



**Australian Government**

**Australian Transport Safety Bureau**

# Runway incursion involving Bombardier Dash-8-402, VH-LQJ

Gladstone Airport, Queensland, 17 March 2020

**ATSB Transport Safety Report**

Aviation Occurrence Investigation (Short)

AO-2020-019

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#### Addendum

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# Safety summary

## What happened

On the morning of 17 March 2020, a QantasLink Bombardier Dash-8-402, registered VH-LQJ (LQJ), was being taxied for a scheduled flight from Gladstone Airport, Queensland to Brisbane Airport, Queensland. There were two flight crew, two cabin crew and 34 passengers on board. At the same time, a ATEC Faeta 321, registered 24-8279 (Faeta 8279), with one instructor and student on board, was conducting circuit training at Gladstone Airport.

At about 0645, as Faeta 8279 was on approach to conduct a touch-and-go on runway 10, LQJ entered and taxied along the runway in front of Faeta 8279. The instructor on board Faeta 8279 conducted a go-around to avoid an incident on the occupied runway.

## What the ATSB found

The ATSB found that the flight crew of LQJ set the incorrect common traffic advisory frequency and did not select the appropriate traffic collision avoidance system/transponder mode during the before start checks. These errors were likely influenced by increased workload and time pressures experienced during before start preparations.

The errors went undetected during the taxi phase of flight. As a result, the flight crew's situational awareness was significantly degraded and caused the captain and first officer to form the shared belief that no other traffic was operating in the vicinity of Gladstone Airport. This shared incorrect mental model likely impacted the efficacy of the visual scan conducted prior to entering the runway, with neither flight crew member sighting the approaching aircraft.

## What has been done as a result

Following this incident, QantasLink undertook a review of operating procedures at non-controlled airports. The procedural review included transponder activation and introduced a requirement to contact Air Traffic Control prior to entering the runway. QantasLink also provided internal communications to flight crew detailing the importance of standard operating procedures and threat management when dealing with distractions and workload.

## Safety message

This incident illustrates the human factors implications associated with the combination of increased workload and time pressures. Flight crews can guard against similar outcomes by applying effective threat and error management strategies that recognise when such threats may arise and set in place suitable actions that minimise error potential. These actions include strict adherence to standard operating procedures and increased cross-checking of system inputs and mode changes.

# The investigation

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 investigation was conducted in order to produce a short investigation report, and allow for greater industry awareness of findings that affect safety and potential learning opportunities.

## The occurrence

At about 0600 Eastern Standard Time,<sup>1</sup> on 17 March 2020, the crew of a QantasLink Bombardier Dash-8-402 aircraft, registered VH-LQJ (LQJ), commenced pre-flight preparations for a scheduled regular public transport flight from Gladstone Airport, Queensland to Brisbane Airport, Queensland. The crew comprised the captain, first officer (FO) and two cabin crew.

It was the first flight of the day for LQJ and the scheduled departure at 0645 meant that the crew had about 45 minutes to prepare the aircraft. Shortly after arriving at the aircraft, the captain started the auxiliary power unit (APU),<sup>2</sup> while the FO conducted the aircraft walk around. The captain then commenced the 'originating' and 'before start' checks, which included selecting APU bleed air 'ON' to provide air-conditioning to the cabin. At this point the APU failed, so the captain completed the automatic APU shutdown actions.

At about 0610 during the walk around, the FO noticed a small aircraft taxi behind LQJ. This aircraft was an ATEC Faeta 321, registered 24-8279 (Faeta 8279), that was being taxied for circuit training with one instructor and one student on board. The FO made a mental note of the taxiing aircraft, finalised the walk around, and returned to the flight deck to complete the remainder of the pre-flight preparations.

The captain and FO then restarted the APU, but it failed for a second time when APU bleed air was selected 'ON'. At about the same time, a ground crew member attended the flight deck to inform the captain and FO that a 'person in custody'<sup>3</sup> and their police escort would be travelling on the flight. The captain left the flight deck to review the person in custody paperwork and brief the cabin crew on the custody arrangements. The person in custody and their escort then boarded the aircraft, with the remainder of the flight's 34 passengers boarding a short time later.

At about 0622, Faeta 8279 commenced circuit training using runway 28. The occupants of Faeta 8279 made regular positional broadcasts on the Gladstone Airport common traffic advisory frequency (CTAF)<sup>4</sup> throughout the training activity.

Meanwhile, on board LQJ, the captain returned to the flight deck and elected to apply the Minimum Equipment List (MEL)<sup>5</sup> to the APU system. The captain and FO then actioned the procedures required to apply the MEL with remote support provided by QantasLink maintenance engineers. Completing this task took the crew 5-10 minutes.

Once the MEL had been finalised, the captain and FO undertook the remainder of the before start checks, but omitted to set the traffic collision avoidance system (TCAS)<sup>6</sup>/transponder<sup>7</sup> to 'ON ALT'

<sup>1</sup> Eastern Standard Time (EST): Universal Coordinated Time (UTC) +10 hours.

<sup>2</sup> An auxiliary power unit is a small turbine engine that is normally located in the tail of an aircraft and supplies power to aircraft systems independently of ground support equipment.

<sup>3</sup> A 'person in custody' is a person who is in custody under an Act of Parliament, including a law of a State or Territory, that needs to travel by air.

<sup>4</sup> A common traffic advisory frequency is a designated frequency on which pilots make positional broadcasts when operating in the vicinity of a non-controlled aerodrome or within a broadcast area.

<sup>5</sup> A Minimum Equipment List (MEL) allows the continued operation of aircraft with certain equipment inoperative, subject to specified conditions.

<sup>6</sup> A traffic collision avoidance system (TCAS) monitors the airspace around an aircraft for other traffic equipped with a corresponding active transponder and gives warning of possible collision risks.

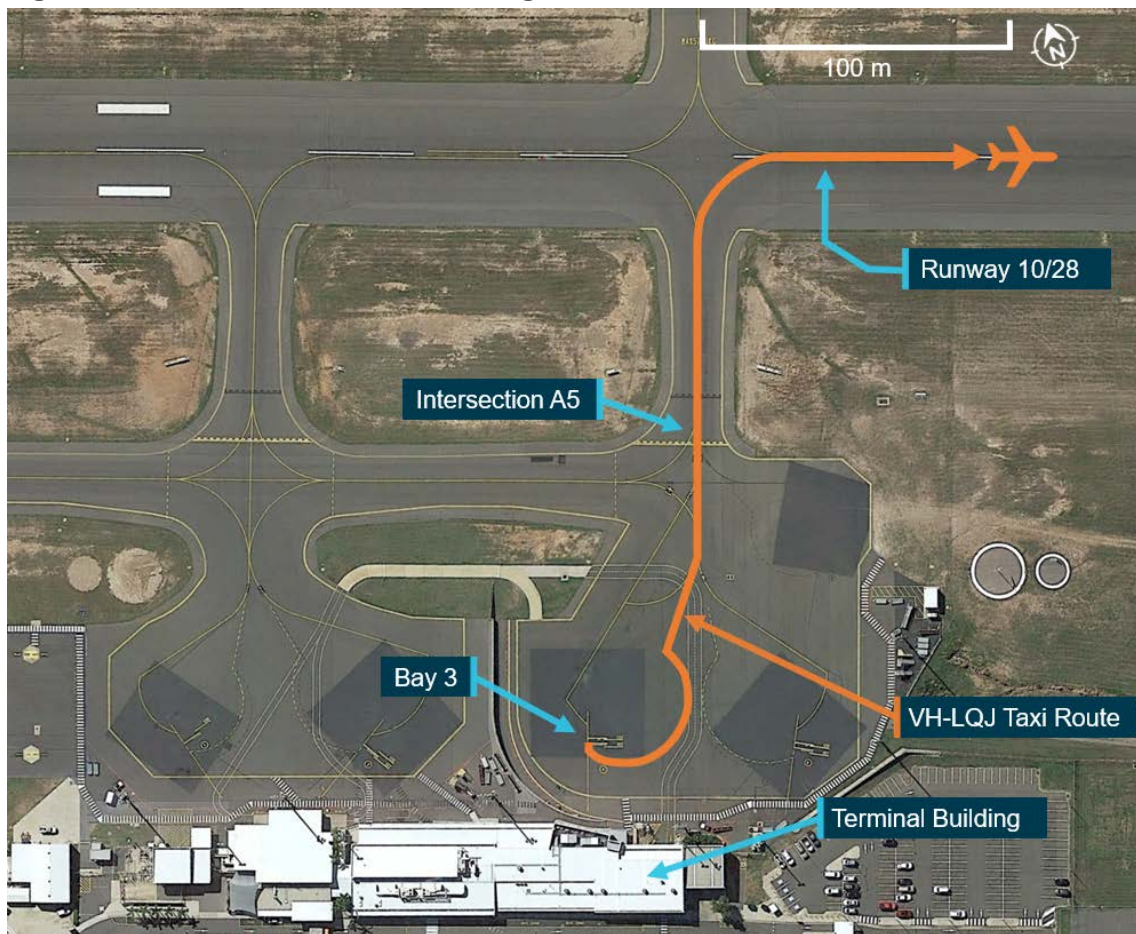
<sup>7</sup> A transponder is a receiver/transmitter fitted to an aircraft which will generate a reply signal upon proper interrogation; the interrogation and reply being on different frequencies.

and to select the Gladstone CTAF in VHF COM 2.<sup>8</sup> The CTAF omission was identified by the FO during the departure briefing and subsequently addressed. However, the FO entered the incorrect frequency of 126.7 MHz instead of 118.8 MHz, which was the correct frequency for the Gladstone CTAF.

At 0643, a pilot in Faeta 8279 made a CTAF broadcast advising traffic that the aircraft would be changing runway direction for a touch-and-go on runway 10. The captain and FO of LQJ did not receive this broadcast as they were monitoring the incorrect frequency.

The weather at the time was reported as being a wind from 201 degrees magnetic at 6 knots, no cloud, and a visibility of 43 km. As the wind did not favour either runway, the flight crew of LQJ elected to use runway 28 to avoid departing towards the rising sun. This required a short taxi from bay 3 to the A5 intersection, and a right turn to enter and backtrack runway 28 (Figure 1 and Figure 2).

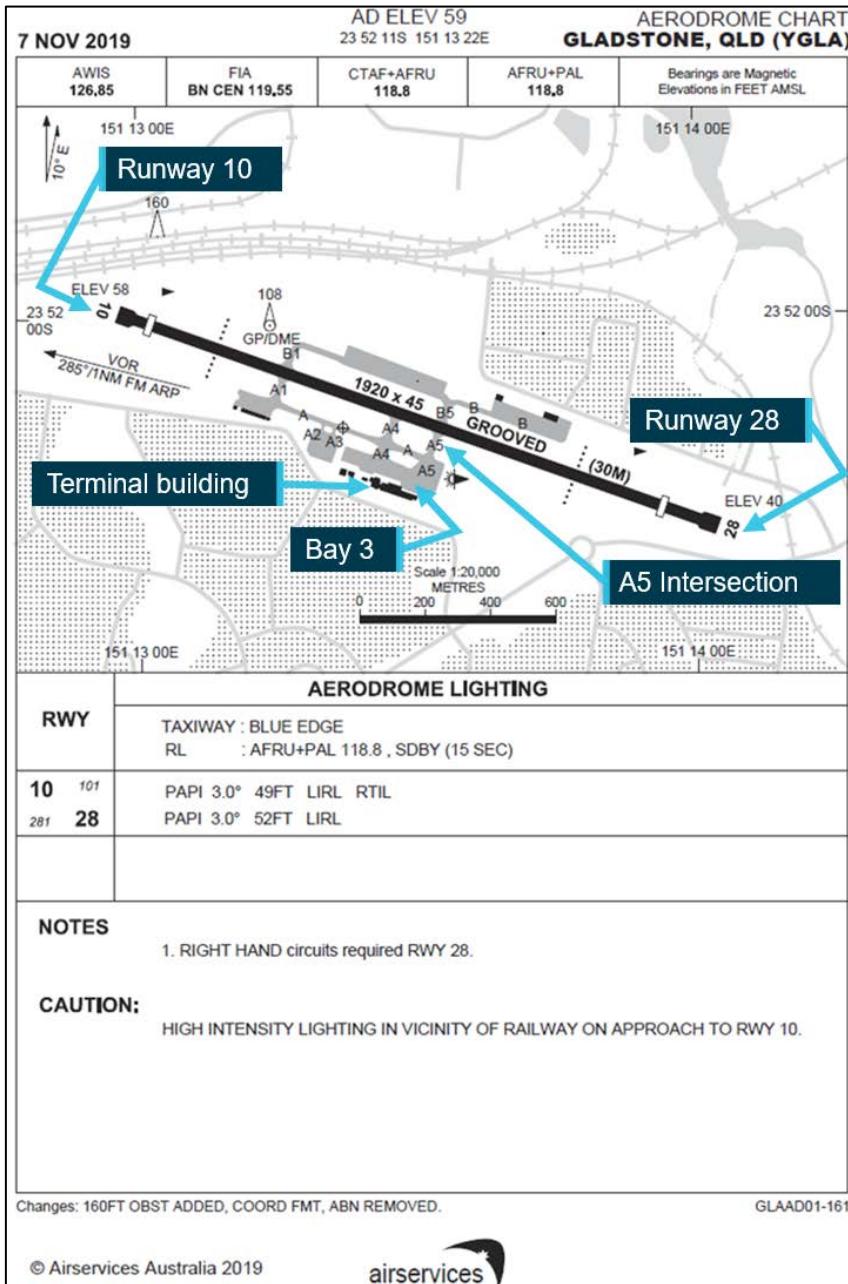
**Figure 1: Overview of VH-LQJ taxi routing**



Source: Google Earth, annotated by the ATSB

<sup>8</sup> The VHF COM 2 is one of two VHF transceivers available on the aircraft.

Figure 2: Gladstone aerodrome chart



Source: Airservices Australia, annotated by ATSB

At 0643:38, the FO made a broadcast on the incorrect CTAF using VHF COM 2 and LQJ was taxied from its parked position on bay 3.

At 0644:23, the FO made a second broadcast on the incorrect CTAF as the aircraft taxied towards the A5 intersection.

At 0644:29, a pilot in Faeta 8279 made a broadcast on the Gladstone CTAF advising traffic that the aircraft was on short final for a touch-and-go on runway 10. The flight crew of LQJ did not receive this broadcast either.

The captain and FO conducted a visual scan as LQJ neared the A5 intersection, but neither flight crew sighted Faeta 8279 on approach for runway 10. At about 0645, LQJ was taxied onto the runway in front of the approaching Faeta 8279. In response, the instructor on board Faeta 8279 commenced a go-around and attempted, unsuccessfully, to contact LQJ on the Gladstone CTAF.

At 0645:02, as LQJ backtracked along the runway, the FO made a taxi report to Brisbane Centre<sup>9</sup> using VHF COM 1. A secondary surveillance radar transponder code<sup>10</sup> was provided to LQJ and the captain entered it into the transponder. Shortly afterwards, the captain identified that the TCAS/transponder was not appropriately set and selected it to 'ON ALT'.

At 0645:42, the TCAS presented the flight crew with a traffic advisory<sup>11</sup> indicating climbing traffic above LQJ. The traffic – Faeta 8279 – was subsequently sighted by the captain and FO climbing in an easterly direction overhead the airport.

The captain and FO checked the frequency set in VHF COM 2 and identified the incorrect frequency selection. The frequency was changed to the correct frequency of 118.8 MHz and the FO made a broadcast at 0646:29 advising that LQJ was 'entering and backtracking' runway 28.

At about 0646:36, a pilot in Faeta 8279 replied to LQJ's broadcast, but the flight crew of LQJ did not respond to Faeta 8279's transmission. A short time later, the instructor in Faeta 8279 broadcast the intention to manoeuvre for runway 28 to allow LQJ to depart. At about 0648, LQJ commenced its take-off from runway 28.

## Context

### ***Air Traffic Control communications***

The captain and FO elected to delay the taxi report to Brisbane Centre until LQJ had entered the runway. This was due to the shared understanding that the Gladstone Airport terminal buildings shield VHF transmissions and prevent contact being made with Brisbane Centre when parked on bay 3. QantasLink procedures permit an aircraft to be moved to an alternate location when communications with air traffic services are not possible on the bay.

### ***Human factors***

The same crew had flown LQJ into Gladstone Airport the evening prior, arriving at about 1900 on 16 March 2020. The crew then stayed overnight in local hotel accommodation. Both the captain and FO reported no fatigue issues associated with the overnight stay, and an assessment of the flight crew's previous 14-day roster did not identify any significant fatigue risk factors.

During pre-flight preparations, the captain and FO encountered a number of unanticipated events and distractions, including two APU failures, boarding of a person in custody, and application of a MEL to the APU system. The additional actions, due to these events, increased their workload.

On the morning of the incident, neither the captain nor the FO recalled listening for an aerodrome frequency response unit (AFRU)<sup>12</sup> reply to the two broadcasts made on the incorrect frequency. The first broadcast took place when both flight crew members recall increased workload associated with the turn off bay 3. The second CTAF broadcast was made mid-way through the short taxi to the runway intersection.

Prior to entering the runway, the captain recalled believing there was no other aircraft in the vicinity of Gladstone Airport as the crew had not heard any broadcasts on VHF COM 2 and there was no traffic indicating on the TCAS display. The FO recalls making reference to the small aircraft that had been sighted during the walk around checks. However, given the elapsed time since the sighting, combined with the lack of transmissions received on VHF COM 2, the FO concluded that the traffic was no longer in the vicinity of the airport.

<sup>9</sup> Brisbane Centre is the air traffic control area control centre responsible for the flight information region within which Gladstone Airport is located.

<sup>10</sup> The number assigned to a particular multiple-pulse reply signal transmitted by a transponder in Mode A or Mode C.

<sup>11</sup> A traffic advisory is an indication given to the flight crew that a certain intruder is a potential threat.

<sup>12</sup> An Aerodrome Frequency Response Unit (AFRU) is a device installed at non-controlled aerodromes that will provide an automatic response when pilots transmit on the CTAF for the aerodrome at which it is installed.

## Safety analysis

This was the first flight of the day for LQJ and the crew had about 45 minutes to complete all pre-flight preparations prior to the scheduled departure time of 0645. During this period, the captain and FO encountered several unanticipated events and distractions, including the APU failure and person in custody paperwork, that required additional actions to be performed within the allocated timeframe. These interruptions and additional actions within a defined time period added workload and time pressures.

The combination of increased workload and time pressures is known to result in degraded information processing, increased errors, the tunnelling of attention, and an increased reliance on familiar strategies or actions (Staal, 2004). This response to workload and time pressures likely resulted in the flight crew's omission of the two 'before start' checklist items and the selection of the incorrect frequency in VHF COM 2.

The frequency selection error was further compounded by the flight crew not recognising an absence of AFRU reply when making radio calls on the incorrect frequency. As a result, the captain and FO were not aware that they were monitoring and broadcasting on the incorrect CTAF.

The flight crew's inadvertent omission of the TCAS/transponder selection resulted in the captain and FO incorrectly believing the TCAS would alert them to the presence of any transponder equipped aircraft that were operating in the vicinity of Gladstone Airport.

As a result of the frequency selection and TCAS/transponder errors, the flight crew's situational awareness was significantly degraded resulting in the captain and FO forming the shared belief that no other traffic was operating in the vicinity of Gladstone Airport. This shared incorrect mental model likely impacted the efficacy of the visual scan conducted by the flight crew as they neared the A5 intersection. Consequently, neither flight crew member identified the approaching aircraft and LQJ was taxied onto the runway in front of Faeta 8279. The instructor on board Faeta 8279 conducted a go-around to avoid an incident on the occupied runway.



## Findings

ATSB investigation report findings focus on safety factors (that is, events and conditions that increase risk). Safety factors include ‘contributing factors’ and ‘other factors that increased risk’ (that is, factors that did not meet the definition of a contributing factor for this occurrence but were still considered important to include in the report for the purpose of increasing awareness and enhancing safety). In addition ‘other findings’ may be included to provide important information about topics other than safety factors.

These findings should not be read as apportioning blame or liability to any particular organisation or individual.

From the evidence available, the following findings are made with respect to the runway incursion involving Bombardier Dash-8-402, registered VH-LQJ, at Gladstone Airport, Queensland, on 17 March 2020.

### ***Contributing factors***

- The flight crew of VH-LQJ were not aware that light aircraft 24-8279 was on approach and taxied onto the runway in front of it. Consequently, the pilot of 24-8279 had to conduct a go-around.
- The visual scan by the flight crew of VH-LQJ before entering the runway did not identify the approaching 24-8279, probably because of their degraded situational awareness.
- Increased workload and distractions while preparing VH-LQJ for departure led to the crew not setting the correct radio frequency and the appropriate mode on the traffic collision avoidance system/transponder. Without these essential aids to situational awareness, neither pilot developed an accurate mental model of the traffic.

## Safety actions

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.

### ***Safety action by QantasLink***

Following this incident, QantasLink undertook a review of operating procedures at non-controlled airports. The procedural review included transponder activation and introduced a requirement to contact Air Traffic Control prior to entering the runway. QantasLink also provided internal communications to flight crew detailing the importance of standard operating procedures and threat management when dealing with distractions and workload.

## Sources and submissions

### ***Sources of information***

The sources of information during the investigation included:

- the flight crew of VH-LQJ
- the pilot in command of 24-8279
- QantasLink
- Avdata
- Civil Aviation Safety Authority
- Airservices Australia.

## **References**

Staal MA 2004, *Stress, cognition, and human performance: A literature review and conceptual framework*, National Aeronautics and Space Administration Technical Memorandum NASA/TM-2004-212824.

## **Submissions**

Under section 26 of the *Transport Safety Investigation Act 2003*, the ATSB may provide a draft report, on a confidential basis, to any person whom the ATSB considers appropriate. That section allows a person receiving a draft report to make submissions to the ATSB about the draft report.

A draft of this report was provided to the crew of VH-LQJ, the pilot in command of 24-8279, QantasLink, and the Civil Aviation Safety Authority.

Submissions were received from QantasLink and the captain of VH-LQJ.

The submissions were reviewed and, where considered appropriate, the text of the report was amended accordingly.

# General details

## Occurrence details

Date and time:	17 March 2020 – 0645 EST	
Occurrence category:	Incident	
Primary occurrence type:	Runway Incursion	
Location:	Gladstone Airport, Queensland	
	Latitude: 23° 52.18' S	Longitude: 151° 13.37' E

## Aircraft 1 details

Manufacturer and model:	Bombardier DHC-8-402	
Registration:	VH-LQJ	
Operator:	Sunstate Airlines (operating QantasLink flights)	
Serial number:	4414	
Type of operation:	Regular Public Transport	
Departure:	Gladstone Airport, Queensland	
Destination:	Brisbane Airport, Queensland	
Persons on board:	Crew – 4	Passengers – 34
Injuries:	Crew – None	Passengers – None
Aircraft damage:	None	

## Aircraft 2 details

Manufacturer and model:	Atec Faeta 321	
Registration:	24-8279	
Serial number:	F770912A	
Type of operation:	Recreational	
Departure:	Gladstone Airport, Queensland	
Destination:	Gladstone Airport, Queensland	
Persons on board:	Crew – 2	Passengers – 0
Injuries:	Crew – None	Passengers – None
Aircraft damage:	None	