraft is the legal document for raising and clearing MEL items and therefore an unserviceability may be cleared by maintenance after flight planning is completed.

6 The flight planning documents included a nine page flight plan and 32 page briefing package with weather, notice to airmen (NOTAM) and MEL report.

Figure 1: QF61 Destination and EDTO alternates



Source: Google earth, annotated by ATSB

The captain initially thought that two GPS units were required at dispatch because the Saipan Airport runway 25 approach procedure required GPS. However, after further discussion they decided that they were mistaken as maintenance and flight dispatch were aware one GPS was unserviceable and the captain had very few past experiences of an incorrect serviceability requirement at dispatch. One flight crew member then mentioned that the flight crew operating manual indicated one GPS unit was required.[7]

The captain referred to the MEL. The MEL includes the MEL items and their associated operational procedures. The operational procedures may impose additional operational requirements to what is documented in the MEL items. The MEL item for the aircraft GPS function indicated only one GPS unit was required at dispatch. However, the associated operational procedures indicated that 'primary means GNSS approval'[8] was required at dispatch if the alternate airport arrival procedure requires GPS navigation. 'Primary means GNSS approval' indicated the requirement for two operational GPS units. When the captain reviewed the MEL operational procedures they considered the reference to 'alternate' to be a reference to destination alternate airport and not to an EDTO alternate airport. They planned to use Saipan as an EDTO alternate airport and not a destination alternate airport, having already decided to add a second mainland Japan destination alternate airport. This fitted with their expectation that the unserviceable GPS 2 MEL item was acceptable for their flight.

The flight departed from Brisbane with 12 crew and 231 passengers on board and proceeded in accordance with the flight plan. As QF61 travelled north along the east coast of Australia, the captain was uncomfortable with their decision to accept the aircraft with GPS 2 listed as unserviceable.[9] Therefore, the captain reviewed the flight plan and the publications. They concluded they had misinterpreted the MEL operational procedures reference to alternate airport requirements and that their flight plan required two serviceable GPS units to use the Saipan Airport runway 25 GPS approach for destination or EDTO alternate airport purposes.

The captain identified Guam Airport (runway 24R VOR/DME[10]) as a suitable airport to plan to use instead of Saipan Airport for their EDTO alternate airport and briefed the other two flight crew

7 This was an inflight requirement as opposed to a dispatch requirement. The dispatch requirement includes system redundancies to account for unforeseen failures.
8 Global navigation satellite system (GNSS) supports the aircraft GPS unit.
9 GPS 2 operated throughout the flight without fault.
10 Ground based radio navigation aid using VOR for steering guidance with DME distance information.

members. However, one flight crew member queried if Guam could be used for replanning in lieu of Saipan without two serviceable GPS units. The attention of this flight crewmember was drawn to a note on one of the Guam terminal plate pages (Figure 2), which indicated runway 24R required ‘primary means GNSS approval’ for use as an alternate airport. However, the captain considered that this was a reference to the destination alternate (which required two separate approaches) and that the runway 24R VOR/DME approach could be used for EDTO alternate purposes (see *Use of Guam Airport as an adequate aerodrome*).

The captain entered a new critical point[11] between Tokyo and Guam (in lieu of Saipan) into the aircraft flight management and guidance computer. The computer calculated that an extra 800 kg of fuel was required, which was within the limits of the extra fuel the captain requested before departure. The flight continued to Narita Airport and landed without further incident.

The GPS 2 unit was observed by the crew to be serviceable throughout the flight. It was tested by maintenance at Narita Airport, found to be serviceable, and then removed from the MEL unserviceability list before the next flight.

Extended diversion time operations

For the A330, extended diversion time operations (EDTO) apply at any stage of the flight where the flight time to an adequate aerodrome (EDTO alternate), at the one engine inoperative cruise speed, is greater than 60 minutes. The EDTO limit for the A330 is 180 minutes.

For further information on EDTO requirements refer to *Civil Aviation Advisory Publication 82-1(1): Extended diversion time operations (EDTO)*

Use of Guam Airport as an adequate aerodrome

In accordance with Civil Aviation Order 82.0 paragraph 2.1, an EDTO alternate aerodrome requires at least one suitable authorised instrument approach procedure. Therefore, the Guam Airport runway 24R VOR/DME approach could be used by flight QF61 for this purpose.

If Guam Airport runway 24R had been used as a destination alternate airport, then two instrument approach procedures, which do not use a common ground based radio navigation aid, would have been required. In this case, the runway 24R GPS approach would have been required as the second approach and therefore two serviceable GPS units would have been required at dispatch. Hence the reference to ‘primary means GNSS approval’ for runway 24R on the Guam terminal plate page, which caught the attention of one of the flight crew members (Figure 2).

For further information about alternate requirements for international IFR[12] operations outside Australia, refer to Civil Aviation Safety Authority *Manual of Standards 173 paragraph 8.1.11.*

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11 The flight plan critical point is the point between two airports, which are equi-distant in time and fuel. The critical point is used to aid decision making between continuing to a destination and diverting to an alternate if a problem occurs in flight. The critical point for QF61 was based on the critical flight condition of one engine inoperative and the cabin depressurised.

12 Instrument flight rules (IFR): a set of regulations that permit the pilot to operate an aircraft to operate in instrument meteorological conditions (IMC), which have much lower weather minimums than visual flight rules (VFR). Procedures and training are significantly more complex as a pilot must demonstrate competency in IMC conditions while controlling the aircraft solely by reference to instruments. IFR-capable aircraft have greater equipment and maintenance requirements.

Figure 2: Guam terminal procedures note for Qantas operations

FOR FILING AS ALTERNATE

	Precision	Non-Precision				
	Rwys 6L/R	2 Rwys 6L/R	3 or 4 Rwys 6L/R	1 Rwy 6R	1 Rwy 24L	1 Rwy 24R
C D	1200-3	1200-3	1200-3½	800-3	1000-4¼	1000-4

1 Requires Primary Means GNSS Approval.
2 Requires Rwy 6R with its LOC and Rwy 6L with its VOR.
3 Requires both Rwys & LOCs.
4 Rwy 6L: Requires its LOC & VOR.

DEFAULT: 2800′-4 1/4 SM. BASED ON 2600′ MSA. **NOISE PAGE:** NO

Source: Aircraft captain, annotated by ATSB

Global positioning system unserviceability

The number 2 GPS was recorded as unserviceable and raised as an MEL item for QPC on 31 July 2016. The A330 GPS MEL had a repair interval of 10 consecutive calendar days and was scheduled for repair on 8 August 2016. No change was made to this schedule prior to the dispatch of flight QF61 on 4 August 2016.

Flight dispatcher comment

The flight plan had a free text box on the front page, which the flight dispatcher used to communicate the presence of a tropical storm to the flight crew in the incident flight. The flight dispatcher commented that in future they would use this free text box to communicate to the flight crew if they expected a change to the MEL status of the aircraft before dispatch.

ATSB comment

The ATSB notes that in large organisations there may be multiple departments with responsibilities for the dispatch of an aircraft. Whereas procedures are normally executed within a department, processes often involve multiple departments. Cross-checks occurred within the IOC and separately among the flight crew during this incident flight, but the cross-checks were not conducted between the departments, where personnel had a different mental model of the situation. The flight dispatcher believed the GPS 2 MEL item would be cleared before flight and the captain believed the flight was planned to be released with the GPS 2 as an unserviceable MEL item.

Safety message

This incident highlights the importance of personnel challenging their own assumptions when something does not appear right in the environment. After the dispatch of QF61 from Brisbane Airport, the captain experienced a ‘gut feeling’ that something was not right. Rather than ignore their sense of unease, the captain reviewed the flight plan and company documents, identified the problem and resolved the issue so that the flight could continue without compromising safety. Throughout the process, they kept the other flight crewmembers informed of the problem they had identified and their decision-making, which enabled the crew to provide feedback to the captain.

General details

Occurrence details

Date and time:	4 August 2016 – 1000 EST	
Occurrence category:	Incident	
Primary occurrence type:	Aircraft preparation event	
Location:	Brisbane Airport, Qld	
	Latitude: 27° 23.05’ S	Longitude: 153° 07.05’ E

Aircraft details

Manufacturer and model:	Airbus A330	
Registration:	VH-QPC	
Operator:	Qantas Airways Limited	
Serial number:	0564	
Type of operation:	Air Transport High Capacity – passenger	
Persons on board:	Crew – 12	Passengers – 231
Injuries:	Crew – 0	Passengers – 0
Aircraft damage:	Nil	

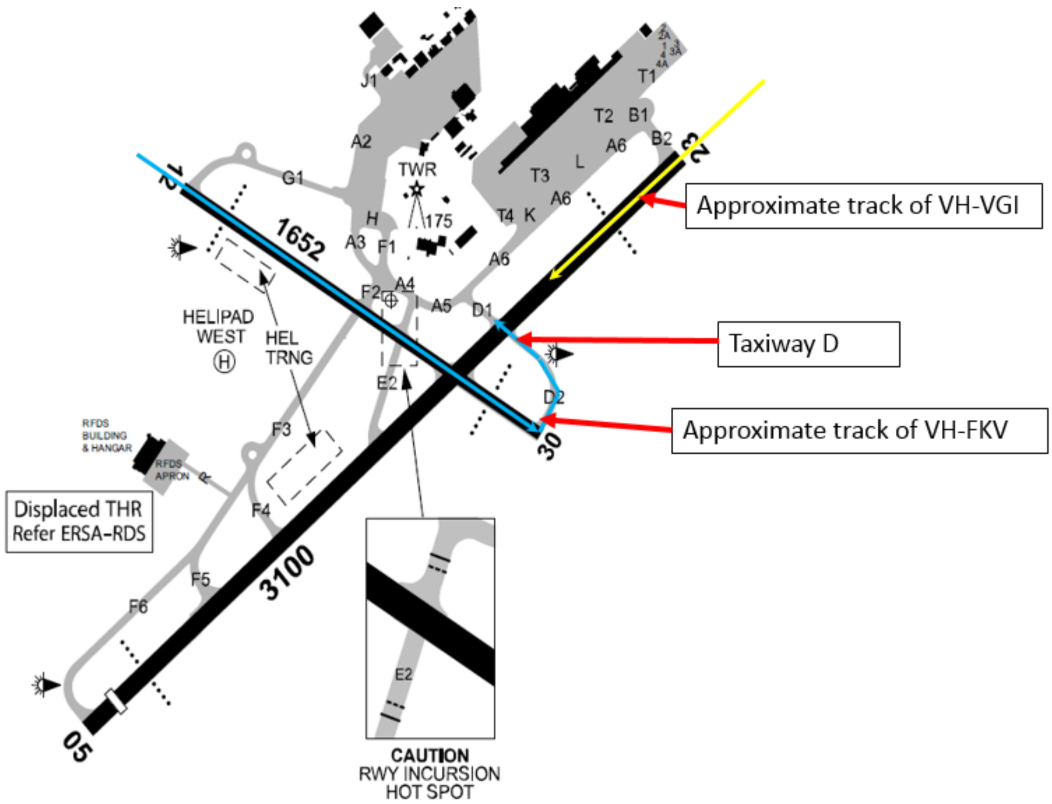
Loss of separation due to runway incursion involving Airbus A320, VH-VGI, and Fokker F50, VH-FKV

What happened

On 17 August 2016, at about 0926 Central Standard Time (CST), an Alliance Airlines Fokker F27 MK 50 aircraft (Fokker 50), registered VH-FKV (FKV), and operating with callsign ‘Unity 3201’, landed on runway 12 at Adelaide Airport, South Australia (SA) after a flight from Olympic Dam, SA. The flight crew consisted of a captain seated in the left seat and a check captain seated in the right seat acting as the first officer. Also on board were two cabin crewmembers and 49 passengers.

Air traffic control (ATC) audio recordings showed that at 0926:53, after FKV had rolled through the intersection with runway 23, the aerodrome controller (ADC) cleared an aircraft for take-off on runway 23 (Figure 1).

Figure 1: Adelaide Airport



Source: Airservices Australia – annotated by ATSB

At the end of runway 12, FKV then exited runway 12 onto taxiway D2. After vacating the runway, the check captain switched the aircraft radio from the ATC Tower frequency to Ground frequency and reconfigured the aircraft in accordance with standard operating procedures after landing. The check captain was unable to immediately contact the surface movement controller (SMC) due to congestion on the Ground frequency. The SMC position had combined SMC and airways clearance[1] delivery responsibility.

At 0927:46, the ADC cleared a Jetstar Airbus A320 aircraft, registered VH-VGI (VGI), to land on runway 23. At that stage, the ADC sighted the A320 about 3 NM away on final approach. The flight crew of FKV did not hear that clearance.

Shortly after entering taxiway D2, the check captain, seated on the right of FKV looked outside and sighted an aircraft in the take-off roll on runway 23 and also sighted the A320 on final approach. They estimated that the A320 was 5 to 6 NM away. Based on that estimate, the check captain assessed that they would probably be cleared to cross runway 23 behind the departing aircraft and in front of the landing A320, and then turned their attention inside the cockpit to complete their after-landing checks.

As FKV approached holding point D2, the flight crew had not received an ATC clearance to cross runway 23, and the flight crew therefore assumed they were going to stop at the holding point. The check captain was still waiting for a break in transmissions to make their initial contact with the SMC to advise 'Adelaide Ground, Unity 3201 for bay 50 golf'.

The SMC was issuing a clearance to another aircraft when they sighted FKV taxiing on taxiway D2 towards the direction the controller was facing. At 0927:49, the SMC told the flight crew of an aircraft awaiting an airways clearance to standby, then immediately said 'Unity 3201 hold short of runway 23, I've got you going to 50 golf'.

The check captain of FKV reported that the start of the transmission from the SMC was over-transmitted and what they heard was 'runway 23 and I've got you for bay 50 golf'. As the instruction included the parking bay, the check captain thought the SMC had instructed them to 'cross runway 23…' and read back 'cross runway 23 to 50 golf, Unity 3201'. The SMC thought the pilot read back 'short runway 23...' and assumed that the word 'hold' had been 'clipped'. Both flight crewmembers of FKV thought they had received a clearance to cross runway 23.

The ADC sighted FKV on taxiway D2 and heard the SMC say 'hold short', but did not hear the response from the flight crew. The ADC scanned runway 23 to check it was still clear for the landing A320, which was then over buildings and less than 30 seconds from touchdown, and then commenced a handover of the ADC position to another controller.

At 0928:10, the SMC coordinated[2] with the ADC and cleared a vehicle to cross runway 12.

The captain (in the left seat) of FKV then looked to their left and stated 'clear left' and taxied the aircraft onto runway 23 to cross. The check captain then looked to their right and sighted the A320 and reported that it was a lot closer than they had expected.

The SMC had looked down at their screen to check the flight strip for the aircraft awaiting a clearance. As the controller looked up, they saw FKV crossing the holding point.

At 0928:21, the SMC called 'hold short' and immediately realising that was not the correct instruction, said 'Unity expedite expedite Unity'. The SMC could then see the A320 in the go-around. The ADC heard the SMC call 'expedite' and looked up to see the A320 about 100 ft above the runway – already in the go-around. At 0928:25, the ADC directed the A320 crew to go around.

The captain of FKV continued to taxi the aircraft across the runway and onto taxiway D1 and did not sight the A320 at any time. The A320 (VGI) returned to land without further incident.

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1 A clearance issued by ATC to operate in controller airspace along a designated track or route at a specified level to a specified point or flight-planned destination.

2 Coordination is the process of obtaining agreement on clearances, transfer of control, advice or information to be issued to aircraft, by means of information exchanged.

Flight crew (FKV) comments

Check captain acting as first officer

The check captain commented that a crossing instruction fitted with their judgment of the situation when they first sighted the A320 while taxiing on D2. They were close to the holding point when they received the initial (hold short) instruction from ATC, and assessed that there was a level of urgency in the SMC's voice which indicated to them that it was a crossing instruction.

The sun was behind the A320 on final approach to runway 23, which may have affected the check captain's initial estimate, when they first entered taxiway D2, of how far away the A320 was. However, it was not a factor when FKV taxied onto the runway. At that time, the check captain estimated that the A320 was about 1.5 NM away at about 200 ft above the runway. The check captain decided not to advise the left-seat captain then of the A320 as they had already entered the runway.

There was no confusion in the flight deck over whether they had been instructed to cross the runway or not, they both thought that was the clearance.

The clearance was clipped or over-transmitted and led them to believe it was 'cross' not 'hold short'. In hindsight, the pilot commented that maybe they should have reconfirmed the clearance to cross because the words were clipped, but they expected the readback would give the SMC confirmation that what they understood was correct and the opportunity to detect any misunderstanding. They did not hear anything that sounded like 'hold short'. It was possible that the check captain had pushed their transmit (push-to-talk (PTT)) button which had momentarily over-transmitted the SMC's call.

If the check captain had sighted the A320 later in the taxi and closer to the holding point, they would probably have expected to hold short rather than cross in front of it.

The controller's addition of the bay information to the instruction was not consistent with a hold short instruction. The standard clearance is either hold short (with no further instructions), or cross and taxi to your bay or with additional taxiing instructions.

It was possibly a professional courtesy so the pilot did not have to respond with their bay number, but it added to their expectation that it was a crossing instruction. The flight crew had contacted their company personnel about 100 NM prior to their arrival and were issued with parking bay 50G. It was standard procedure to advise the SMC of their bay number on first contact with the SMC. The SMC presumably gets the bay allocation from the airport ground personnel, and provided that information to the flight crew to save a radio transmission. However, its addition to the end of the hold short instruction misled the pilots.

In the absence of any communication with the SMC prior to reaching the holding point, they would have stopped at the holding point rather than enter the runway.

When discussing the incident afterwards, the captain told the check captain that they had not been aware of or sighted the A320 at any time. The check captain commented that maybe they should have told the captain 'there is one rolling and one on final' when they first saw the two aircraft to increase the captain's situational awareness.

Captain

The captain was normally based in New Zealand and commented that to cross an active runway there, pilots are required to contact the ADC on the Tower frequency for a clearance.

The captain was intending to stop at the holding point, but proceeded to cross when they thought they got the clearance to do so. They had to increase power to accelerate, having slowed ready to stop.

The bay number was a non-normal addition to a taxi instruction, possibly provided as the check captain had not yet been able to give the normal transmission with their bay allocation after exiting the runway.

Controller comments

The air traffic controllers provided the following comments.

Aerodrome controller

It was a quiet and routine traffic sequence and the weather at the time was benign.

The voice equipment was fitted in 2013 to Adelaide Tower. The Tower was a ‘quiet tower’, which means that the controllers can only hear the transmissions on the frequency they are controlling, in their own headsets. Although the ADC could hear the SMC give the instruction to hold short, they could not hear any response from flight crew on the Ground frequency.

Prior to the implementation of the quiet tower, controllers could hear transmissions on the other frequencies on speakers in the Tower. The ADC commented that this improved their situational awareness, particularly from a coordination perspective.

The ADC commented that since the incident, in a similar situation, they would wait for the aircraft to land before commencing a handover.

The ADC commented that following the incident there would be a greater focus among the controllers, not just on the instructions controllers give, but that it is not complete until you get adequate readback that responds to all the components of the clearance. In addition, there should be no taxi instruction beyond a hold short instruction.

Controller taking over from aerodrome controller

The controller in the process of a handover/takeover with the ADC was looking at the weather display and listening to the ADC handing over, when they heard the SMC say ‘hold short’ and then ‘expedite’. The controller looked across and sighted FKV half way across the runway and the A320 in the go-around.

The controller commented that before the ‘quiet tower’ they could all hear each other’s radio, which improved their situational awareness.

The controller also commented that when they receive a call from a pilot, they sometimes miss the first part of the transmission. The controller reported that this is a known fault that the controllers have reported via the Airways systems issues reporting scheme (see below). They also advised that they have become desensitised to hearing only part of the readback, which negates the effectiveness of the readback.

The controller advised that there were a number of things that could have prevented the incident:

- if the SMC had heard the readback correctly
- better scanning by air traffic controllers and pilots of aircraft approaching and crossing runways
- stop bars[3] could have been an effective risk control even without hearing the readback or effective scanning.

The controller commended the actions of the A320 flight crew.

Surface movement controller

The SMC was confident they had given the hold short instruction clearly.

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[3] Stop bars are a series of unidirectional lights at right angles to the taxiway centreline. The lights are spaced three metres apart and located 0.3 m before the holding point. Stop bars show red in the direction of approach to the stop bar from the taxiway and are controlled by ATC.

The SMC thought that the Unity flight crew would be expecting to hold short because there was no way they were going to be cleared to cross in front of the landing A320. The SMC commented that if they had not contacted Unity 3201 as they were approaching the holding point, they would have stopped. Because the aircraft was taxiing towards the runway and it is difficult to tell if the aircraft is slowing down, the SMC issued the hold short instruction to be sure they would stop.

They commented that they added the bay number to the hold short instruction to save a transmission, as another aircraft was waiting for their clearance. They were not sure why they did not pick up the incorrect readback, but they did not hear the first word.

The SMC asserted that in most of the transmissions in Adelaide, the initial second of a readback is clipped, for example they only hear 'short' instead of 'hold short'. The controller thought the readback was 'short runway 23' not 'cross runway 23'. As they thought the pilot would be expecting to hold short, the controller was expecting the readback to be 'hold short' and that expectation affected what the controller heard.

In Adelaide Tower, it is difficult to tell when a controller's PTT button is released and whether the frequency is open or closed. Normally for a 'hold short' readback, you would be expecting two words but they get used to looking for one word. If you are not certain of a readback, you are meant to ask again, but if they don't get the first word every time, it can lead to a lot of additional transmissions. Maybe if radio operators push the PTT button and then wait two heartbeats before they start talking, that technique may prevent transmissions being clipped.

The pilots may not hear the controllers' instructions clearly either as they are also not listening in a perfect environment.

The airport ground staff provide the ADC with bay allocations, which the ADC then put on the flight strip. When the pilots first make contact with the SMC, they state the bay allocated by their company and the SMC checks that matches the bay number on the strip.

The SMC did not hear the ADC clear the A320 to land (or the other aircraft to take off) because they were issuing a clearance at the time.

If the A320 had landed and FKV had crossed the runway, they may have just got across in front of it but it would have been close.

If the airport had stop bar lights, the incident would more than likely not have occurred.

Manual of air traffic services

In the Manual of air traffic services (MATS), under section 12.3.1.11 *Taxiing across runways*, section 12.3.1.11.1 *Intermediate holding points*, stated: 'Do not include positions beyond required intermediate holding points in taxi instructions.'

Airways systems issues database report

Airservices Australia provided the ATSB with a copy of the relevant *Airways systems issues database (ASID)* report. In June 2013, the ASID report from Adelaide ATC stated that inbound calls from pilots were clipped at the beginning of calls. This could be heard on recorded audio from the tower transmissions and was compared with transmissions recorded prior to the implementation of the new radio system. Following ATC transmissions, when the controller releases the PTT, the voice communications control system switch remains in the transmit state for 200 milliseconds, known as the guard period. During this period, receive audio is blocked, therefore the audio from pilots is dropped.

In August 2014, the report was updated to state that the clipping issue had been incorporated into the voice system training manual. On 17 December 2015, the comment added was 'Vendor has advised that this defect will be addressed in the next software release which is currently scheduled for delivery in June 2016'. There was no indication what, if anything, was delivered in that release to address the issue.

On 25 August 2016, a comment was added to the report indicating that rather than a system defect, the cut-off responses could be ‘mostly attributed to poor radio technique by pilots or ATC’. Furthermore, ‘it is also important that controllers release PTT as soon as possible to ensure that the receiver is unmuted’.

The ASID entry dated 17 December 2015 was based on information received from the vendor. Airservices sought input from the vendor on whether they believed the reported issue was a defect and whether the guard period could be adjusted.

Airservices received a response from the vendor with a list of issues which the vendor aimed to address in the next release and the guard period issue was included in this list. Airservices has investigated this issue and has determined it is not a system issue, given that the guard period of 200 milliseconds is less than other voice communication systems used by Airservices and the same as used in other Integrated Tower Automation Suite (INTAS) towers where there has been no observed replication of this issue. It was instead concluded that this issue was due to controller actions related to extended engagement of the foot PTT beyond the end of their transmissions. Airservices considers that the issue was not prevalent in the occurrence as was communicated by the interviewees.

Airservices Australia comment

Airservices Australia provided the following comments in response to the ATSB draft report.

Quiet tower

Although some controllers prefer speakers to increase their situational awareness, it may also result in considerable noise when all three positions are open during periods of increased traffic. Such noise is particularly distracting for controllers that have transitioned from an enroute environment where headsets are used and speakers are not permitted.

Additionally, ATC procedures are designed to ensure controllers can perform their duties safely without reliance on speakers. The use of speakers does not always increase situational awareness and should not be relied upon as an effective threat barrier.

Clipped transmissions

The recorded audio leading up to, during and after the occurrence did not contain any clipped transmissions related to the ‘fault’ reported.

Adelaide Tower Line Manager's and Shift Manager's regular monitoring of the controller's air-ground communications have observed that pilot transmissions may occasionally be missing the first part of the call (clipped transmissions are less than one second in duration). This typically occurs when the pilot commences their response prior to the controller releasing the press to talk (PTT) button. However, clipping of this nature does not occur frequently and not to a point where controllers would become desensitised to only hearing part of the readback.

Existing ATC procedures require the controller to obtain a correct readback of instructions (in accordance with per AIP GEN 3.4 -12). In the absence of the correct and complete readback, the controller must challenge the readback until they are satisfied it is correct.

Audio sample

Airservices randomly sampled 90 minutes of audio from 1 August 2016 at Adelaide and did not identify any calls which had a clipped the transmission.

On 12 September, Airservices reviewed the radio technique of a controller in the tower using a foot PTT and noted that there was a significant (0.5-1 second) delay from the end of the delivery of the instruction by the controller to the time when the controller disengaged the foot PTT. This anomaly in the controller's technique resulted in a number of clipped pilot transmissions due to them starting the readback whilst the foot PTT was still engaged. The controller's error was rectified by using the in-line PTT which decreased the delay of the controller releasing the foot PTT.

Additionally, the Voice Communications and Control System (VCCS) enables controllers to view the status of the transmitter and receiver.

ATSB comment

The A320 crew are to be commended for their actions in preventing a potentially more serious incident occurring.

The flight crew of FKV thought they were cleared to cross the runway probably because of the bay allocation at the end of the hold short instruction. An effective sighting of the aircraft on final approach may have led them to query their understood instruction to cross the runway.

The SMC heard one word in response and mis-heard it as ‘short’ rather than ‘cross’ and that assumed ‘hold’ had been clipped from the transmission. The SMC did not question the pilots about the missing word as they had some previous experiences of the beginning of transmissions being clipped. As there was a ‘quiet tower’ communications system, there was no opportunity for the ADC to hear this pilot read-back to the SMC and notice the misunderstandings before the runway incursion.

The ADC was in the process of handover/takeover and was not watching the landing A320 or the runway as they assumed FKV would hold short and that the runway was clear.

Safety message

The risk of runway incursions and other separation events can be minimised through good communication. This incident highlights the importance of:

- controllers and flight crews using correct phraseology
- controllers and pilots challenging instructions which they have not heard or understood fully
- pilots looking carefully for aircraft or other hazards before entering an active runway.

General details

Occurrence details

Date and time:	17 August 2016 – 0928 CST	
Occurrence category:	Serious incident	
Primary occurrence type:	Operational – Runway events – Runway incursion	
Location:	Adelaide Airport, South Australia	
	Latitude: 34° 56.70' S	Longitude: 138° 31.83' E

Aircraft details: VH-FKV

Manufacturer and model:	Fokker Aircraft F27 Mk 50	
Registration:	VH-FKV	
Operator:	Alliance Airlines	
Serial number:	20303	
Type of operation:	Air transport high capacity – Passenger	
Persons on board:	Crew – 4	Passengers – 49
Injuries:	Crew – 0	Passengers – 0
Aircraft damage:	Nil	

Aircraft details: VH-VGI

Manufacturer and model:	Airbus A320	
Registration:	VH-VGI	
Operator:	Jetstar Airways	
Serial number:	4466	
Type of operation:	Air transport high capacity – Passenger	
Persons on board:	Crew – Unknown	Passengers – Unknown
Injuries:	Crew – 0	Passengers – 0
Aircraft damage:	Nil	

Turboprop aircraft

Loading event involving Embraer EMB-120, VH-ANQ

What happened

On the morning of 6 August 2016, the flight crew of an Airnorth Embraer EMB-120 aircraft, registered VH-ANQ (ANQ) (Figure 1), prepared to conduct flight TL414 from Darwin to Groote Eylandt, Northern Territory. On board were three crew and 30 passengers. The first officer for the flight was undergoing training to become a captain. This involved undertaking all tasks normally performed by the captain including the completion of the aircraft trim sheet.[1]

At about 0530 Central Standard Time (CST), the flight crew arrived at ANQ. They discovered that the refueller was running late and the aircraft servicing had not been completed. The aircraft load information also arrived about 10 minutes late. In an attempt to depart on time, the first officer (acting as the captain) completed the trim sheet more quickly than usual and did not conduct their usual double check to confirm that it was completed correctly. The completed trim sheet indicated 3° nose-up trim[2] should be used for the take-off. The first officer did not pass the completed trim sheet to the captain (acting as the first officer) to sight as is required by the company standard operating procedure.

At about 0555, the crew started the take-off roll. As the aircraft rotated,[3] the captain (the pilot flying) noted the aircraft felt out of trim, so adjusted the trim and completed a normal rotation. After the initial climb, the captain asked to review the trim sheet. The captain found that the first officer did not include 584 kg of baggage and freight in the take-off trim setting calculation. The captain and first officer recalculated the aircraft trim and found the correct trim setting for the take-off should have been 0.8° nose-up. The crew rechecked the trim sheet which showed the aircraft was within all weight and balance limitations.

The flight proceeded to Groote Eylandt without further incident.

1 Trim sheet is a method used to determine the take-off elevator trim setting. The sheet uses the position and weight of items carried within the aircraft to determine the total aircraft weight and balance.

2 Trim adjusts the longitudinal balance of the aircraft. As items of different weights are loaded at different positions in the aircraft the balance changes. Take-off trim adjustments allow for this change to achieve a neutral force through the pilot control column during the take-off.

3 Rotation is the positive, nose-up, rotation of an aircraft about the lateral (pitch) axis immediately before becoming airborne.

Figure 1: Embraer 120, VH-ANQ

Source: Simon Coates

First officer comment

The first officer of ANQ provided the following comment:

- Due to the late arrival of the loading paperwork and the passengers sitting in the aircraft longer than was usual, they felt pressured to complete the trim sheet quickly and pass it to the customer service officer who was standing behind them.

Captain comment

The captain of ANQ provided the following comments:

- As the first officer was approaching the end of their training, the captain felt comfortable with the first officer's ability to complete the trim sheet without error.
- The company operating procedure required both flight crew to sight the trim sheet. However, this did not normally occur in operations.
- The pre-flight delays had compounded to give the first officer 10 minutes to complete the pre-flight paperwork instead of the usual 20 minutes. As part of the training, the captain wanted to observe how the first officer managed the pre-flight delays and did not assist unless requested.
- The day prior to the incident, the captain reported raising concerns regarding the pressure being placed on first officers training to become captains to complete the trim sheet in under two minutes. They felt that the focus during training should be on completing the trim sheets correctly before the speed naturally increases. It is better to take extra time to complete the trim sheet correctly and double check. If the time had been taken to double check, the error may have been identified.
- The captain felt company communications to flight crew had a large focus on flights departing on time. This placed pressure on the flight crew to rush their pre-flight preparations.
- The captain found the manual trim sheets used for EMB-120 operations laborious and presented a high risk of error.

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

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

Change to procedure

The company standard operating procedure 'Completion of the Trim Sheet' has changed from both flight crew being required to sight the trim sheet to include a requirement for both flight crew members to cross check the trim sheet and take-off/landing data card for correctness.

Safety message

The NASA Aviation Safety Reporting System *Hurry-Up Study* examined 125 incident records that involved time related problems. The study found that in 63% of incidents the error took place in the pre-flight phase. The report suggested using the following strategies to reduce the frequency of time-related errors:

- Maintain an awareness of the potential for the 'Hurry-Up Syndrome' in pre-flight and taxi-out operational phases.
- When pressures to 'hurry-up' occur, particularly in the pre-flight operational phase, it is a useful strategy for pilots to take the time to prioritise their tasks.
- If a procedure is interrupted for any reason, returning to the beginning of that task and starting again will significantly reduce the opportunity for error.
- Practicing positive crew resource management technique will eliminate many errors -- effective crew coordination in 'rushed' situations will catch many potential problems.
- Strict adherence to checklist discipline is a key element of pre-flight and taxi-out task execution.
- Defer paperwork and non-essential tasks to low workload operational phases.

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.

SafetyWatch

Data errors, such as the wrong figure being used as well as data being entered incorrectly, not being updated, or being excluded, happen for many different reasons. The ATSB web page *Data input errors* highlights that no one is immune from data input errors. However, risk can be significantly reduced through effective management and systems

The ATSB research report *Take-off performance calculation and entry errors: A global perspective* concluded that despite advanced aircraft systems and robust operating procedures, accidents continue to occur during the take-off phase of flight. It is imperative that the aviation industry continues to explore solutions to firstly minimise the opportunities for take-off performance parameter errors from occurring and secondly, maximise the chance that any errors that do occur are detected and/or do not lead to negative consequences.

General details

Occurrence details

Date and time:	6 August 2016 – 0555 CST	
Occurrence category:	Incident	
Primary occurrence type:	Aircraft preparation	
Location:	Darwin Airport, Northern Territory	
	Latitude: 12° 24.880’ S	Longitude: 130° 52.600’ E

Aircraft details

Manufacturer and model:	Embraer EMB 120 ER	
Registration:	VH-ANQ	
Operator:	CAPITEQ (Operating as Airnorth)	
Serial number:	120079	
Type of operation:	Air transport low capacity - passenger	
Persons on board:	Crew – 3	Passengers – 30
Injuries:	Crew – 0	Passengers – 0
Aircraft damage:	Nil	

In-flight engine shutdown involving Saab 340, VH-ZRJ

What happened

On 23 August 2016, at about 0634 Eastern Standard Time (EST), a Regional Express Saab 340B aircraft, registered VH-ZRJ, taxied at Ballina/Byron Gateway Airport, for a scheduled passenger flight to Sydney, New South Wales. On board were two flight crewmembers, one cabin crewmember and 22 passengers (Figure 1).

Figure 1: VH-ZRJ

Source: Victor Pody

All engine indications had been normal throughout the start and after-start procedures. The crew elected to use runway 06 for take-off. The runway was wet so the flight crew selected the environmental control system (ECS) off for take-off in accordance with the operator's standard operating procedures.

Shortly after take-off, the captain called 'positive rate gear up' and the first officer selected the landing gear up. While the gear was retracting, the crew heard loud bangs and the left engine performance degraded noticeably, reducing the climb performance. The crew also noticed that the left engine instruments were fluctuating rapidly and indicating a high inter-turbine temperature. At that time, the cabin crewmember advised the flight crew that passengers could see flames coming from the left engine.

The flight crew kept the aircraft tracking straight ahead over water and climbing. Based on the noises and engine instrument indications, the crew identified the issue as a compressor stall and carried out the failure management procedure. This included reducing the power on the left engine and setting maximum continuous thrust on the right. Reducing the power also reduced the banging noises to popping noises.

At about 0639, the first officer contacted air traffic control (ATC) and declared a PAN.[1] The crew then commenced the checklist procedures for a compressor stall from the operator's quick reference handbook. The checklist procedure involves trying to increase the rearward flow of air through the compressor via the low and high pressure bleed valves and the engine anti-ice bleed valves. Although reducing the fuel flow to the left engine reduced the popping noises, the compressor stall continued. The crew therefore commenced the appropriate failure management procedure to shut down the left engine and feather the left propeller.

At about 0650, the crew shut down the left engine and the first officer advised ATC that they had one engine inoperative. The crew also advised ATC that once they had completed their checks, they would return to Ballina via an area navigation (RNAV) approach.

After levelling out at 5,000 ft, the captain completed two to three holding patterns while the crew completed all relevant checklists. They then made an RNAV approach to runway 24. The captain reported that the approach and landing went smoothly and the aircraft landed at about 0720.

During the landing roll, as the captain moved the thrust lever on the right engine from flight idle to ground idle, the aircraft deviated to the right of the runway centreline. The captain later commented that this was probably associated with asymmetric propeller drag (the left propeller was feathered and the right propeller generated more drag as the right thrust lever was moved into ground idle). The captain moved the right engine thrust lever forward, out of ground idle, and the aircraft straightened up. The taxi to the bay was uneventful. There were no injuries to crew or passengers and no damage to the aircraft.

Pilot comments

The captain commented that ECS is usually selected ON for take-off on the first flight of the day (see *Similar incidents*). However, as the runway was wet, the crew selected ECS to OFF for this take-off, which was the standard procedure because of the performance considerations associated with a wet runway. In this incident, it is unlikely that the ECS selection contributed to the compressor stall, as the stall did not clear despite reducing the fuel flow and managing the bleed air in the failure management checks.

Both members of the flight crew commented that their simulator training, dealing with compressor stalls and one-engine inoperative scenarios, had been invaluable in contributing to their effective management of the situation. A compressor stall scenario that the captain had recently practised in the simulator was very similar to the incident, except that during the actual incident, the noises were louder and the instrument fluctuations more varied.

The captain also commented that the aircraft was easier to handle than the simulator during the compressor stall/one engine-inoperative situation, except during the landing roll where the simulator did not mirror the yawing tendency when ground idle is selected.

Engineering report

Engineers reviewed the flight data from the incident flight, which confirmed a compressor stall had occurred. No exceedances of torque, inter-turbine temperature, or turbine speed (rpm) limits (Ng and Np) were recorded. Borescope inspections of the engine did not detect any compressor damage. After finding no fault that may have caused the compressor stall, engineers replaced the hydromechanical unit (HMU) in accordance with the manufacturer's fault isolation procedure.

The SAAB 340B *Aircraft operations manual* includes the following in the description of the HMU:

> *The HMU provides high pressure metered fuel for combustion. It contains a high pressure vane pump and a pressure regulator and metering valve that schedules fuel to meet the various engine operating conditions and demands. The HMU also controls the variable*

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[1] An internationally recognised radio call announcing an urgency condition which concerns the safety of an aircraft or its occupants but where the flight crew does not require immediate assistance.

geometry system (inlet guide vanes and stage 1 and 2 stator vanes) and the start and anti-ice bleed valve to provide for efficient and smooth engine operation throughout the entire speed range.

Significantly, the variable geometry system is instrumental in minimising the risk of compressor stall.

After replacing the HMU, engineers conducted ground runs of the engine with no defects found and the aircraft was returned to service.

Compressor stall

A turbine compressor stall occurs when there is a breakdown in airflow through the compressor. This can lead to a flow reversal, banging sounds and flame expulsion. The normal (rearward) air flow can usually be restored by reducing the engine power or thrust setting. Despite the noise, flames and associated heat, a compressor stall often results in no damage to the engine.

Similar occurrences

ATSB investigation 200300040 reported two incidents involving compressor stalls shortly after take-off in different Saab 340B aircraft. Both of those incidents also occurred on the first flight of the day. In response, the engine manufacturer made some recommendations to the operator of those aircraft, including that the operator consider amending procedures to include the selection of ECS ON for the first flight of the day. Use of the ECS opens the bleed air valves and reduces the likelihood of compressor stalls. The report stated that use of ECS on the first flight of the day would counteract the conditions of temperature inversions that were usually more pronounced in the early morning.

Safety message

This incident highlights the importance of well-designed simulator training and robust failure management procedures. Faced with an abnormal scenario, from their training and robust procedures, the crew was able to manage the situation efficiently and safely.

General details

Occurrence details

Date and time:	23 August 2016 – 0640 EST	
Occurrence category:	Incident	
Primary occurrence type:	Technical – Powerplant/propulsion – Engine failure or malfunction	
Location:	19 km N of Ballina/Byron Gateway Airport, New South Wales	
	Latitude: 28° 40.00' S	Longitude: 153° 33.75' E

Aircraft details

Manufacturer and model:	SAAB Aircraft Company 340	
Registration:	VH-ZRJ	
Operator:	Regional Express	
Serial number:	340B-396	
Type of operation:	Air transport low capacity – Passenger	
Persons on board:	Crew – 3	Passengers – 22
Injuries:	Crew – 0	Passengers – 0
Aircraft damage:	Nil	

Runway collision with arrestor cable involving Raytheon B200, VH-ZCJ

What happened

On 9 August 2016 at about 2020 Central Standard Time (CST), a Raytheon B200 aircraft, registered VH-ZCJ (ZCJ), departed from Darwin Airport, Northern Territory (NT), to collect a patient from Tindal Airport, NT, for transfer to Darwin. On board the flight from Darwin were the pilot and one flight nurse.

As the flight approached Tindal Airport, the pilot checked the Tindal ATIS[1] which stated that runway 14 was not available. There was no NOTAM[2] to indicate that was the case, so the pilot contacted Brisbane Centre air traffic control (ATC) to confirm the status of Tindal Airport. Brisbane Centre ATC advised the pilot there was an earlier incident at Tindal that was now cleared and runway 14 would be available for their arrival. The aircraft landed on runway 14 with Tindal ATC still active, at about 2120, then back-tracked runway 14 and parked at the terminal for the patient collection.

The patient was loaded on board ZCJ at about 2250. At about 2300, the Tindal ATC tower closed and procedures for operating at non-controlled aerodromes then applied. The pilot taxied ZCJ for departure at 2309. They entered runway 14 from taxiway echo (Figure 1), lined up for departure ensuring they used the entire runway length available and applied power. At about 70 kt, the pilot performed their 'cross check of airspeed indicators'. At this time there were no warning indications, so the pilot committed to continue the take-off.

At about 85–87 kt, the pilot felt the aircraft nose wheel strike something on the runway with an associated vibration through the rudder pedals. The pilot checked the airspeed, observed the aircraft was continuing to accelerate and there was no change in directional control, so they rotated the aircraft at the lift-off speed of 94 kt.

After departure, the pilot contacted the Tindal Airport emergency services and asked them to inspect the runway to check on the status of the aircraft arrestor cable (refer to *Aircraft Arrestor System* and *Enroute Supplement Australia*). The emergency services inspected the runway and advised the pilot that the arrestor cable was in the raised position, and that they would immediately report this to the Tindal Airport cable barrier crew for rectification.

The pilot continued the flight to Darwin and enroute contacted their company chief pilot to report the incident and discuss options for the management of the landing at Darwin. They also discussed the management of the patient in the event of a landing incident or accident. The chief pilot, in turn, contacted one of the company check and training captains, and notified Darwin ATC. On approach to Darwin, the pilot consulted the checklist for landing with an unsafe landing gear. When they extended the landing gear, there were no unsafe indications, so the pilot considered a blown tyre was the most credible risk for the landing.

The chief pilot then advised the pilot that Darwin ATC had activated their emergency response for the landing. They also suggested that the nurse look outside the cabin windows for any visual indications of damage. The nurse could not see any indications of damage. The pilot conducted their approach and landed at Darwin Airport without further incident. The aircraft was not damaged and there were no injuries.

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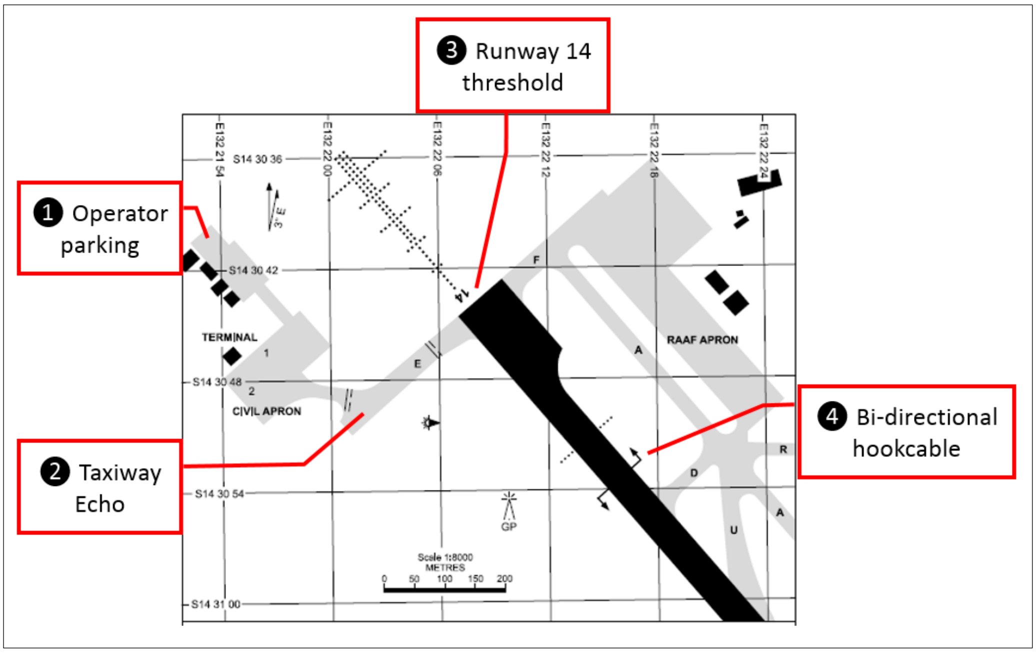
[1] An automated pre-recorded transmission indicating the prevailing weather conditions at the aerodrome and other relevant operationsl information for arriving and departing aircraft.

[2] A Notice To Airmen advises personnel concerned with flight operations of information concerning the establishment, condition or change in any aeronautical facility, service, procedure, or hazard, the timely knowledge of which is essential to safe flight.

Aircraft Arrestor System

The Tindal Airport aircraft arrestor system (AAS) is used to stop military jets that have a malfunction, which may otherwise cause them to overrun the runway. In this case, the jet will lower a hook at the rear of the aircraft to catch the cable. The AAS includes two cables, one positioned at either end of the runway and displaced from the respective threshold as displayed on the airport diagram of runway 14 (Figure 1).

Figure 1: Tindal airport apron diagram



Source: Airservices, annotated by ATSB

The AAS may be controlled by ATC from the Tindal ATC tower through each cable's control console, or by the AAS barrier crew from the runway site control location. Each location control console feeds into the hookcable control module, which manages the cable position logic (Figure 2). When ATC is active the control of the system is with the Tindal ATC tower. When the tower closes, ATC select the AAS controller to 'maintenance', which switches the control to the runway site control location.

There are four pushbutton selection/indicator lights on the tower control consoles (Figure 2). They comprise two green UP and DOWN pushbuttons, an amber maintenance pushbutton and a red fail pushbutton. The maintenance pushbutton is used to pass AAS control between the tower and runway site control location.

When AAS control is passed to the runway site control, the amber maintenance pushbutton will illuminate to indicate the runway site have control of the AAS. The red fail pushbutton will also flash, and be accompanied by an audible clicking. This is a warning to the tower controllers that they do not have control of the AAS. The warning is cancelled by manually depressing the fail pushbutton. In maintenance control, the tower console UP and DOWN pushbuttons are indicator lights only, which will respond to cable position changes made at the runway location.

Figure 2: Tower control console cable pushbuttons

Source: Tindal Airport

The runway site control has a physical switch, which is selected to either the UP or DOWN position. When control of the cable is passed from the tower to the runway site control, the hookcable control module will command the cable into the position selected on the runway site control switch.

When an aircraft is arrested with the AAS, the barrier crew take control of the AAS from ATC until the aircraft is released and the inspection and servicing of the cable completed. On completion of the cable servicing, the barrier crew lower the cable using the site control switch before passing control of the AAS back to ATC.

On 9 August 2016, at about 2045 CST, the runway 14 AAS was used to stop a military jet. The barrier crew then entered the runway and performed the servicing and reset of the cable. This task required the control of the AAS to be passed from the tower to the runway site control. The servicing and reset also required the cable to be cycled between the UP and DOWN positions. On completion of the reset the barrier crew passed AAS control back to the tower with the runway site control switch selected in the UP position. This deviated from the barrier crew's normal procedures, which required them to lower the cable into the DOWN position before passing control back to the tower.

Tindal ATC did not notice the discrepancy with the handover. They cycled the cable to check serviceability, then continued with normal cable operation for the remainder of ATC services. The cable was in the DOWN position for the arrival of ZCJ. When the Tindal ATC tower closed at 2300, the controller closing the tower performed the procedural steps, which included (1) ensuring the cable is set to DOWN on their control console, and (2) once confirmed DOWN, select AAS control to maintenance. The ATC procedural steps did not include checking the position of the cable after the maintenance selection.

There are no differences in the maintenance and fail pushbutton light indications if the cable changes position after control is passed to maintenance. However, the DOWN pushbutton green light would extinguish after about one second and the UP pushbutton green light would illuminate after about 10–15 seconds.

When the airport emergency services inspected the cable at 2320 they found the cable raised and contacted the barrier crew supervisor. The supervisor inspected the runway site control location and found the switch selected to the UP position.

Enroute Supplement Australia

The Enroute Supplement Australia entry for Tindal airport includes the following information:

> ***Physical characteristics:*** *Recessed bi-directional hookcables installed 1,266 ft from threshold runway 14 and 1,515 ft from threshold runway 32… Distance between cables 6,214 ft… No arrestable aircraft operations or outside tower hours – both ends down. No crossing restrictions in down position... In the event of power failure, cables will rise to a*

height of 10 cm until [power] restored – recommended that aircraft not approved to trample hookcables confine operations to between cables during CTAF.

Enroute Supplement Australia introduction paragraph 22.2 b. states:

Pilots should refer to the Pilot Operating Handbook of Flight Manual for specific restrictions for each aircraft. In the absence of any reference to trampling in either the Handbook or Manual, trampling is not authorised.

Company procedures for Aircraft Arrestor System

The pilot was unaware of any previous incident or discussion within the company regarding the AAS at Tindal Airport. There is no reference to trampling hookcables in their B200 flight manual and therefore no trample speed approved for the aircraft. The company did not have a procedure in place to require their pilots to avoid the runway length which incorporates the AAS when non-controlled aerodrome procedures apply.

ATSB comment

The ATSB notes that although there was sufficient runway for the pilot to stop the aircraft after trampling the cable, they were already passed their 'airspeed indicator cross check'. After this point, the pilot was mentally committed to continue the take-off and only to abort the take-off for a cockpit warning light.

It is likely that when the Tindal Airport tower closed and passed AAS control to maintenance, the runway 14 threshold AAS cable raised into the UP position in response to the existing site control switch selection, and this was not detected by ATC during the tower closing procedure.

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.

Airport operator

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

Training

The training for barrier crew is to be reviewed to ensure the runway switch is set to DOWN during hand-over procedures. A maintenance assurance inspection is to be investigated for the purpose of verification of switch position within the hand-over procedure.

ATC training is to be reviewed to ensure indication of DOWN position after hookcable is switched to maintenance position.

Aircraft operator

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

Operations notice

The company has issued an operations notice to their flight crew to advise them of the incident and instruct them that if the pilot in command cannot be assured of the cable status, to taxi past the cable prior to take-off, or land long to avoid it on arrival.

Training

The company's pilot training syllabus relating to potential hazards associated with operating at military aerodromes was updated to include arrestor cables.

Safety message

While the outcome of this incident was benign, the actions of the pilot demonstrated how crew resource management skills can be employed to engage assistance from outside the aircraft to effectively manage an unexpected risk. Their decision to contact Tindal Airport emergency services mitigated a potential risk to other operators before the tower re-opened.

General details

Occurrence details

Date and time:	9 August 2016 – 2313 CST	
Occurrence category:	Incident	
Primary occurrence type:	Runway events - Other	
Location:	Tindal airport, NT	
	Latitude: 14° 31.27’ S	Longitude: 132° 22.67’ E

Aircraft details

Manufacturer and model:	Raytheon Aircraft Company B200	
Registration:	VH-ZCJ	
Serial number:	BB-1853	
Type of operation:	Aerial work – EMS	
Persons on board:	Crew – 2	Passengers – 1
Injuries:	Crew – 0	Passengers – 0
Aircraft damage:	Nil	

Piston aircraft

Propeller failure involving de Havilland DH-82, VH-ARU

What happened

On 2 July 2016, at about 1420 Eastern Standard Time (EST), a de Havilland DH-82A aircraft, registered VH-ARU, departed Shute Harbour aircraft landing area (ALA), Queensland, for an aerobatic joy flight. On board were a pilot and one passenger.

When the aircraft reached about 4,500 ft over water, the pilot advised air traffic control (ATC) that they were commencing aerobatic operations. The pilot reported that they then raised the aircraft nose and reduced the throttle to idle. The aircraft then pitched nose-down and the pilot initiated a rotation to the left. After about one and a half rotations, the pilot levelled the aircraft wings and stopped the rotation. As the airspeed was then about 110 kt, which was the entry speed for the next manoeuvre (a loop), the pilot raised the aircraft nose and applied full power as the nose passed the horizon.

The aircraft was then passing about 3,500 to 4,000 ft on climb, when the pilot and passenger heard a bang. The pilot saw a small object fly past to their left in close proximity, and the passenger saw that the on-board camera had been knocked.

The pilot discontinued the manoeuvre and stabilised the aircraft in a glide attitude. As the aircraft continued to descend, the pilot elected to return to Shute Harbour ALA. The pilot reported that the aircraft was not vibrating and the tachometer was indicating maximum RPM. The pilot also assessed that the engine was not producing any thrust, regardless of the throttle position. The pilot advised ATC that they had completed operations and were returning to Shute Harbour. At no time did the pilot inform ATC that there was an emergency.

As the aircraft passed the highest terrain en route to Shute Harbour ALA, the pilot assessed that they were not going to be able to reach the ALA (Figure 1). The pilot then turned the aircraft to land on the beach at Funnel Bay, but sighted boats moored on the beach. The pilot therefore aimed to land the aircraft at Funnel Bay on the mudflats. The pilot conducted a forced landing onto the mud and the aircraft continued onto some rocks. After landing, as the pilot inspected the aircraft, they noticed that the propeller was missing.

Figure 1: Shute Harbour ALA and Funnel Bay

Source: Google earth – annotated by ATSB

The pilot was uninjured and the passenger sustained minor injuries. The aircraft sustained substantial damage (Figure 2).

Figure 2: Accident site showing damage to VH-ARU

Source: Aircraft owner – modified by ATSB

Pilot comments

The pilot had completed a daily inspection of the aircraft earlier in the day and had subsequently flown it for about 6 minutes to assess the weather conditions. The incident flight was the first commercial flight of the day. During the pre-flight inspection, the pilot reported having made a visual check of the propeller for defects, gravel rash and any chips, but had not detected anything abnormal.

The pilot had asked the passenger their weight prior to the flight, and although they did not complete a weight and balance calculation, assessed that the aircraft was within its weight and balance limitations for aerobatic flight.

At the time of the incident, they were operating about 4 to 5 NM from the ALA, and over water. The pilot thought that the aircraft probably struck a bird resulting in the propeller failing.

When they realised that the aircraft was unable to reach the runway at Shute Harbour, the pilot had a secondary plan to land on the beach at Funnel Bay. They commented that their training helped to deal with the situation by being aware of their surroundings and having a series of plans in case of emergency.

Engineering report

The aircraft maintenance engineer assessed the aircraft after the incident and sent the remnants of the (timber) propeller that had remained attached to the aircraft to the ATSB. The engineer also spoke to the manufacturer of the propeller and was able to trace its history. The manufacturer suggested the propeller failure was indicative of a propeller overspeed, although they did not inspect the propeller remnants. The propeller was not retrieved as it failed when the aircraft was over water.

ATSB analysis

Video footage

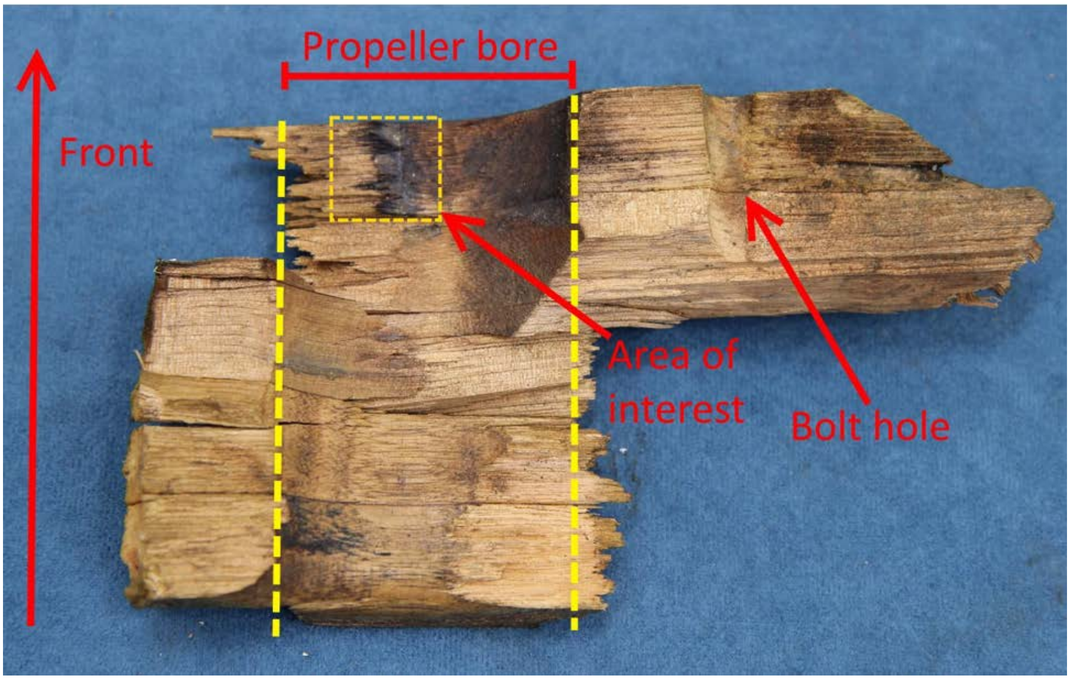
The ATSB analysed the data card from the on-board camera. The camera was facing rearwards and no evidence of a birdstrike was visible on the footage when viewed frame-by-frame. Analysis of the sound component of the recording was conducted to determine the engine frequency at the time of the propeller failure, but the results were inconclusive due to background noise including a radio transmission.

From the video footage, it was evident that the aircraft entered a spiral manoeuvre that involved substantial rudder and aileron input such that the aircraft was in balance (not skidding or slipping sideways). The wings were then levelled and the aircraft pulled out of the dive. The propeller failed just as the aircraft nose passed back up through the horizon at the start of the next manoeuvre and power was applied. The propeller was under substantial load at this stage.

Propeller remnants

The ATSB examined two fragments of the propeller that were identified as parts of the hub section. An area of interest, depicted in Figure 3, showed evidence of bending consistent with the blade breaking away from the hub while under load. No bird remains were found on the fragments. The factors contributing to the propeller failure could not be determined from the timber fragments.

Figure 3: Propeller remnants



Source: ATSB analysis

ATSB comment

One of the findings of ATSB investigation AO-2013-226, *In-flight break-up involving de Havilland DH82A Tiger Moth, VH-TSG, 300 m E of South Stradbroke Island, Queensland, 16 December 2013*, was that 'publicly-available video recordings showed that some Australian commercial Tiger Moth operators conducted aerobatic flick (otherwise known as 'snap') rolls and tailslide manoeuvres, which were prohibited by the Type Design Organisation'. However, the on-board video recording showed that the types of aerobatic manoeuvres conducted during the accident flight were all permitted for the aircraft type.

The ATSB cautions commercial vintage aircraft operators about the risks associated with aircraft age and the importance of understanding the originally-intended use of the design before commencing their operations.

Safety message

This incident highlights the value of always having a consideration of landing areas available in case a forced landing is required. Alerting air traffic control as emergencies arise enables them to provide the necessary and appropriate assistance.

General details

Occurrence details

Date and time:	2 July 2016 – 1430 EST	
Occurrence category:	Accident	
Primary occurrence type:	Propellers/Rotor malfunction	
Location:	near Shute Harbour ALA (Funnel Bay), Queensland	
	Latitude: 20° 16.70' S	Longitude: 148° 45.33' E

Aircraft details

Manufacturer and model:	de Havilland Aircraft DH-82	
Registration:	VH-ARU	
Serial number:	AM237	
Type of operation:	Charter – Aerobatics joy flight	
Persons on board:	Crew – 1	Passengers – 1
Injuries:	Crew – 0	Passengers – 1 Minor
Aircraft damage:	Substantial	

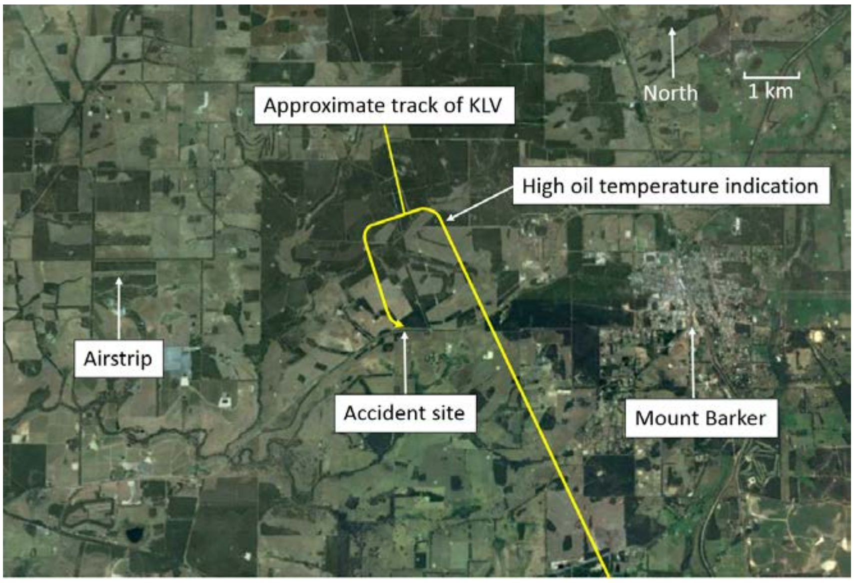
Engine failure and collision with terrain involving Van's RV-9A, VH-KLV

What happened

On 4 September 2016, at about 1655 Western Standard Time (WST), an amateur-built Van’s RV-9A aircraft registered VH-KLV (KLV), departed Albany Airport, Western Australia (WA), for a flight to Jandakot Airport, WA. On board the private flight were a pilot and one passenger.

About 15 minutes into the flight, the aircraft was north-west of Mount Barker and climbing through about 4,000 ft. At this time, the pilot observed an oil temperature indication greatly exceeding the normal operating limit, all other engine indications appeared normal. The pilot immediately reduced power to idle and turned the aircraft towards an airstrip to the west of Mount Barker (Figure 1). As the aircraft descended through about 2,500 ft, the pilot assessed that they did not have sufficient altitude to glide to the airstrip. The pilot then elected to conduct a precautionary[1] landing.

Figure 1: Approximate flight path of VH-KLV



Source: Google maps, modified by ATSB

The pilot identified a section of disused road as suitable to conduct the precautionary landing and positioned the aircraft to make a curving approach to the road. At about 200 ft above ground level, the pilot detected the aircraft becoming low and applied power to continue the approach. The engine responded briefly before losing all power. The pilot identified that they did not have sufficient height to glide to the disused road. To avoid powerlines located next to the disused road, the pilot elected to fly the aircraft into trees.

The aircraft struck the tree canopy and slowed to a near stop before falling onto the disused road. The aircraft landed nose first before overturning and coming to rest inverted (Figure 2). The weight of the aircraft prevented the pilot from opening the sliding canopy. The pilot and passenger exited through the broken windscreen.

1 A landing conducted when the pilot considers further flight inadvisable.

The pilot and passenger sustained minor injuries and the aircraft was substantially damaged.

Figure 2: VH-KLV after the accident

Source: Western Australia Police

Pilot comments

The pilot of VH-KLV provided the following comments:

- After the pilot identified the high oil temperature, they prepared for a precautionary landing. They did not consider a forced[2] landing until the engine failed.
- The pilot advised that when they are flying, they are always looking for places to land as if the engine fails there is only a short time to decide where to land.
- The aircraft is fitted with a four point harness. This worked extremely well and prevented more serious injuries.

Engineering examination

Due to the limited scope of this investigation a post-accident engineering examination was not conducted. The cause of the high oil temperature indication was not determined.

Safety message

This incident highlights the importance of actively managing an emergency situation. The pilot identified the abnormal engine indication and elected to conduct a precautionary landing while the engine continued to develop power. Once an engine malfunction is identified it is important to consider that remaining power may be inconsistent and unreliable.

The US Federal Aviation Administration airplane flying handbook chapter: *Emergency procedures* provides information on effective management of precautionary and forced landings.

The RV-9A is not an aerobatic aircraft, however, KLV was fitted with a four-point aerobatic type harness. Four-point harnesses provide superior occupant protection during an accident, in particular when an aircraft overturns. The fitment and use of the four-point harness most likely prevented more serious injuries to the occupants.

2 An immediate landing made when the aircraft engine does not continue to produce power.

General details

Occurrence details

Date and time:	4 September 2016 – 1715 WST	
Occurrence category:	Accident	
Primary occurrence type:	Engine failure or malfunction	
Location:	39 km NNW of Albany Airport, Western Australia	
	Latitude: 34° 38.030’ S	Longitude: 117° 36.880’ E

Aircraft details

Manufacturer and model:	Amateur built aircraft, Van’s RV-9A	
Registration:	VH-KLV	
Serial number:	90509	
Type of operation:	Private – Pleasure/Travel	
Persons on board:	Crew – 1	Passengers – 1
Injuries:	Crew – 1 (Minor)	Passengers – 1 (Minor)
Aircraft damage:	Substantial	

Helicopters

Sling load incident involving Aerospatiale Industries AS350, VH-BII

What happened

On 23 May 2016 at about 0600 Western Standard Time (WST), a team of ground and flight crew met to discuss the day's operations to move a drill rig and associated platform and equipment by helicopter to a new location at Lake Disappointment, Western Australia (Figure 1). The rig had been operating on a salt lake and the move involved two helicopters – an Aerospatiale Industries AS350 helicopter, registered VH-BII (BII), to move the rig and heavier equipment, and a smaller helicopter (Robinson R44) to move the smaller, lighter equipment and personnel.

Figure 1: Drilling rig on Lake Disappointment

Source: Ground crew operator

The pilot of BII suggested that the ground crew use tag lines for the operation. These would enable the ground crew to manoeuvre the loads as necessary while the load was off the ground slung under the helicopter. For tag lines, the pilot provided the ground crew with slings – 6 m loops (Figure 2), which they were to attach to the loads that were already encased in other slings ready for moving.

The ground team for the removal of the equipment, consisted of a load master and a driller's offsider. The driller's offsider involved in the operation was new to the role. For the operation, the offsider's role included ground support and to sling equipment under the guidance of the load master. The load master was to guide the helicopter using hand signals and a two way radio to communicate with the helicopter pilot.

Figure 2: Loop slings

Source: Operator of VH-BII

At about 0700, the pilot of BII commenced sling operations. The pilot worked with the ground crew to move three mats (weighing 550 kg each) and a power pack (770 kg) to a new site, before returning to move the rig (about 700 kg). The pilot positioned the helicopter into wind. The load master and offsider attached the rig to the hook under the helicopter using the slings around the load and four attachment points. They attached two tag lines to the load on separate corners. At about 1040, in readiness to lift the rig, the load master advised the pilot using hand signals that the load was attached and that they were clear and ready for the lift.

The pilot commenced lifting the rig. The helicopter climbed and the rig lifted a few centimetres above the ground. The load swivelled as it lifted off the ground, and pushed against a PVC pipe protruding from a bore hole. The load master and offsider stepped in closer to guide the rig. The load master pushed the rig while the offsider pulled on the tag line to manoeuvre the rig clear of the pipe.

The pilot looked down through a window in the floor of the helicopter beside the seat and observed the ground crew then step away from the rig. The pilot then shifted their attention inside the cockpit to the instruments to monitor power settings and continued with the lift.

As they[1] stepped back, the offsider had inadvertently stepped into the loop of the tag line. As the helicopter lifted the rig, the tag line went taught, and the offsider's leg was ensnared in the loop. The offsider was lifted off the ground by the leg and the helicopter began lifting the load. The load master radioed the pilot, and advised that the offsider was hanging in the loop.

By the time the pilot became aware that the offsider was caught in the loop, the helicopter was about 50–60 ft above the salt lake. The pilot turned the helicopter around to return to the pad and encountered a tailwind of 8–10 kt. The helicopter overflew mud flats and the pilot descended as low as they felt was safe, which was about 15–20 ft above the ground. The pilot also slowed the helicopter as much as possible given the load and the tailwind, to a groundspeed of about 25 kt.

The offsider then freed their leg and was about to jump off from about 2 m above the ground, but reported that the helicopter then started to climb and accelerate. Now only holding on by their hands, the offsider was concerned that they would not be able to hold on much longer if the helicopter sped up, and that they risked injury from falling further as the helicopter climbed. The offsider therefore released the tag line and dropped into the mud below. The offsider estimated they were about 10 m above the ground when they let go.

1 Gender-free plural pronouns are used throughout the report to refer to an individual (i.e. they, them and their).

The load master ran to assist the offsider. The pilot saw the offsider land in the mud and flew the helicopter to an island nearby and put the rig down. The pilot of the R44 helicopter working on the site picked up the offsider, who was then taken for medical assessment. The offsider sustained a serious injury.

Pilot comments

The pilot later commented that, having become aware that the offsider was ensnared, they had no intention of putting the rig down while the offsider was hanging underneath. The pilot intended to turn the helicopter back around into wind to slow the helicopter sufficiently for the offsider to release themselves back onto the ground, at the pad where they had lifted off.

The ground crew had cautioned each other to be careful of the loop. But with the noise and downwash of the helicopter, watching the rig taking off, and the tag line hanging 4-5 m after the load, the offsider was ensnared.

In future, if a ground crewmember became trapped in a line, the pilot would remain in radio contact with the load master and would not put the load down. They would return as quickly as possible to the site so the load master could assist with the safe release of the offsider.

Driller’s offsider comments

The offsider commented that once they were slung under the helicopter there was no way they could communicate with the pilot or the load master. The offsider did not have a radio. The helicopter was then about 100 m from the pad and too far away to be able to hear or communicate with the load master. Although there was a small window in the floor of the helicopter, the pilot would not have been able to see the offsider hanging as they were below the rig.

The offsider further commented that it was important for the load master, or person in radio communication with the pilot, to ensure all ground personnel were a safe distance from the helicopter before giving the pilot the all clear to lift.

The offsider also commented that use of a sling as a tag line carries increased risk of ensnarement. A single or unlooped line would be less hazardous.

Ground crew operations company report

The ground crew operations company conducted an investigation into the incident and identified three contributing factors:

1. Tag lines to loads were introduced without an associated risk assessment.
2. The offsider was a new employee and was not fully aware of the hazards.
3. The load shifted in an unexpected direction, resulting in the ground crew moving back in towards the rig after the load master had given the all clear.

Helicopter operator report

The helicopter operator conducted an investigation into the incident and included the following conclusions:

- The pilot was appropriately qualified, current and proficient.
- The format of the ground crew briefing did not, nor was it required to, include an entanglement response in emergency procedures.
- Tag lines were new equipment on the project and were introduced without a formal risk assessment. There were no formal procedures for the use of tag lines and the risk of entanglement was not identified at the time. The 6 metre loops usually used for lifting loads were not standard tag lines.
- Some improvements could be made with better communication between pilot and ground crew which may require additional training or practice. This may have been a factor in this incident.

- The pilot met the procedural take-off requirement visually ensuring they were clear of the load before lifting started, however, procedures do not identify risk aspects of multiple ground crew operations nor do they take into account the high workload of the pilot at time of lift.

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 safety action in response to this occurrence.

Ground crew operations

As a result of this occurrence, the ground crew operations company has advised the ATSB that they have taken the following safety actions:

- people carrying out slinging operations are to use more appropriate tag lines – 16 mm single strand synthetic rope[2]
- ground crew to undergo Dogging[3] training
- helicopter pilot to visually confirm the load is not entangled prior to moving off
- job hazard analysis to incorporate the use of tag lines
- safe working procedures to take into account visual confirmation that the load is clear
- promotion of 'take 5 culture'[4] to address hazards as they are identified
- platform scales to weigh rig items have been provided, sling line certification has been conducted and and routine condition inspections have been conducted
- UHF radios have been installed.

Helicopter operator

As a result of this occurrence, the operator of BII has advised the ATSB that they have taken the following safety actions:

- Enhanced briefing implemented for client ground crew which includes potential of entanglement and preventative measures as well as roles when there are more than one ground crew member.
- A risk profile has been completed for tag line use.
- Clients are provided with a personal protective equipment list for their personnel involved with ground operations.

Safety message

This incident highlights the importance of conducting a thorough risk analysis prior to commencing operations. The risk assessment should clearly identify hazards and introduce measures that mitigate any associated risks. In addition, it is important to consider possible emergency scenarios and develop procedures to follow in the event of an abnormal situation developing.

Appropriate training is essential for personnel working in complex operations. In addition to individual roles and skills, training should include how team members work together to maintain and improve safety. Part of working together safely involves effective communication and a mutual understanding of phrases and signals.

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2 The helicopter operator commented that the lines are to be weighed and assessed to ensure they do not create an entanglement hazard in flight to the tail or main rotor.

3 Use and care of slings and strapping gear, and load movement and crane operations.

4 Take 5 culture increases safety awareness by encouraging workers to 5 minutes to assess hazards and implement risk control actions.

General details

Occurrence details

Date and time:	23 May 2016 – 1040 WST	
Occurrence category:	Accident	
Primary occurrence type:	Miscellaneous – Other	
Location:	Lake Disappointment, Western Australia	
	Latitude: 23° 35.05' S	Longitude: 122° 50.53' E

Aircraft details

Manufacturer and model:	Aerospatiale Industries AS350	
Registration:	VH-BII	
Serial number:	2267	
Type of operation:	Aerial work – Other – Sling operations	
Persons on board:	Crew – 1	Passengers – 0
Injuries:	Flight crew – Nil Ground crewman – 1 Serious	Passengers – Nil
Aircraft damage:	Nil	

Separation Issues

Near collision due to runway incursion involving Van's RV-7, VH-VTZ, and Glaser-Dirks DG-400 motor-glider, VH-XJZ

What happened

On the morning of 27 August 2016, a Van's RV-7 aircraft, registered VH-VTZ, and a Glaser-Dirks DG-400 motor-glider, registered VH-XJZ, were both prepared for flight from Gympie aircraft landing area (ALA), Queensland.

The pilot taxied the motor-glider from the Gympie ALA glider hangars and back-tracked on the grass alongside runway 14 (Figure 1). Before entering the runway strip, the pilot made a radio broadcast on the common traffic advisory frequency (CTAF) 126.7, that they were entering and back-tracking runway 14. On arrival at the runway threshold, the pilot made another broadcast that they were lining-up on runway 14. The pilot taxied the motor-glider onto the threshold of runway 14 and conducted their engine run-up checks. After about 10–15 seconds, they made a broadcast that they were rolling on runway 14 and released the brakes for take-off.

At about the same time as the motor-glider was backtracking runway 14, the pilot of the RV-7 made a broadcast on the CTAF that they were taxiing from the general aviation hangars. At the runway holding-point, the pilot then made a broadcast that they were entering and back-tracking runway 14 (Figure 1). Neither pilot heard the broadcasts from the other pilot.

The motor-glider started the take-off roll from the threshold of runway 14 and as it approached take-off speed, the pilot noticed the top of another aircraft (RV-7) appear on the horizon. Both pilots applied their aircraft brakes and veered to their right. The aircraft came to a stop next to each other on the runway abeam the glider hangars at about 1110 Eastern Standard Time (EST). The pilots performed a radio check and verified they could hear each other and both were broadcasting on the CTAF 126.7. They then proceeded on their planned flights without further incident.

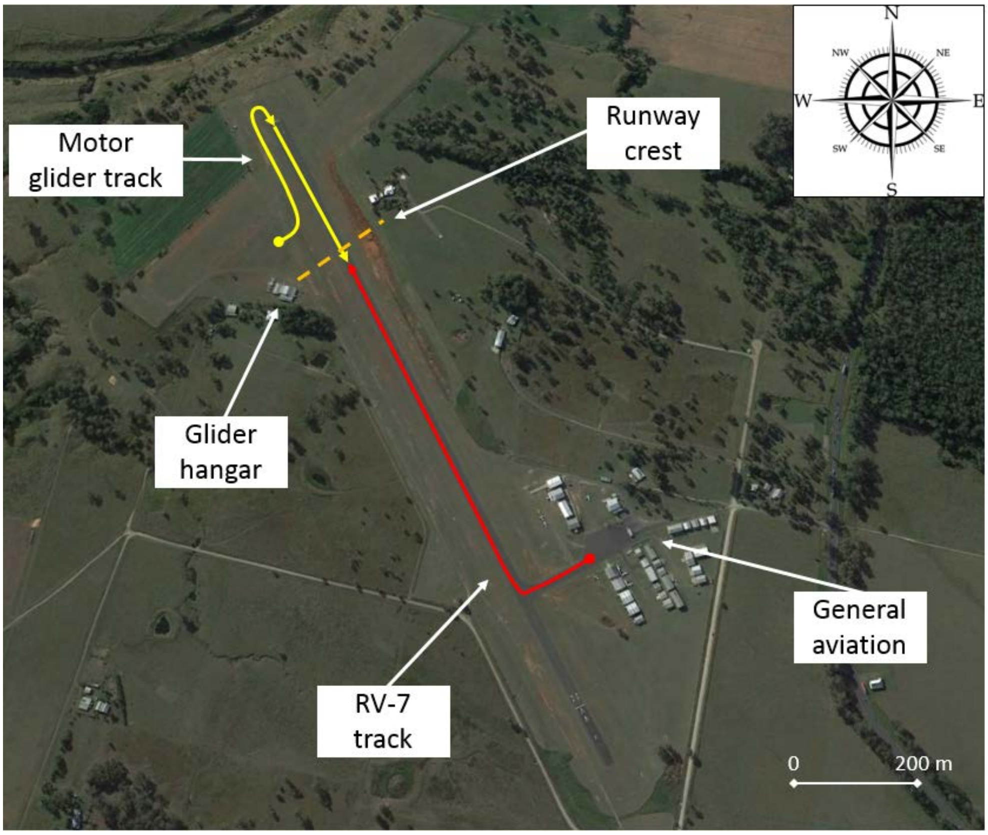
Gympie runway slope

From the runway 14 threshold, runway 14 slopes upward to a crest, which is in line with the glider hangars (Figure 1). Runway 14 then slopes downhill to the threshold of runway 32. The motor-glider pilot commented that in an aircraft low to the ground, such as a glider, stationed at the threshold of runway 14, the pilot would not be able to see an aircraft such as the RV-7, back-tracking runway 14, until the other aircraft was abeam the glider hangars (Figure 1). The RV-7 pilot commented that when back-tracking runway 14 in their aircraft they cannot see another low profile aircraft, such as a glider, until they are about 300 m from the threshold of runway 14.

Aircraft radios

The RV-7 has one radio antenna located on the underside of the aircraft. The motor-glider pilot was unsure of the location of their radio antenna, because they are integral to the airframe in order to minimise drag. Both aircraft radio systems are capable of monitoring two frequencies, but can only broadcast on one. Both pilots confirmed they had 126.7 CTAF set and in use as their active frequency at the time of the serious incident. However, the RV-7 pilot commented that their radio microphone may not have been up against their mouth, which would have reduced the volume of their transmissions.

Figure 1: Gympie ALA and ground tracks of the aircraft



Source: Google earth, annotated by ATSB

Previous incidents

Both pilots commented that there have been previous incidents of traffic conflicts between aircraft, which started with missed radio calls when the aircraft were at opposite ends of the main runway (runway 14/32). On these previous occasions, aircraft airborne in the circuit could hear the radio calls of opposite end traffic on CTAF, despite the traffic on the ground not hearing each other.

A search of the ATSB notifications database indicated that in 2016 there were two incidents at Gympie ALA, where the reporter has indicated that a broadcast was either not made, or not heard. It is unknown if terrain shielding contributed to these events.

ATSB comment

The ATSB notes that it is reported that traffic at Gympie ALA is increasing and therefore exposure to the risk presented in this report is increasing. Despite the fact that both pilots made all the required radio calls for their planned operation, a runway conflict occurred. There is currently no reference to the potential for terrain shielding of radio calls in the Gympie ALA Enroute Supplement Australia entry.

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.

RV-7 pilot

As a result of this occurrence, the pilot of the RV-7 has advised the ATSB that they are taking the following safety action:

Radio checks

The pilot of the RV-7 indicated they would introduce a radio check broadcast, when circumstances permit, during their start checks to verify their transmission volume and readability.

Aerodrome Operator

As a result of this occurrence, the Gympie Aerodrome Operator has advised the ATSB that they are taking the following safety action:

Enroute Supplement Australia

The Gympie Aerodrome Operator indicated they intend to add a note to the Gympie entry in the Enroute Supplement Australia, under ‘Additional Information’, to advise pilots that poor radio propagation between aircraft operating on the ground at opposite ends of the main runway may be experienced.

Safety message

A potential accident was avoided by the actions of both pilots who responded to the presence of the other aircraft by braking and veering to the right. Rather than continuing their flights with the assumption the other made a mistake, they performed a radio check with each other to verify there was no fault with their respective aircraft radios.

General details

Occurrence details

Date and time:	27 August 2016 – 1110 EST	
Occurrence category:	Serious incident	
Primary occurrence type:	Aircraft separation - near collision	
Location:	Gympie ALA, Qld	
	Latitude: 26° 16.97’ S	Longitude: 152° 42.12’ E

Aircraft details - RV-7

Manufacturer and model:	Amateur Built Aircraft – Van’s RV-7	
Registration:	VH-VTZ	
Serial number:	73097	
Type of operation:	Private – pleasure / travel	
Persons on board:	Crew – 1	Passengers – 1
Injuries:	Crew – 0	Passengers – 0
Aircraft damage:	Nil	

Aircraft details – DG-400

Manufacturer and model:	Glaser-Dirks – DG-400	
Registration:	VH-XJZ	
Serial number:	4-275	
Type of operation:	Gliding – pleasure / travel	
Persons on board:	Crew – 1	Passengers – 0
Injuries:	Crew – 0	Passengers – 0
Aircraft damage:	Nil	

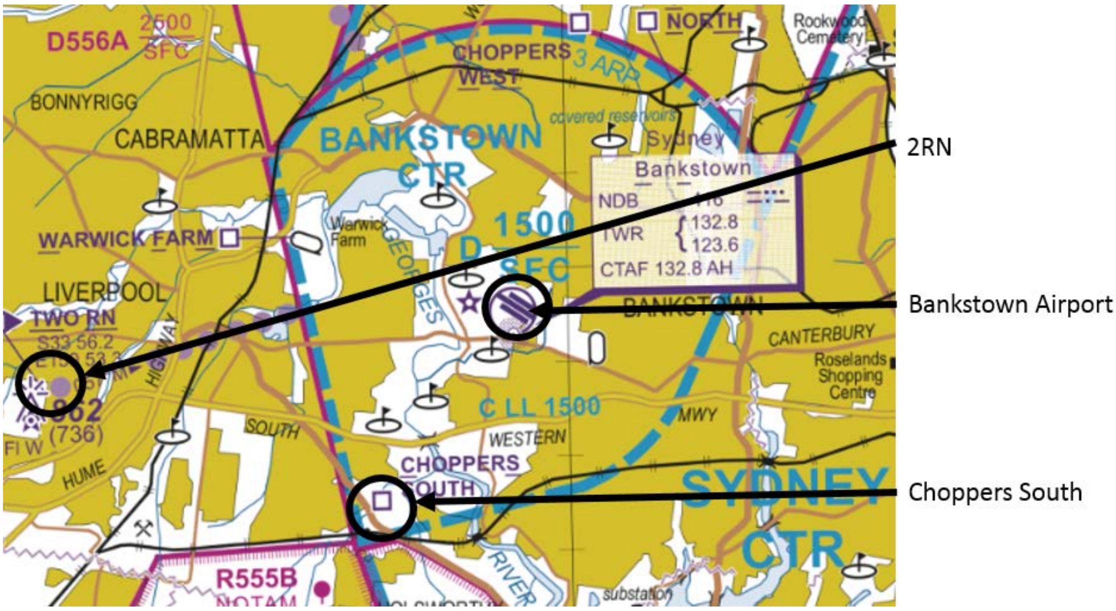
Separation issue involving Robinson R44, VH-EYD, and Cessna 152, VH-MRC

What happened

On 25 August 2016, a Robinson R44 helicopter, registered VH-EYD (EYD), departed from Bankstown Airport on a training flight to Camden Airport, New South Wales. On board were a student pilot and a flight instructor. After completing exercises in the Camden area, the helicopter returned towards Bankstown.

According to air traffic control (ATC) audio data, at about 1607 Eastern Standard Time (EST), the instructor of EYD contacted the Bankstown aerodrome controller (ADC), advising that they were at inbound reporting point 2RN at 1,000 ft (Figure 1). The ADC instructed EYD to track via, and report at, ‘Choppers South’ reporting point at 500 ft. EYD then tracked via Choppers South at 500 ft, but the instructor omitted to advise ADC when they were overhead that point.

Figure 1: Extract of Sydney Visual Terminal Chart



Source: Airservices Australia – annotated by ATSB

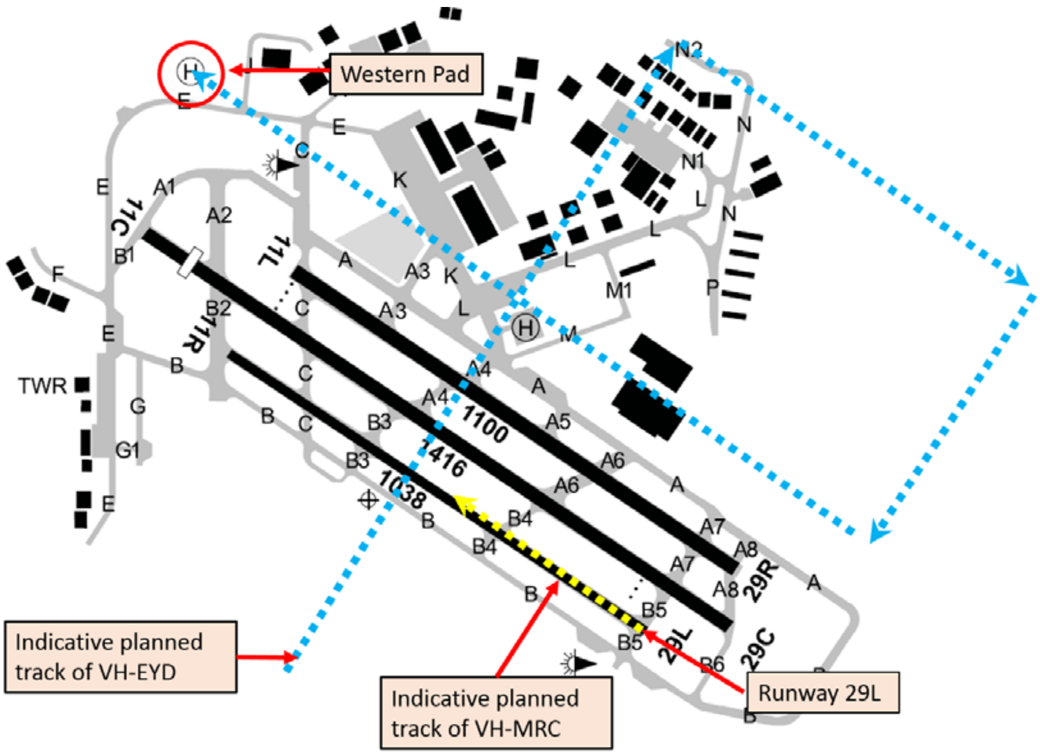
At about 1610, the solo student pilot of a Cessna 152 aircraft, registered VH-MRC (MRC), who was conducting circuit training at Bankstown Airport, contacted the ADC and stated that MRC was on the downwind circuit leg, and requested clearance to depart the control zone on the upwind circuit leg. The ADC instructed the pilot of MRC to ‘go around from base, maintain 1,000 ft and depart on upwind’.

The pilot of MRC asked the ADC to repeat the instruction and then read back ‘MRC going around from base and depart at 1,000 ft’. The pilot of MRC then continued their approach, descending on the base leg and final approach to about 300 ft above the runway before commencing a go-around. At about 1613, passing about 500 ft on climb, the pilot of MRC advised the ADC that they were going around and departing at 1,000 ft upwind.

The ADC reported that they sighted MRC about mid-way along the runway, lower than the assigned altitude of 1,000 ft, and also sighted EYD about 200 m away at about the same altitude (Figure 2). The ADC immediately issued a safety alert[1] to the pilot of MRC advising of a helicopter (EYD) to their left crossing midfield at 500 ft. The ADC then issued a safety alert to EYD advising of the Cessna (MRC) in the go-around.

The instructor of EYD had already sighted MRC and commenced a right turn to increase separation. On receiving the safety alert, the pilot of EYD continued the right turn to pass behind MRC. EYD landed at the western helipad without further incident. MRC departed to the training area, before returning to land at Bankstown Airport, also without further incident.

Figure 2: Indicative aircraft tracks



Source: Airservices Australia – annotated by ATSB

Aerodrome control and radio frequencies

There were two Tower frequencies and two ADC positions at Bankstown, with ADC1 having responsibility for arrivals and departures on runways 29 right/11 left and 29/11 centre; ADC2 was responsible for the training circuit with runway 29 left/11 right.

The two Tower frequencies at Bankstown were combined at the time of the incident, and one controller occupied the ADC position. When combined, pilots of aircraft operating on either the circuit Tower frequency or the arrivals and departures Tower frequency would have been able to hear transmissions on the other frequency. Although the pilots of MRC and EYD had different radio frequencies selected, they were combined such that the transmissions made on both frequencies could be heard on either frequency.

1 ATC will issue a Safety Alert to aircraft, in all classes of airspace, when they become aware that an aircraft is in a situation that is considered to place it in unsafe proximity to: terrain; obstruction; active restricted or prohibited area; or other aircraft.

Pilot comments

Pilot of MRC

The pilot of MRC was a student with 41 hours of aeronautical experience, six of which were solo. They provided the following comments:

- They had not departed from the circuit runway to the training area previously and were not sure how to do so or what to expect from ATC.
- Their understanding of a go-around was to descend as if on a normal approach to the runway, discontinue the approach on final at about 300 ft, apply full power and commence a climb, and diverge to the left of the runway.
- They misunderstood the ADC's instruction, but were unsure why the controller had not noticed the aircraft descending on base and final before it commenced the go-around.
- They were not aware of the Choppers South arrival procedure until after the incident.
- If the instruction had been sequenced differently, with the direction to maintain 1,000 ft first, it would have made the ADC's expectations clearer.

Controller comments

The ADC commented that if the pilot of MRC had maintained 1,000 ft there would not have been a separation issue. Having issued the instruction to maintain 1,000 ft, the ADC turned their focus to monitoring other aircraft and communicating with the pilots of other aircraft in the control zone.

The controllers have a liaison role with local flying schools, which involves visiting them and talking to the students, and they also invite students to the tower during quiet periods. This liaison fosters a safer working relationship between pilots and air traffic control.

Go-around

Aeronautical Information Package (AIP) En Route (ENR) 1.1 – 16.4 stated:

> *At Class D aerodromes with parallel runways where contra-rotating circuit operations are in progress, if ATC instructs, or a pilot initiates a go around, the pilot must:*
>
> *a. commence climb to circuit altitude*
>
> *b. position the aircraft on the active side and parallel to the nominated duty runway, while maintaining separation from other aircraft and*
>
> *c. follow ATC instructions or re-enter the circuit from upwind.*

The Manual of Air Traffic Services defined a go-around as a 'procedure in which the pilot discontinues the approach immediately and rejoins for another circuit, or proceeds as directed by ATC'.

The ADC commented that when they issued the instruction to go around, they expected the pilot of MRC to terminate their approach and maintain 1,000 ft while continuing to fly the circuit geographically.

En Route Supplement Australia

The ERSA entry for Bankstown included the following under the heading Class D:

'CAUTION: HELICOPTERS OVERFLY RUNWAYS MIDFIELD AT 500FT.'

Operator comments

The operator of MRC provided the following comments:

- Helicopter pilots inbound via Choppers South should be aware that crossing a training circuit runway is inherently risky as a go around can occur at any time and is obviously more likely to

occur with low time student pilots who are more likely to not have their approach to land stabilised.
- It is also very likely that during their initial solo circuit training students will be more likely to be focussing on the preceding traffic they are following and will be less likely to see crossing helicopter traffic in their peripheral vision.
- Bankstown is a very busy training environment, which can have sudden increases in traffic volume. ATC needs to be aware of this as it is very difficult for student pilots to monitor traffic and radio calls and make broadcasts when conjoined frequencies are in operation, and there is a heavy traffic load.
- It is, and it always will be, company policy to safely fly the aeroplane first, navigate to the southern side of the runway and then communicate their intentions/actions.

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-MRC

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

Amended operations manual

The operator of MRC is proposing to amend their operations manual to read:

> *Unlicensed solo pilots are not permitted to request circuits on arrival or when inbound to Bankstown. Unlicensed solo pilots may only depart the training circuit after they have demonstrated proficiency in the procedure to an instructor and a note has been made in the training record to that effect*

Safety message

The Civil Aviation Safety Authority booklet, *Class D airspace*, advises pilots that when operating in Class D airspace, they must sight and maintain separation from other aircraft. Pilots and ATC have a dual responsibility to maintain situational awareness of other traffic.

General details

Occurrence details

Date and time:	25 August 2016 – 1612 EST	
Occurrence category:	Incident	
Primary occurrence type:	Aircraft separation – Issues	
Location:	Bankstown Airport, New South Wales	
	Latitude: 33° 55.47' S	Longitude: 150° 59.30' E

Helicopter details

Manufacturer and model:	Robinson Helicopter Company R44	
Registration:	VH-EYD	
Serial number:	2288	
Type of operation:	Flying training – dual	
Persons on board:	Crew – 2	Passengers – 0
Injuries:	Crew – 0	Passengers – 0
Aircraft damage:	Nil	

Aircraft details

Manufacturer and model:	Cessna Aircraft Company 152	
Registration:	VH-MRC	
Serial number:	15279612	
Type of operation:	Flying training – solo	
Persons on board:	Crew – 1	Passengers – 0
Injuries:	Crew – 0	Passengers – 0
Aircraft damage:	Nil	

Australian Transport Safety Bureau

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

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

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

Purpose of safety investigations

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

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

About this Bulletin

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

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

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

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

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

Conducting these Short investigations has a number of benefits:

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

Australian Transport Safety Bureau

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