Australian Government
Australian Transport Safety Bureau

Loading event involving Embraer EMB-120, VH-ANQ

Darwin Airport, Northern Territory, 6 August 2016

ATSB Transport Safety Report
Aviation Occurrence Investigation
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Addendum

Page	Change	Date

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.

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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.

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	

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.