

Australian Government Australian Transport Safety Bureau

# Operational non-compliance involving an Airbus A320, VH-VGU

Near Melbourne, Victoria, 01 January 2014

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#### Addendum

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# **Operational non-compliance involving an Airbus A320, VH-VGU**

# What happened

During the afternoon of 1 January 2014, an Airbus A320 aircraft, registered VH-VGU, was operating a scheduled passenger service from the Sunshine Coast, Queensland to Melbourne, Victoria. Prior to descent, the crew was cleared by Air Traffic Control (ATC) to conduct the ARBEY 4P standard arrival route (STAR), and was expecting to continue from the STAR to the RNAV-P (RNP)<sup>1</sup> approach to runway 34. The ARBEY 4P procedure for runway 34 takes the aircraft to the south-west of Melbourne to waypoint LAVER, which is one of the initial approach fixes for the RNAV-P (RNP) approach to runway 34 (Figure 1). The crew briefed the arrival procedure and noted heavy showers and strong winds in the area, but there were no unusual or specific threats identified that may affect their arrival.

The STAR was cancelled by ATC before the aircraft reached LAVER to allow ATC to sequence VH-VGU with other aircraft arriving into Melbourne. Descent continued in a southerly direction under radar vectors. The descent was stepped to 4,000 ft, followed soon after by a speed reduction and advice that the crew could expect radar vectors to join the RNAV-P (RNP) procedure at waypoint MEXUN (Figure 1). The approach procedure identified MEXUN as the latest point at which an aircraft could join the procedure.



### Figure 1: Excerpt from RNAV-P (RNP) runway 34 approach procedure<sup>2</sup>

Source: Airservices Australia – modified by the ATSB

<sup>&</sup>lt;sup>1</sup> RNAV (RNP) refers to an Area Navigation (Required Navigation Performance) approach.

<sup>&</sup>lt;sup>2</sup> Figure 1 is an excerpt from the Airservices Australia RNAV – P (RNP) runway 34 approach chart. The crew involved in this incident were using a chart provided by Jeppesen, but relevant details are identical.

As the radar vectoring to the south continued, ATC cleared the aircraft to descend to 3,000 ft and applied a further speed restriction to ensure that appropriate spacing was maintained with other aircraft in the arrival sequence. About 12 NM south-west of Melbourne, the aircraft was turned from a southerly to a south-easterly heading, then an easterly heading. Soon after, as the aircraft was nearing the assigned altitude of 3,000 ft, about 14 NM south of Melbourne, ATC cleared the crew to track direct to waypoint MEXUN to join the RNAV-P (RNP) approach.

The crew read back the clearance to track direct to MEXUN, which was followed almost immediately by an ATC clearance to conduct the RNAV-P (RNP) approach to runway 34. ATC did not issue further descent instructions with that clearance. The position of the aircraft at 3,000 ft, soon after being cleared for the RNAV-P (RNP) approach, is depicted on an ATC radar image at Figure 2. When cleared to track direct to MEXUN, the crew entered MEXUN as the next waypoint on the flight management guidance system (FMGS) flight plan. When cleared for the approach, the crew armed final approach mode<sup>3</sup> which engaged almost immediately.



Figure 2: Aircraft position soon after being cleared for the RNAV-P (RNP) approach

Source: Airservices Australia - modified by ATSB

Tracking direct to MEXUN with final approach mode engaged, the aircraft continued descent from 3,000 ft. The auto-flight system was descending the aircraft in final approach mode towards 2,000 ft which was the next altitude constraint or 'hard altitude' identified in the FMGS navigation database (corresponding to waypoint ML627 – the approach procedure final approach fix).<sup>4</sup> The crew were aware that the final approach mode had engaged and descent was continuing, but were not initially aware that continued descent would take the aircraft outside controlled airspace.

As the aircraft descended through about 2,700 ft there was a 14 second dialogue with ATC regarding further speed reduction due to slower traffic ahead in the sequence. Immediately

<sup>&</sup>lt;sup>3</sup> Arming final approach mode sets the auto-flight system to capture and track the final approach lateral and vertical flight paths. Final approach is armed by pressing the approach (APPR) pushbutton on the flight control unit.

<sup>&</sup>lt;sup>4</sup> The approach procedure includes a table (Figure 1) that provides recommended altitudes at specific distances from the runway threshold and approach waypoints, to provide guidance with respect to a constant descent path. An aircraft flying a constant 'on profile' descent would normally pass over MEXUN at 2,480 ft as the table indicates, but that altitude does not represent a minimum safe altitude or altitude constraint.

following that dialogue, the aircraft descended through 2,500 ft which was the lower limit of controlled airspace at that point.

Soon after, as the aircraft passed about 2,400 ft, ATC cautioned the crew to the effect that they were nearing the lowest safe altitude in their immediate area, and then updated that information as the aircraft continued toward MEXUN. Responding to the advice from ATC, the crew stopped the descent at 2,100 ft and continued towards MEXUN at that altitude. The point at which descent was stopped at 2,100 ft is depicted on an ATC radar image at Figure 3.



Figure 3: Aircraft position at 2,100 ft tracking toward waypoint MEXUN

Source: Airservices Australia - modified by the ATSB

When the aircraft left 3,000 ft on descent, it entered the 500 ft buffer between the aircraft and the lower limit of controlled airspace,<sup>5</sup> then when it passed 2,500 ft, the aircraft left controlled airspace. Controlled airspace was re-entered as the aircraft reached the airspace with a lower limit 1,500 ft, 11 NM south of Melbourne. The elapsed time from the point the aircraft left 3,000 ft to the point it re-entered controlled airspace was about 1 minute and 15 seconds. The aircraft was outside controlled airspace for about 45 seconds. There was no conflict with other known air traffic and the approach continued normally from 2,100 ft following intercept of the intended descent profile.

<sup>&</sup>lt;sup>5</sup> ATC apply a 500 ft buffer between an aircraft and the limit of controlled airspace beneath, to ensure separation from other air traffic that may be operating outside but near the vertical boundary of controlled airspace.

## **Operator's investigation**

The operator's investigation into the incident found that by arming final approach mode as soon as they were cleared for the approach, the crew established a condition whereby the auto-flight system continued descent and the aircraft proceeded temporarily outside of controlled airspace. The operator identified a number of factors that, in combination, may have distracted the crew to some degree at the time of the incident. These factors included:

- The crew were required to comply with a number of ATC-imposed speed restrictions to facilitate separation with other arriving traffic.
- Weather considerations there were strong winds, heavy showers and moderate turbulence in the area at the time of the incident.
- The conditions prompted the captain to make a relatively late decision to change the intended landing configuration from a flap FULL landing to a flap 3 landing the crew were required to enter corrected data into the FMGS, review performance information and brief the changes.

The operator identified a number of procedural issues surrounding the incident, including:

- The operator's procedures stated that if an aircraft is joining a procedure at the latest intercept point (which in this case was waypoint MEXUN), the assigned altitude should be the minimum vector altitude or the 'not below' altitude specified for the latest intercept point. In this case, there was conflicting altitude requirements - cleared altitude versus the altitude from which the aircraft could continue the approach at waypoint MEXUN. The crew may have been able to resolve this conflict by requesting further descent clearance from ATC, or seeking to join the procedure at another waypoint prior to MEXUN.
- The operator's procedures include limitations with respect to the engagement of final approach mode. One limitation is that 'the approach is defined in the navigation database'. In this case, the aircraft was not established on an approach defined in the navigation database, until reaching waypoint MEXUN.

The operator also made an observation with respect to the ATC clearance for the approach, noting that the clearance seemed incomplete without an instruction regarding further descent. Nonetheless, the operator identified that it remains a crew responsibility to seek clarification if they believe that an ATC clearance is incomplete.

## Airservices Australia comment

Airservices Australia commented that under the circumstances that existed during this incident, ATC expect an aircraft to maintain the last assigned altitude until the aircraft is established on the published approach procedure (which in this incident, would have been when the aircraft reached MEXUN). Airservices Australia therefore considers that clearance for the approach (without any further descent instruction) was complete on this occasion, at the time the clearance was issued.

Noting that in this case, the aircraft would have been high on profile had it arrived at MEXUN at 3,000 ft, Airservices Australia also commented that if the assigned level is above that required for a successful intercept of the approach, the expectation is that ATC will assign a lower level (when possible). In this case, ATC could have cleared the aircraft to descent to 2,000 ft once it passed inside 11 NM from Melbourne. ATC also expect flight crew to request a lower level if the assigned level is above that from which a successful intercept of the approach procedure can be made.

# **ATSB comment**

A recent amendment to the Manual of Air Traffic Services (subsequent to this occurrence) requires that ATC qualify clearance for an RNAV (RNP) approach (when an aircraft is tracking directly to the initial approach fix or to the procedure latest intercept point) with the requirement to be 'established'. While this change relates to transfer of responsibility with respect to terrain clearance, the change will probably assist in reducing the likelihood of similar occurrences.

# **Safety action**

## Aircraft operator

In response to this incident, the aircraft operator has reminded flight crew of the importance of assessing the nature of ATC instructions before continuing descent. The operator has also reminded flight crew of the importance of maintaining airspace awareness.

# Safety message

This incident highlights the need for clear procedural guidance and careful auto-flight system management under conditions where the transition from a STAR to an instrument approach procedure is interrupted. Furthermore, under these conditions, awareness of the position of the aircraft relative to the intended vertical profile, relevant controlled airspace boundaries and lowest safe altitudes assumes elevated significance. The incident also highlights the importance of seeking clarification if an ATC instruction or clearance appears incomplete.

# **General details**

### Occurrence details

Date and time:	01 January 2014 – 1540 EDT		
Occurrence category:	Incident		
Primary occurrence type:	Operational non-compliance		
Location:	26 km S of Melbourne, Victoria		
	Latitude: 37° 54.13' S	Longitude: 144° 47.08' E	

## Aircraft details

Manufacturer and model:	Airbus A320		
Registration:	VH-VGU		
Operator:	Jetstar Airways		
Serial number:	4245		
Type of operation:	Air Transport – High Capacity		
Injuries:	Crew – nil	Passengers – nil	
Damage:	None		

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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.

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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.