Australian Government
Australian Transport Safety Bureau

ATSB TRANSPORT SAFETY INVESTIGATION REPORT
Aviation Occurrence Report – 200505536
Final

Breakdown of co-ordination
Gold Coast Airport, Qld – 3 November 2005
VH-VQH
Boeing Company 717–200
VH-VQV
Airbus Industrie A320–232

Australian Government

Australian Transport Safety Bureau

ATSB TRANSPORT SAFETY INVESTIGATION REPORT

Aviation Occurrence Report
200505536

Final

Breakdown of co-ordination
Gold Coast Airport, Qld – 3 November 2005
VH-VQH
Boeing Company 717–200
VH-VQV
Airbus Industrie A320–232

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

Published by: Australian Transport Safety Bureau
Postal address: PO Box 967, Civic Square ACT 2608
Office location: 15 Mort Street, Canberra City, Australian Capital Territory
Telephone: 1800 621 372; from overseas + 61 2 6274 6130
Accident and incident notification: 1800 011 034 (24 hours)
Facsimile: 02 6274 6474; from overseas + 61 2 6274 6474
E-mail: atsbinfo@atsb.gov.au
Internet: www.atsb.gov.au

ISBN and formal report title: see 'Document retrieval information' on page iii.

DOCUMENT RETRIEVAL INFORMATION

Report No.	Publication date	No. of pages	ISBN
200505536	7 June 2007	12	978 1 921164 84 2

Publication title

Breakdown of co-ordination – Gold Coast Airport, Qld – 3 November 2005, VH-VQH, Boeing Company 717–200, VH-VQV, Airbus Industrie A320–232

Prepared by

Australian Transport Safety Bureau
PO Box 967, Civic Square ACT 2608 Australia
www.atsb.gov.au

Reference No.

Jun2007/DOTARS 50262

Acknowledgements

Extract from Airservices Australia PC-replay (Figure 1)

Extract from Airservices Australia Aeronautical Information Publication - Gold Coast Standard Instrument Departure (SID) Runway 14/32 South (Figure 2).

Abstract

On 3 November 2005, the aerodrome controller (ADC) at Gold Coast Airport, Qld issued the crew of a Boeing 717 (717) aircraft a take-off clearance following closely behind an Airbus A320 (A320) aircraft. The ADC was responsible for the initial visual separation between the two aircraft and also for providing a suitable separation standard for the Brisbane approach controller who was responsible for the overlying airspace. While the ADC was able to continue to visually separate the two aircraft after departure, he was not able to communicate this or arrange another standard, with the approach controller. The two aircraft entered the approach controller's airspace with less than the required radar separation standard and the approach controller took action by initiating a significant change in heading for the 717. There was a breakdown of co-ordination.

The pilot in command of the 717 later reported that the crew had considered the distance behind the A320 to be safe for their departure, and that the crew maintained visual contact with the A320 throughout the takeoff, departure and subsequent tracking.

Documentation available to both controllers provided guidance relating to coordination phraseology and separation responsibilities. The attempted coordination exchange did not adhere to the requirements of these documents and was continuously interrupted as a result of the workload of both controllers. The incident highlighted the need for controllers to use clear unambiguous words and phrases to ensure complete understanding of all communications, including coordination exchanges. It also highlighted the importance of tactical separation assurance which places emphasis on traffic planning and conflict avoidance, rather than conflict resolution.

As both the ADC and the crew of the 717 had continuous visual contact with the two aircraft it was unlikely that the situation would have resulted in the aircraft coming into such close proximity as to have presented any significant safety risk.

THE AUSTRALIAN TRANSPORT SAFETY BUREAU

The Australian Transport Safety Bureau (ATSB) is an operationally independent multi-modal Bureau within the Australian Government Department of Transport and Regional Services. ATSB investigations are independent of regulatory, operator or other external bodies.

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.

Purpose of safety investigations

The object of a safety investigation is to enhance safety. To reduce safety-related risk, ATSB investigations determine and communicate the safety factors related to the transport safety matter being investigated.

It is not the object of an investigation to determine blame or liability. However, 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.

Developing safety action

Central to the ATSB's investigation of transport safety matters is the early identification of safety issues in the transport environment. The ATSB prefers to encourage the relevant organisation(s) to proactively initiate safety action rather than release formal recommendations. However, depending on the level of risk associated with a safety issue and the extent of corrective action undertaken by the relevant organisation, a recommendation may be issued either during or at the end of an investigation.

The ATSB has decided that when safety recommendations are issued, they will focus on clearly describing the safety issue of concern, rather than providing instructions or opinions on the method of corrective action. As with equivalent overseas organisations, the ATSB has no power to implement its recommendations. It is a matter for the body to which an ATSB recommendation is directed (for example the relevant regulator in consultation with industry) to assess the costs and benefits of any particular means of addressing a safety issue.

About ATSB investigation reports:

How investigation reports are organised and definitions of terms used in ATSB reports, such as safety factor, contributing safety factor and safety issue, are provided on the ATSB web site www.atsb.gov.au.

FACTUAL INFORMATION

At 1010 Eastern Standard Time[1] on 3 November 2005, an Airbus Industrie A320–232 (A320) aircraft, registered VH-VQV, taxied at Gold Coast Airport, Qld on a scheduled passenger service to Williamtown, NSW. At 1011, a Boeing Company 717–200 (717) aircraft, registered VH-VQH, taxied at Gold Coast Airport on a scheduled passenger service to Sydney, NSW.

The aerodrome controller (ADC) was responsible for the provision of air traffic services in the Gold Coast control zone up to an altitude of 1,500 ft above mean sea level (A015). The Brisbane approach controller was responsible for the provision of air traffic services in the overlying airspace. The crews of both aircraft were in receipt of a clearance to taxi to the duty runway 14. They had also been issued with air traffic control standard instrument departure (SID) clearances via instrument flight rules (IFR) waypoint APAGI. The ADC had provided the approach controller with coordination about both taxiing aircraft and was responsible for providing an initial separation standard that could be used by the approach controller.

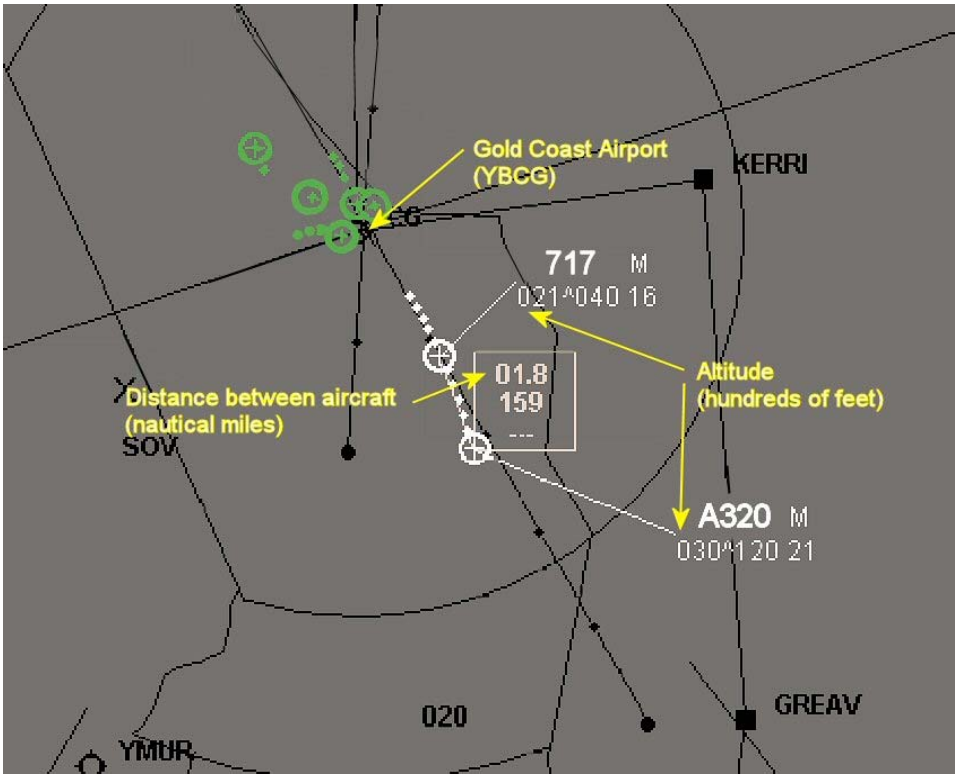
At 1015:52, the ADC issued a take-off clearance to the crew of the A320. At 1017:05, after observing a runway separation standard with the preceding A320, the ADC issued a take-off clearance to the crew of the 717. The two aircraft entered the approach controller's airspace with a longitudinal spacing of 1.8 NM observed by radar (Figure 1). In the absence of any other form of separation being coordinated from the ADC, the approach controller required a minimum radar separation standard of 3 NM. The ADC later reported that on departure, he was able to visually separate the two aircraft, but was unable to coordinate this with the approach controller. There was a breakdown in co-ordination.

The ADC later reported that the workload at the time of the incident was both moderately busy and complex. In addition to a number of jet aircraft departures and arrivals there were also local helicopter operations, circuit training and instrument flying training taking place. At the time the ADC issued the take-off clearance to the crew of the 717, there was a landing jet aircraft on final approach to runway 14, approximately 2 NM from the runway threshold and there was another jet aircraft waiting on the taxiway behind the 717 for a take-off clearance.

The ADC reported that when he had instructed the 717 to line up on the runway he had added the phrase 'no delay' due to his concern about the possibility of the 717 crew delaying on the runway with the approaching landing aircraft. After he issued the take-off clearance to the crew of the 717, he attended to other control related tasks. He reported that he did not observe the 717 commence the take-off roll and the next time he observed the aircraft it was becoming airborne, more quickly than he had expected.

1 The 24-hour clock is used in this report to describe the local time of day, Eastern Standard Time (EST), as particular events occurred. Eastern Standard Time was Coordinated Universal Time (UTC) + 10 hours.

Figure 1: Extract from Airservices Australia computer replay[2] at 1018



The pilot in command (PIC) of the 717 later reported that the crew had observed the aircraft on final approach prior to lining up on the runway. They did not consider that aircraft to be a 'conflict' for their departure. As they had been instructed to line up without delay, he considered that the aerodrome controller may have been attempting to 'get the [jet] behind us away as well' before the approaching aircraft landed.

The PIC of the 717 recalled that the crew of the A320 had commenced their take-off roll when the aerodrome controller had instructed the 717 crew to line up on the runway. He then observed the A320 become airborne and estimated that the A320 was beyond the up-wind end of the runway when they were issued with their take-off clearance.[3] The PIC stated that the distance between the 717 and the A320 ahead when the 717 was issued the take-off clearance was the one of the closest he had ever been issued without the flight crew having been assigned the responsibility for separation by a controller. However, he had considered the distance behind the A320 to be safe for their departure and had discussed with the copilot the need to maintain visual separation with the A320. The PIC reported that they had maintained visual contact with the A320 throughout the takeoff, departure and

---

2 The replay was created from recorded data used for investigation purposes by Airservices Australia and has been edited for clarity. The information was not taken directly from the air situation display (ASD) available to either of the controllers at the time of the occurrence.

3 The Manual of Air Traffic Services (MATS) and the Aeronautical Information Publication (AIP) stated that a departing aircraft must not be permitted to commence take-off unless the preceding departing aircraft has crossed the up-wind end of the runway in use, or is airborne and has reached a point at least 1,800 m ahead of the following aircraft provided the runway is longer than 1,800 m and the distance can be readily determined. Gold Coast Airport runway 14 was 2042 m long.

subsequent tracking, as well as observing the aircraft on traffic alert and collision avoidance system (TCAS)[4]. The TCAS did not provide any Traffic Advisory or Conflict Resolution alerts to the crew, nor were any expected due to the distance and relative positions of the two aircraft. The PIC of the 717 reported that he had requested the copilot to inform air traffic control that they had 'the preceding [aircraft] in sight' but that they were unable to do so due to their workload and the amount of radio transmissions at the time.

The ADC had recognised that the spacing required to enable the two jets to depart prior to the approaching aircraft landing aircraft would be 'tight'. He advised the approach controller of this after issuing the take-off clearance to the crew of the 717. After the 717 was airborne, the ADC observed that the spacing between the two departing aircraft was unlikely to be sufficient to provide a suitable radar separation distance standard for the approach controller. At 1018, he attempted to coordinate with the approach controller using the hot-line[5]. He stated 'do you want me to do something with [the 717]'. The approach controller responded by indicating that the current situation would not provide a standard and the ADC would need 'to do something'. Later analysis of recorded audio data revealed the ensuing discussion between the two controllers lasted for about 36 seconds and was continuously interrupted by radio calls from pilots of aircraft operating on both tower and approach frequencies. Many of those radio calls overlapped. During that time 31 separate transmissions were made or received by the two controllers within a 78-second period, including their coordination exchange.

Both aircraft were on climb in the approach controller's airspace, with only the A320 crew on the approach controller's frequency. As the coordination exchange was ineffective, the approach controller instructed the ADC to turn the 717 onto a heading of 090 'immediate'. The ADC promptly issued the instruction to the crew of the 717, who complied. The PIC of the 717 later stated that the crew had expected to be issued with some form of requirement to increase the separation between their aircraft and the A320.

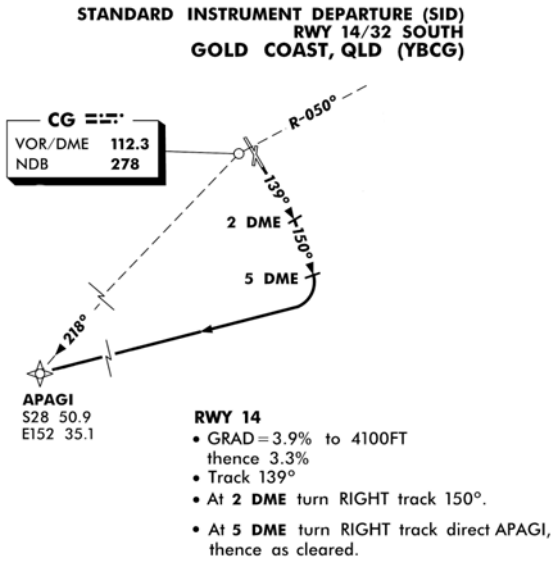
At about the same time, the crew of the A320 had turned onto the SID track of 150 degrees and were about to turn onto the direct track to APAGI (Figure 2). With the angle between the tracks of the two aircraft increasing to about 135 degrees, the distance between the aircraft increased rapidly. At 1020, after the approach controller observed a radar separation standard had been established, the crew of the 717 crew were issued with another radar heading and then an instruction to track direct to APAGI.

---

4 TCAS is an independent onboard collision avoidance system. It is designed as a backup to the ATC system and the 'see and avoid' concept.

5 A hot-line is an audio communications channel able to be selected by either controller. It becomes active immediately upon selection by the caller, without requiring any action or reply from the other controller. Normally all communications can be heard on the line, including the air-ground programme of the other controller.

Figure 2: Extract from Gold Coast Runway 14/32 South SID (via APAGI)



The Gold Coast Runway 14/32 South Standard Instrument Departure (APAGI SID) required a track of 139 degrees[6] until 2 NM from the VOR/DME[7] then a right turn onto a track of 150 degrees until 5 NM and then a further right turn to track direct to APAGI. The track direct to APAGI after this turn is approximately 225 degrees.

An Airservices Australia internal letter of agreement (LOA) between the tower and Brisbane Approach included instructions that:

> Jet aircraft planned via APAGI shall be issued the APAGI SID
>
> All departing aircraft cleared above A015 will be coordinated with [Brisbane approach] by the [ADC], prior to the aircraft being cleared for takeoff
>
> [Tower] shall provide an initial separation standard (Radar or Procedural) useable by [Brisbane approach] based on the Initial Departure Track/ Heading between departures from all runways. Initial Departure Track/ Heading is defined as:
>
> Track - 150 for Jet aircraft departing R14 via the APAGI SID.
>
> For Separation/Sequencing in all other situations there must be mutual agreement between [Brisbane approach] and [tower] controllers. One of the following phrases must be used and an acknowledgement must be received.
>
> [Coolangatta tower] must specify … 'Tower separation with (call-sign)'.
>
> [Brisbane approach] must specify… 'Tower separate with (call-sign)'.

The ADC reported that he was fully aware of the requirement to provide separation and a usable standard for the approach controller. He stated that he was visually

---

6 Gold Coast Airport runway 14 was aligned on a bearing of 139 degrees magnetic. The initial SID track of 139 degree was a continuation of runway heading.

7 VOR/DME = Very high frequency omnidirectional radio range / Distance measuring equipment. Co-located ground based navigational aids which provided azimuth position information from the VOR and distance position information from the DME.

separating the two aircraft and could continue to do so until another form of separation could be applied. During the coordination exchange with the approach controller he had tried to state this fact. He had also attempted to coordinate with the approach controller to cancel the SID for the 717 and have the crew continue straight ahead on runway heading. He stated that this would have provided more azimuth for the continued application of visual separation, together with an increasing distance between the aircraft to enable the minimum radar standard to be achieved. He indicated that this solution had been used in the past, and that other separation standards such as vertical separation were also available.

The ADC acknowledged that he should have advised the approach controller 'tower separation', however, he thought the approach controller understood he was separating. He also reflected that 'someone has to be separating and someone has to say it, I think I made an error in not telling [the approach controller] I was separating'.

The Manual of Air Traffic Services (MATS) details the objectives of air traffic services. It states, in part, that 'the objectives shall be to prevent collisions between aircraft' and to 'expedite and maintain an orderly flow of air traffic'.

The MATS also provided the following advice to controllers regarding Separation Assurance:

> Separation Assurance is an integral part of the application of a systemic approach to the safety management system. In order for separation assurance to be effective it must be applied in both the tactical and strategic environments.
>
> Tactical Separation Assurance places greater emphasis on traffic planning and conflict avoidance rather than conflict resolution. This is achieved through:
>
> a. the proactive application of separation standards to avoid rather than resolve conflicts;
>
> b. planning traffic to guarantee rather than achieve separation;
>
> c. executing the plan so as to guarantee separation; and
>
> d. monitoring the situation to ensure that plan and execution are effective.

The ADC had extensive experience in the provision of aerodrome and approach control services. He was correctly rated, endorsed and satisfied recency requirements. His last performance assessment had confirmed his proficiency in all aspects of tower control, including managing traffic, maintaining separation, situational awareness, coordination and phraseology.

On the day of the incident he was working the last day of a 4-day shift cycle and had slept about 6 hours the previous night. He had commenced duty at 0540 and had worked continuously except for a 20-minute break at about 0830. He reported that there was normal staffing in the tower and that there were no operational distractions. He did not consider that he was fatigued, and while he noted that he had some minor family and work related concerns at the time, he did not believe that these had any effect on his performance.

ANALYSIS

The Manual of Air Traffic Services (MATS) provided guidance to controllers on correct coordination phraseology. The letter of agreement that existed between the Gold Coast tower and Brisbane Approach expanded on that document and provided instructions about separation responsibilities, including specific communication phrases that were required to be used to avoid confusion. The lack of adherence to the coordination exchange requirements, together with the continuous interruptions experienced by both controllers, led to the breakdown of coordination. Had both controllers been more concise and positive, by either stating 'tower separation', the situation would have been resolved earlier and probably without the need for any significant change in track for the second aircraft.

The need for clear unambiguous words and phrases is paramount in ensuring complete understanding of all communications between pilots and air traffic controllers. This is equally as important in communication exchanges between controllers. In dynamic, high workload situations there is often little time available for discussion, and the probability of interruptions is high.

This same set of circumstances highlights the importance of tactical separation assurance as described in the MATS. Had more emphasis been placed on traffic planning and conflict avoidance, rather than the conflict resolution, the incident might not have occurred. While the ADC was responsible for the provision of a separation standard, there was little evidence of a proactive strategy. The ADC did not anticipate the possibility of a quick departure of the 717 and did not adequately monitor the aircraft after issuing the take-off clearance even though he had recognised that the departure sequence would be 'tight'. The ADC relied on his extensive knowledge and experience to resolve the situation and assumed that the approach controller knew that he was visually separating.

As both the ADC and the crew of the 717 had continuous visual contact with the two aircraft, it was unlikely that the situation would have resulted in the aircraft coming into such close proximity as to have presented any significant safety risk.