Australian Government
Australian Transport Safety Bureau

Misaligned take-off involving Beechcraft B200, VH-XGV

ATSB Transport Safety Report
Aviation Occurrence Investigation
AO-2016-142
Final – 9 February 2017

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

Publishing information

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Addendum

Page	Change	Date

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What happened

On 26 October 2016, a Beechcraft B200 aircraft, registered VH-XGV (XGV), taxied at Brisbane Airport for a private ferry flight to Archerfield Airport, Queensland. The pilot was the only occupant of the aircraft.

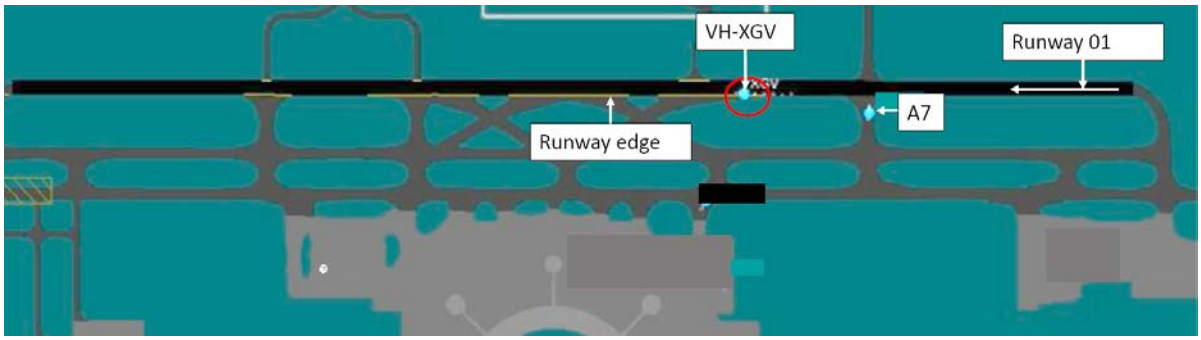
The pilot taxied the aircraft to holding point A7 (Figure 1).

According to recorded air traffic control communications, at about 2010 Eastern Standard Time (EST), the aerodrome controller (ADC) asked the pilot of XGV whether they were 'ready to go' and the pilot responded advising they were ready. The ADC issued an instruction to the pilot to conduct a right turn onto a heading of 090° after take-off, and cleared the pilot to line up on runway 01 and wait due to wake turbulence from an aircraft that had just taken off. The pilot read back the line-up instruction, but as they omitted to read back the assigned heading, the ADC repeated the turn and heading information and then also advised the pilot of an amended Departures frequency (from the one issued in their initial airways clearance).[1]

After the pilot received the line-up instruction, they started to taxi the aircraft onto the runway, and commenced the line-up checks. The pilot read back the frequency initially, but subsequently asked the controller to repeat it. The pilot lined the aircraft up on what they thought was the centreline of runway 01, and the aircraft remained stationary on the runway for about 30 seconds before the controller cleared the pilot for take-off.

At about 2011, the aircraft commenced the take-off run. During the take-off, the pilot realised that the aircraft was not on the centreline, and steered the aircraft right towards the centreline prior to the aircraft becoming airborne. A subsequent runway inspection found damage to a runway edge light and the aircraft sustained minor damage to the nose landing gear.

Figure 1: VH-XGV commencing take-off on runway 01



Source: Airservices Australia

Pilot comments

The pilot provided the following comments:

- It seemed very dark on the taxiway and runway 01. They had difficulty detecting the taxiway centreline markings.
- The aircraft had its LED taxi light on, but it did not seem effective, as it did not appear to illuminate the area.

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[1] An airways clearance authorises a flight to operate in controlled airspace along a designated track or route at a specified level to a specified point or flight planned destination (AIP ENR 1.1-2 para 3.6).

- The pilot advised that the taxiway and runway lights were difficult to see, and was not sure if there were runway centreline lights and whether they were activated.
- Once they had changed to Tower frequency, they felt rushed by air traffic control to line up on the runway.
- The pilot was not expecting the change in Departures frequency, which was given to them with the departure instructions as they were in the process of entering the runway and completing their line-up checks. This distracted them from ensuring the aircraft was lined up correctly on the centreline.
- The pilot thought something was not right, but did not think the aircraft hit anything and realigned the aircraft on the runway centreline. Only after airport ground personnel found the parts of damaged lighting was it evident the aircraft took off on the runway edge.

Airport lighting

At Brisbane Airport, the taxiway has green centreline lights and lead-off lights from the runway, but no lead-on lights from any intersection departure points. The lead-off lights are one way lights and would not be visible to the pilot entering the runway. Runway 01 has white runway centreline lights, runway threshold lights, and both high and medium intensity runway lights along the runway edge.

Air traffic control selects the lights on with one switch, which turns on both edge and centreline lights on the runway. There were no reports of any technical problems with the lighting that night.

Aircraft lighting

The aircraft had two LED landing lights below a single LED taxi light, all of which are attached to the nose landing gear leg of the aircraft. The pilot confirmed that the taxi light was switched on during taxi and take-off. Switching on landing lights is part of the line-up checklist, but the pilot was uncertain whether it was switched on during take-off.

Previous incidents

A search of the ATSB database found similar misaligned take-off occurrences at night during the absence of a particular type of runway lighting and perceived pressure on the pilot to take-off:

- Operational event, Brisbane Airport, Queensland, 25 November 2007 (ATSB investigation AO-2007-064[2]): The pilot of a Gulfstream Aerospace Corporation G-IV was operating a charter flight from Brisbane to Sydney, New South Wales (NSW). The pilot-in-command commenced take-off on taxiway A, which was adjacent to runway 01. The aerodrome controller instructed the pilot to cancel the take-off clearance. It was found that the electronic flight bag (EFB) was not functional, and the pilot-in-command relied on memory of the aerodrome from landing earlier that morning to take-off. On the entrance to runway 01 (at the A7 intersection), there were no runway threshold markings and lights to indicate the beginning of the runway.
- The crew of a SAAB 340B was preparing to take-off from Sydney Airport to Lismore, New South Wales. The aircraft was lined up for take-off on runway 25 on the left runway edge runway lights. During take-off run, the captain thought something was wrong and realised that the aircraft was incorrectly lined up on the runway edge lights and re-aligned with the centreline. The crew were completing the line-up checklist at the time. Furthermore, runway 25 does not have centreline lighting.
- Collision on ground, Townsville Aerodrome, Queensland, 11 February 2009 (ATSB investigation AO-2009-007[3]). During take-off, the pilot-in-command realised that the Bombardier DHC-8 was aligned with the left runway edge of runway 01. The aircraft was manoeuvred to the centre of the runway, and the take-off was rejected. It was found that the

[2] https://www.atsb.gov.au/publications/investigation_reports/2007/aair/ao-2007-064/
[3] https://www.atsb.gov.au/publications/investigation_reports/2009/aair/ao-2009-007/

aircraft's left mainwheel had damaged a runway edge light. Factors that may have led to the misaligned take-off related to the adverse weather. These included the weather being a distraction to the flight crew to monitor the aircraft's path onto the runway, pressure to depart, and reliance on aerodrome lighting. Furthermore, the centre taxiway lighting stopped prior to the runway threshold making it difficult for crew to identify the runway edge.

Safety analysis

Animation of the recorded radar data from Brisbane Airport showed the aircraft commencing take-off on the runway edge, then moving across to the centreline.

Brisbane Airport taxiway and runway lights were operational on the night of the incident. However, lead-in lights were not installed to assist pilots lining up on the runway centreline. In addition, the aircraft's taxi light used during the taxi, and possibly the take-off, supplied only very limited visibility to the pilot.

The pilot stated they felt rushed when the ADC gave them clearance to line up, and they were still completing the line-up checks when the controller issued the change in frequency. This combination of time pressure and distraction affected the pilot's ability to detect the aircraft was not on the runway centreline. Airservices commented that as there was a 30 second delay on the runway for wake turbulence and no other aircraft on final approach, there was no actual urgency for the pilot. Despite this, the pilot had a perception of time pressure.

Findings

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

- The pilot lined the aircraft up and commenced take-off on the runway edge lighting from an intersection (A7) departure.
- The misalignment of the aircraft was influenced by the pilot rushing due to perceived pressure to commence the take-off when the line-up clearance was given, the issuing of a frequency change while the pilot was completing the line-up checks as well as lining up the aircraft on the runway, the lack of taxiway lead-on lights to the runway, and limited brightness of the aircraft taxi light.

Safety message

This incident highlights the effect time pressure and distraction can have on flight safety, particularly during critical stages such as while completing checklists. An ATSB research report *Dangerous distraction: An examination of accidents and incidents involving pilot distraction in Australia between 1997 and 2004* provides an overview of occurrences resulting from pilot distraction. One strategy outlined is that if completion of checklists are disrupted, go back and start the checklist again (if possible) to reduce the potential for error.

In addition, ATSB research report *Factors influencing misaligned take-off occurrences at night* outlines conditions including intersection departure, air traffic control clearance/s issued during runway entry, and divided attention of flight crew. The ATSB has also developed a Pilot Information Card featured within the report to help flight crew identify factors that could increase the risk of a misaligned take-off.

General details

Occurrence details

Date and time:	26 October 2016 – 1937 EST	
Occurrence category:	Incident	
Primary occurrence type:	Runway - Other	
Location:	Brisbane Airport, Queensland	
	Latitude: S 27° 23.05'	Longitude: E 153° 07.05'

Aircraft details

Manufacturer and model:	Beech Aircraft Corp 200	
Registration:	VH-XGV	
Serial number:	BB-1230	
Type of operation:	Private - Ferry	
Persons on board:	Crew – 1	Passengers – 0
Injuries:	Crew – 0	Passengers – 0
Aircraft damage:	Minor	

About the ATSB

The Australian Transport Safety Bureau (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 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 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.