Australian Government
Australian Transport Safety Bureau

Taxiing proximity event involving Airbus A321, VH-VWQ, and Boeing 737, VH-VZB

Melbourne Airport, Victoria, on 30 April 2018

ATSB Transport Safety Report
Aviation Occurrence Investigation
AO-2018-040
Final – 6 June 2019

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

Publishing information

Published by: Australian Transport Safety Bureau
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Addendum

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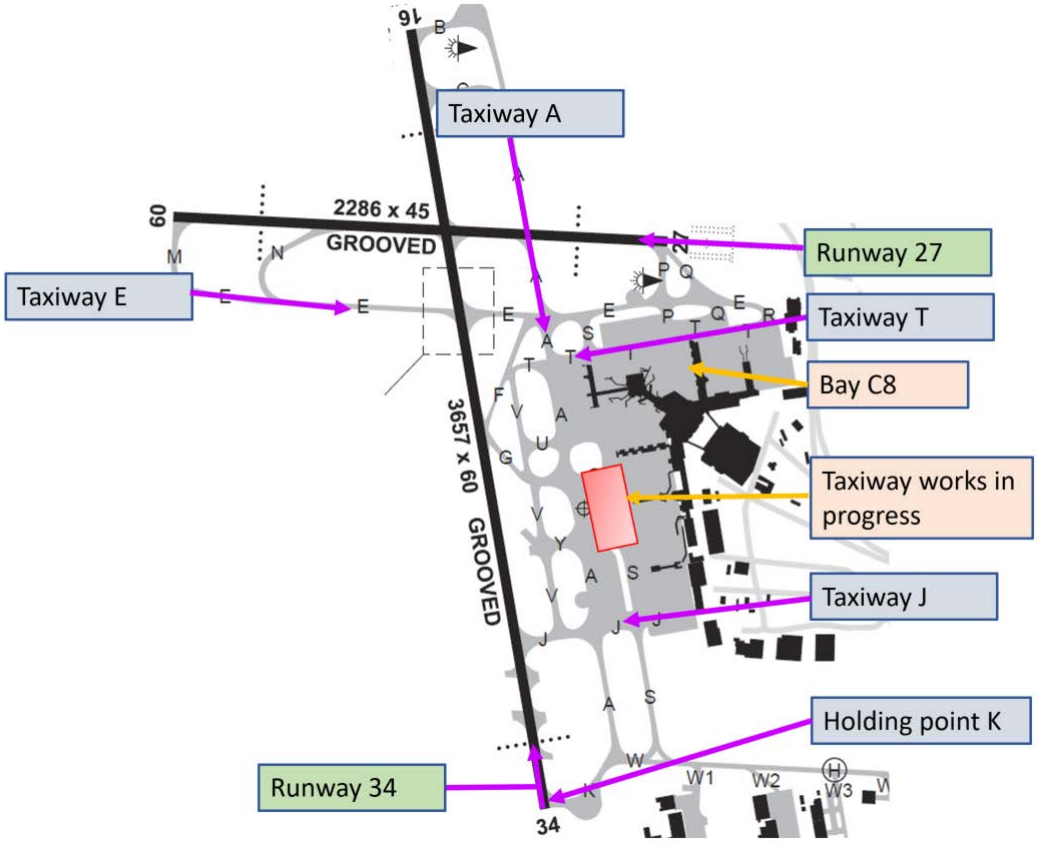
Taxiing proximity event involving A321, VH-VWQ, and B737, VH-VZB

What happened

On the morning of 30 April 2018, the surface movement controller (SMC) at Melbourne Airport, Victoria was conducting on-the-job training of a trainee air traffic controller. Runways 27 and 34 were in use, with aircraft landing on runway 27 and departing from either runway 27 or runway 34 (Figure 1).

Figure 1: Melbourne Airport apron, taxiways and runways



Source: Airservices modified by ATSB

At about 0923 Eastern Standard Time,[1] after the trainee had been in the surface movement control position for nearly 2 hours, the SMC took over in preparation for handing over the position to another controller. At that time, an Airbus A321-231 aircraft, registered VH-VWQ (VWQ) and operating Jetstar flight 730 from Launceston, Tasmania, landed on runway 27 and exited onto taxiway N and then E (Figure 1). After landing, the flight crew of VWQ contacted the SMC, who instructed them to hold short of runway 34.

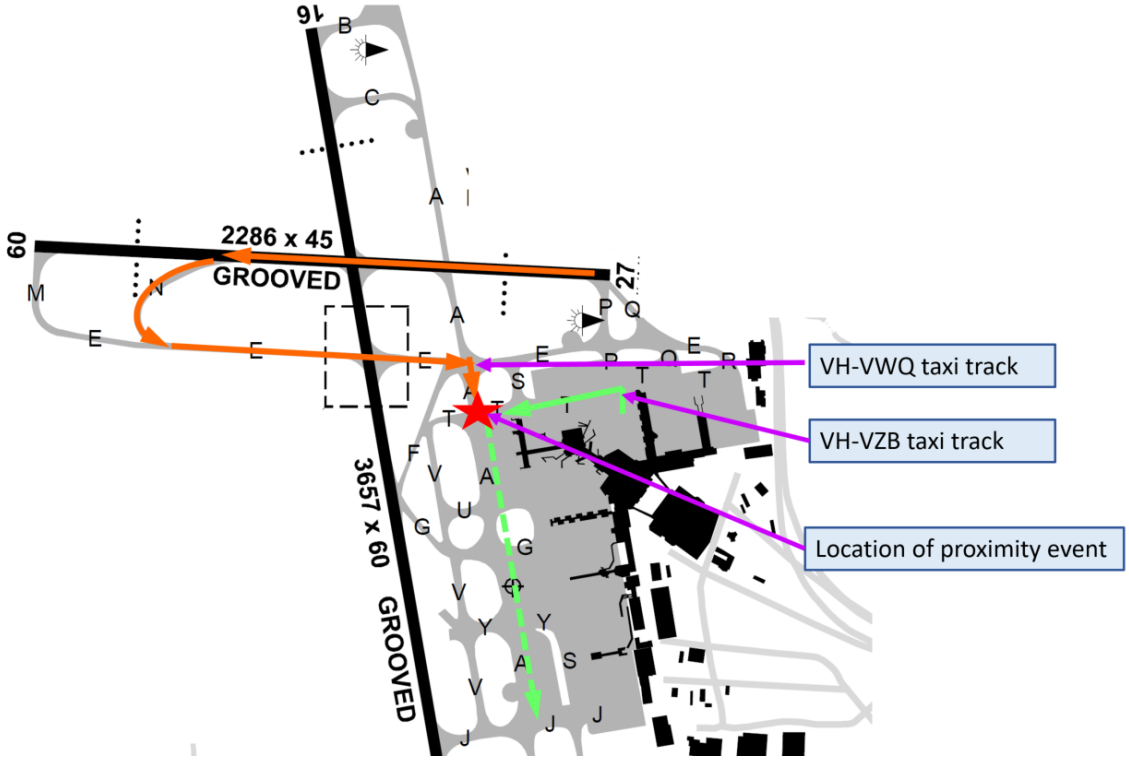
At about the same time, a Boeing 737-838 aircraft, registered VH-VZB (VZB) and operating Qantas flight 610 from Melbourne to Brisbane, Queensland, had been pushed back from bay C8.

About 3 minutes after VWQ landed, it was still holding awaiting clearance to cross runway 34. Meanwhile, the flight crew of VZB requested clearance to taxi to holding point J of runway 34 for

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

take-off. The SMC cleared VZB to 'taxi via TANGO [T] and hold short of [taxiway] ALPHA [A]' (Figure 2).

Figure 2: Airport diagram showing aircraft tracks



Source: Airservices Australia modified by ATSB

At 0927:43, the SMC cleared VWQ to 'cross runway 34, taxi via ALPHA [A], hold short of JULIET [J],' which was four intersections beyond taxiway T. As VZB was required to hold short of taxiway A, at that time, VWQ had right of way through the intersection of taxiways A and T.

Twenty seconds later (at 0928:03), the SMC commenced handover of the surface movement control position. He pressed the handover record button and selected the speaker on so the relieving controller (and the trainee) could hear all transmissions on the Ground frequency. The SMC then proceeded through the handover checklist. When 'Traffic' was the next item on the checklist, the controller said they would 'work through this traffic as we go'. The relieving controller did not take over the position at that time.

At 0928:39, the SMC cleared VZB to continue via A to holding point K of runway 34.

As VWQ taxied along taxiway A and approached the intersection with taxiway T, the captain, seated in the left seat, sighted VZB approaching the intersection from the left (on taxiway T). The captain of VWQ assessed that the flight crew of VZB had not seen VWQ and that if both aircraft continued at their current speed, they might collide at the intersection. In response, he took control of the aircraft from the first officer (the operating pilot) and braked heavily.

At the same time, the flight crew of another aircraft requested clearance. The SMC responded to that request, and by the time he finished that transmission, the captain of VWQ had braked. The SMC, on looking out the window, had also seen the potential conflict and instructed the flight crew of VWQ to 'give way to Qantas [VZB]'. When the captain of VWQ responded that the instruction was late, the SMC acknowledged the oversight.

Meanwhile, VZB continued through the intersection, taxied to holding point K for runway 34 and subsequently departed. The flight crew of VZB had not been aware of any potential conflict.

VWQ continued to taxi first to J then onwards to the bay (at 0931:06).

At 0935:25, 7 minutes after commencing the handover, the SMC returned to the checklist item of Traffic, completed the handover, and the oncoming SMC accepted handover of the position.

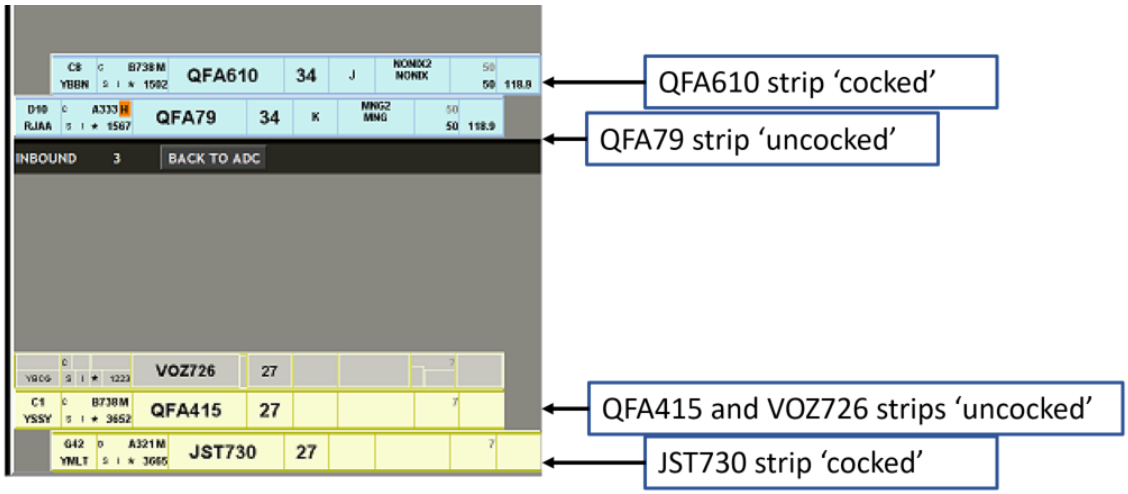
Electronic flight strips (Flight Data Elements)

It is possible to note a clearance limit on the flight strip (such as VZB being instructed to hold short of taxiway A). However, the SMC advised that controllers generally do not do this because the time it takes to do so makes it counterproductive to issuing fast, dynamic clearances.

A technique that controllers do use to remind themselves that a clearance limit has been issued and further instructions are required is to 'cock' the flight strip (Figure 3). This involves leaving the strip offset to the right side of the bay. The controller moves it to the left ('uncocked') when a clearance has been issued where no further instructions are required. The SMC advised that he used that technique.

This technique provides a visual trigger to remind controllers that there is an outstanding action. However, an uncocked strip when no clearance limit has been issued would not provide that cue, or alert to the potential for a proximity event.

Figure 3: Examples of flight strips cocked and uncocked



Source: Airservices Australia

Handover

It was standard procedure for a controller to hand over their position either at the end of a shift or to take a break, in this case after being in the position for 2 hours. The handover requires a division of attention between controlling traffic and communicating with the relieving controller. Along with a division of their attention, the controller's workload increases as they pass required information to the relieving controller.

In preparation for handing over to the oncoming controller, the SMC had taken over from the trainee in actively controlling the traffic about 5 minutes prior to commencing the handover. He commented that the traffic was not necessarily sequenced the way he would have done it if he had been actively controlling and that he had taken over in order to get the traffic in a state that he considered ready to hand over.

Strategies used to mitigate the risks of the increase in workload and of divided attention at handover include the use of a checklist to ensure all vital information is passed on, and delaying the handover until there is a suitable lull in the traffic.

The controller used a checklist and started the handover, which was then delayed due to the volume of traffic. The controller commented that there is an element of distraction in having another person watching them while controlling, and having the transmissions audible on the speaker.

Previous handover occurrences

The ATSB has been notified of 13 occurrences since 2008 where the handover was identified as an influencing factor. A review of these occurrences indicated that the handover increases workload and requires a division of attention from actively controlling. The handover therefore increases the potential for errors.

Taxiway works

Melbourne Airport was conducting planned works as part of the airport's taxiway maintenance program. The works were not directly related to the clearances issued to the two aircraft involved in this occurrence. However, the controller was planning and managing other aircraft around the taxiway closures. This reduced the efficiency of controlling taxiing aircraft, thereby increasing the controller's workload.

Flight crew actions

Airservices Australia Aeronautical Information Publication En Route section 1.1-9 2.3.3.5 stated that the 'separation of aircraft taxiing on the manoeuvring area is a joint pilot and controller responsibility.'

Safety analysis

Controller workload

Workload reflects 'the interaction between a specific individual and the demands imposed by a particular task.'[2]

In this occurrence, several factors increased the controller's task demands and therefore his workload:

- a high volume of traffic associated with the morning peak period
- having recently taken over from the trainee in actively controlling the traffic
- ongoing taxiway works.

Additionally, and according to the European Organisation for the Safety of Air Navigation (2006),[3] handover increases workload demands and distraction, which increases the risk of errors.[4]

After commencing the handover, the controller forgot that he had issued VWQ clearance to taxi through intersection A/T, thinking that he had instructed the crew to hold short of T. Situations of high workload are likely to reduce memory performance.[5]

When the controller then cleared VZB through the same intersection, a potential conflict resulted. His workload and distraction associated with the handover probably contributed to the delay in detecting the conflict. When the conflict was detected, other radio transmissions delayed the controller instructing the flight crew of VWQ to give way to VZB until after avoiding action had already been taken.

Managing workload during handover

Workload experienced by a controller at a given time is subjective and it is difficult to assess the increase in workload that can be managed before the error rate increases. Therefore, it is

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2 Orlady H.W. & Orlady L.M. 1999, *Human Factors in Multi-Crew Flight Operations*, Ashgate Publishing Ltd, Hants, England.

3 European Organisation for the Safety of Air Navigation 2006, *Study Report on Selected Safety Issues for Staffing ATC Operations*.

4 Loukopoulos, L.D., Dismukes, R.K. & Barshi, I 2009, 'The Perils of Multitasking', *Aerosafety World*, August 2009, pp. 18-23.

5 Van Benthem, K.D., Herdman, C.M., Tolton, R.G., & LeFevre, J.A. (2015), 'Prospective memory failures in aviation: Effects of cue salience, workload, and individual differences.' *Aerospace Medicine and Human Performance,* 86(4), pp. 366-373.

important to implement strategies to reduce the risk and potential consequences of errors due to high workload. A widely accepted strategy to reduce that risk is delaying the handover until a suitable lull in the traffic.

In this occurrence, there had been 5 minutes of almost continuous radio communications then a 30-second lull before the controller started the handover. After completing some of the checklist items, the controller then delayed detailing the traffic to the relieving controller. Had the handover been delayed until a longer lull could be expected, it may have reduced the risk of error. However, without any prompt to record taxiing instructions, the controller was still reliant on remembering the issued clearance limits.

Findings

This finding should not be read as apportioning blame or liability to any particular organisation or individual.

- The surface movement controller's workload during handover probably contributed to him forgetting the taxiing instruction he had issued to VH-VWQ. Consequently, he issued a conflicting taxiing instruction to VH-VZB that resulted in a proximity event between the aircraft at an intersection.

Safety message

This occurrence highlights that increased workload and distraction can reduce performance and increase errors. In the air traffic control context, using tools/practices that reduce reliance on memory and delaying handover until lulls in activity can mitigate these effects.

The timely action taken by the captain of VH-VWQ to avoid a collision also demonstrates the importance of flight crew alertness while taxiing.

General details

Occurrence details

Date and time:	30 April 2018 – 0939 EST	
Occurrence category:	Serious incident	
Primary occurrence type:	ANSP Operational error – Failure to pass traffic	
Location:	Melbourne Airport, Victoria	
	Latitude: 37° 40.4' S	Longitude: 144° 50.6' E

Aircraft details: VH-VWQ

Manufacturer and model:	Airbus A321	
Registration:	VH-VWQ	
Operator:	Jetstar Airways	
Serial number:	7384	
Type of operation:	Air transport high capacity - Passenger	
Persons on board:	Crew: Unknown	Passengers: Unknown
Injuries:	Crew: 0	Passengers: 0
Aircraft damage:	None	

Aircraft details: VH-VZB

Manufacturer and model:	The Boeing Company 737	
Registration:	VH-VZB	
Operator:	Qantas Airways	
Serial number:	34196	
Type of operation:	Air transport high capacity - Passenger	
Persons on board:	Crew: Unknown	Persons on board: Unknown
Injuries:	Crew: 0	Passengers: 0
Aircraft damage:	None	

About the ATSB

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

The ATSB is responsible for investigating accidents and other transport safety matters involving civil aviation, marine and rail operations in Australia that fall within ATSB's 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 operations involving the travelling public.

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

The object of a safety investigation is to identify and reduce safety-related risk. ATSB investigations determine and communicate the safety factors related to the transport safety matter being investigated.

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

About this report

Decisions regarding whether to conduct an investigation, and the scope of an investigation, are based on many factors, including the level of safety benefit likely to be obtained from an investigation. For this occurrence, a limited-scope, fact-gathering investigation was conducted in order to produce a short summary report, and allow for greater industry awareness of potential safety issues and possible safety actions.