Australian Government

Australian Transport Safety Bureau

Loading issue involving a Boeing 737, VH-VZO

Canberra Airport, Australian Capital Territory, 9 May 2014

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Aviation Occurrence Investigation
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Addendum

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Loading issue involving a Boeing 737, VH-VZO

What happened

On 9 May 2014, a Qantas Boeing 737 aircraft, registered VH-VZO, operating a flight from Canberra, Australian Capital Territory, to Perth, Western Australia, was prepared for departure. On board the aircraft were the crew and 150 passengers, including a group of 87 primary school children. The group of children was seated together at the rear of the cabin and all had been assigned the standard adult weight of 87 kg during check-in.

The captain and first officer conducted the pre-flight checks and waited some time for the final load sheet to be delivered. The captain contacted ground staff, who advised the crew to expect a short delay due to an issue with the baggage. The load sheet was then uploaded by ground staff via the aircraft communications addressing and reporting system (ACARS). The load sheet stated the take-off weight as 76,800 kg and the stabiliser trim figure as 5.5 units. The crew checked the load sheet and selected the assigned stabiliser trim setting, verifying the setting entered into the flight management guidance computer (FMGC) with that on the load sheet. The value of 5.5 units was in the normal stabiliser trim range.

Due to the relatively heavy weight of the aircraft, the elevation of Canberra Airport and high terrain surrounding it, the 'Flap 1' setting was selected for take-off. As 'Flap 5' was the normal flap setting for take-off, the company standard operating procedure when using Flap 1 was that the captain conducted the take-off. As this was a less commonly used take-off configuration, the captain and first officer took extra precaution with the pre-take-off checks and briefing.

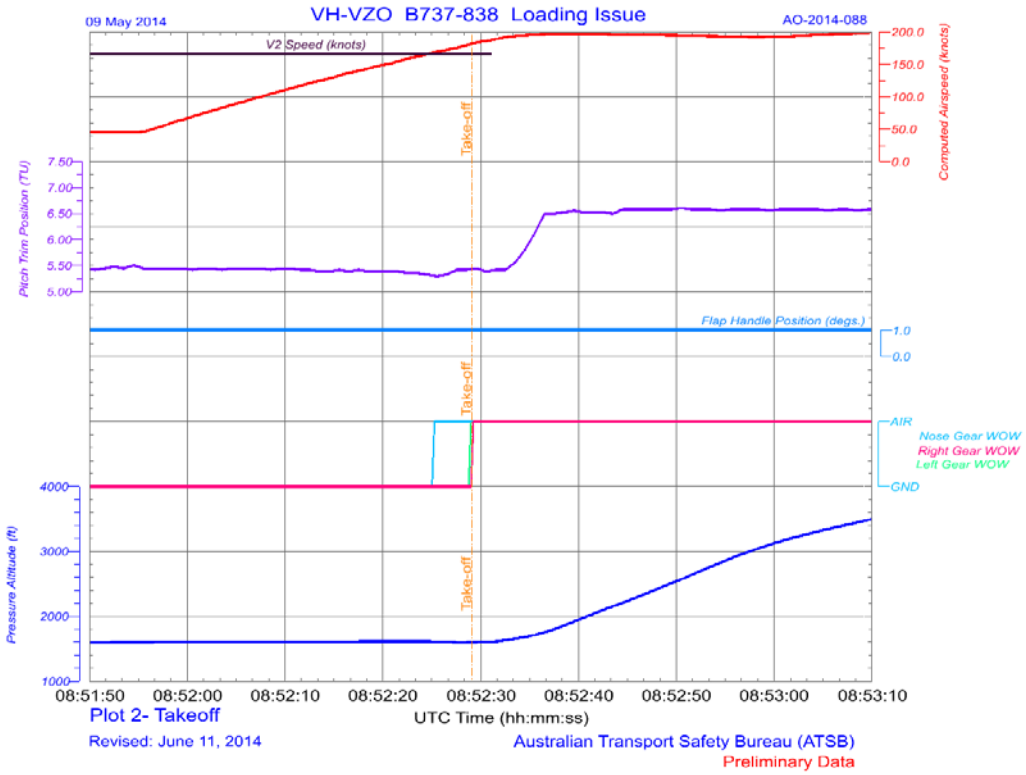
During the take-off, the aircraft appeared nose-heavy. To rotate the aircraft and lift off from the runway, the captain found that significant back pressure was required on the control column. Conscious of the potential of striking the aircraft tail on the runway if too much back pressure was applied to the controls, the captain maintained steady back pressure to ease the aircraft into the air. The aircraft exceeded the calculated take-off safety speed (V_2)[1] by about 25 kt. At V_2 + 25 kt, an exceedance was later detected during analysis of the aircraft quick access reference (QAR) data (Figure 1). The aircraft climbed at a higher initial climb speed than normal, which resulted in a slightly reduced climb gradient, but the crew did not receive any terrain or other warnings.

As the aircraft became airborne, the captain trimmed the stabiliser to relieve some of the back pressure. He advised the first officer that a fair bit of back pressure had been required for the take-off, and the first officer suggested it may have been due to the Flap 1 setting and that the group of children may have contributed. The crew did not experience any further issues during the flight.

A post-flight review determined that the final load sheet overstated the aircraft take-off weight by about 3.5 to 5 tonnes and the take-off stabiliser trim was out by about 1 unit. The captain reported that the weight discrepancy, if known, may have required a change in the electronically generated approach speed based on the load sheet weight, of about 1-2 kt, and no issues or abnormal indications occurred during the approach.

[1] V_2 is the minimum speed at which a transport category aircraft complies with those handling criteria associated with climb, following an engine failure. It is the take-off safety speed and is normally obtained by factoring the stalling speed or minimum control (airborne) speed, whichever is the greater, to provide a safe margin.

Figure 1: Flight data for the take-off phase



Source: ATSB

Group check-in procedures

A 'name template' had been completed by a travel agent on behalf of the school group, and used by Qantas Group Sales to record all data for passengers travelling in the group. The name template field titled 'Gender Description' was marked as mandatory, however the template was completed and uploaded with that field blank The options to complete that field were 'Adult', 'Child', or 'Infant'. A Qantas Group Sales Agent uploaded the information from the template into the booking system passenger name record (PNR) and emailed the Group Movement Advice (GMA) to Customer Service staff in both Perth and Canberra. The email did not include the weights of the children travelling in the group however it stated that the average age of the group was 12 years.

The group had been travelling from Perth to Canberra and return. Two days prior to the Perth-Canberra flight, in accordance with company procedures, a customer service agent (CSA) in Perth 'advance accepted' the group into the booking system, using the GMA email. The Group Sales procedure stated that the ages of the children were to be recorded in the PNR, and for children up to age 11 years 'CHD' was to be entered in the passenger name field, and young passengers between 12-15 years were to have 'YNGP' entered in the PNR. However as the fields for recording the number of children and young passengers in the group were blank, the CSA assumed the passengers were adults. All 95 passengers in that group (87 children and 8 adults) were advance accepted as adults and assigned the standard adult weight of 87 kg. The standard child weight (2-11 years), which was not assigned to any of the group, was 32 kg and the adult weight applied for children aged over 11 years.

A customer service agent (CSA) printed the group's boarding passes and assigned them seating together at the rear of the cabin, in accordance with Qantas procedures. On 5 May 2014, the group travelled from Perth to Canberra on a Boeing 737 aircraft and the flight crew did not experience any loading related issues during the flight.

On 7 May 2014, two days prior to the return flight, a CSA in Canberra again 'advance accepted' the group as adults, and assigned boarding passes and seating together at the rear of the cabin.

On 9 May 2014, the group was checked in by two CSAs at Canberra Airport. They recorded the actual weight of each bag to speed up the check-in process and then attempted to convert the pre-checked baggage weight from 20 kg per bag to the actual weight, in the customer management (CM) module. They were unable to complete that task due to a system error. The customer service supervisor contacted Load Control and advised the load control officer of the adjustment to the baggage weight of 759 kg. The officer manually adjusted the baggage in the aircraft and the load sheet accordingly, which caused the delay in delivering the final load sheet to the flight crew.

It was also found that similar to the system error obtained in the CM, it was not possible to manually adjust passenger weights in the facilities management (FM) module. Hence, if the ages of children travelling were not submitted into CM through the booking process and/or manually at check-in, weight and balance discrepancies would remain.

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.

Aircraft operator

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

Interim safety notice

A New Procedure Notification has been issued to check-in staff. The notice reminds staff to ensure that when a Group Movement Advice (GMA) refers to children, they must also be accepted in the Customer Management (CM) system as children. Tour leaders are to confirm if any children travelling are under the age of 12, in which case they are to be reflected in CM as a child. The aircraft weight and balance will then be based on an accurate passenger type. This change will be reflected in the revised Airport Product and Service Manual.

Civil Aviation Safety Authority (CASA)

CASA is working on a proposed Civil Aviation Safety Regulation (CASR) Part 121, which is expected to consider standard passenger and baggage weights. Currently, Civil Aviation Advisory Publication (CAAP) 235-1(1) provides guidance on adolescent and child weights. A new classification of 'adolescent' (13 to 16 years old) has been identified in the CAAP table. The CAAP is available from the CASA website at http://casa.gov.au/wcmswr/_assets/main/download/caaps/ops/235_1.pdf

Safety message

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. One of the safety concerns is data input errors www.atsb.gov.au/safetywatch/data-input-errors.aspx. In this incident, the crew entered and checked the data supplied to them, however the original passenger weight data at check-in was not accurate.

Determining accurate weight and balance is required for all aircraft prior to flight. Use of an incorrect trim setting for the aircraft's actual weight and balance may adversely affect the aircraft's controllability during flight. In larger aircraft, automated systems have been designed to replace

manual processes for calculating the aircraft's weight and balance. Validation of the data entered into these systems is essential to ensure accurate loading information is provided to flight crew.

Examples of other aircraft loading occurrences are:

- GWH Van Es (2007) *Analysis of aircraft weight and balance related safety occurrences* (NRL-TP-2007-153), p 17, National Aerospace Laboratory: www.skybrary.aero/bookshelf/books/1149.pdf
- ATSB transport safety investigation report 200405064 – Weight and balance event, Airbus A330-301, Changi, Singapore, VH-QPC
- ATSB transport safety investigation report 200100596 – Boeing Co 767-338ER, VH-OGU

General details

Occurrence details

Date and time:	9 May 2014 – 2245 EST	
Occurrence category:	Incident	
Primary occurrence type:	Loading issue	
Location:	Canberra Airport, Australian Capital Territory	
	Latitude: 35° 18.42' S	Longitude: 149° 11.70' E

Aircraft details

Manufacturer and model:	The Boeing Company 737-838	
Registration:	VH-VZO	
Operator:	Qantas Airways Limited	
Serial number:	34191	
Type of operation:	Air transport high capacity – passenger	
Persons on board:	Crew – Unknown	Passengers – 150
Injuries:	Crew – Nil	Passengers – Nil
Damage:	Nil	

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 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.

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.