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Australian Transport Safety Bureau

Loss of separation assurance involving a Boeing 737, VH-XZA and a Fairchild SA227, VH-ANW

near Darwin Airport, Northern Territory, 2 June 2014

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Published by: Australian Transport Safety Bureau
Postal address: PO Box 967, Civic Square ACT 2608
Office: 62 Northbourne Avenue Canberra, Australian Capital Territory 2601
Telephone: 1800 020 616, from overseas +61 2 6257 4150 (24 hours)
Accident and incident notification: 1800 011 034 (24 hours)
Facsimile: 02 6247 3117, from overseas +61 2 6247 3117
Email: atsbinfo@atsb.gov.au
Internet: www.atsb.gov.au

Addendum

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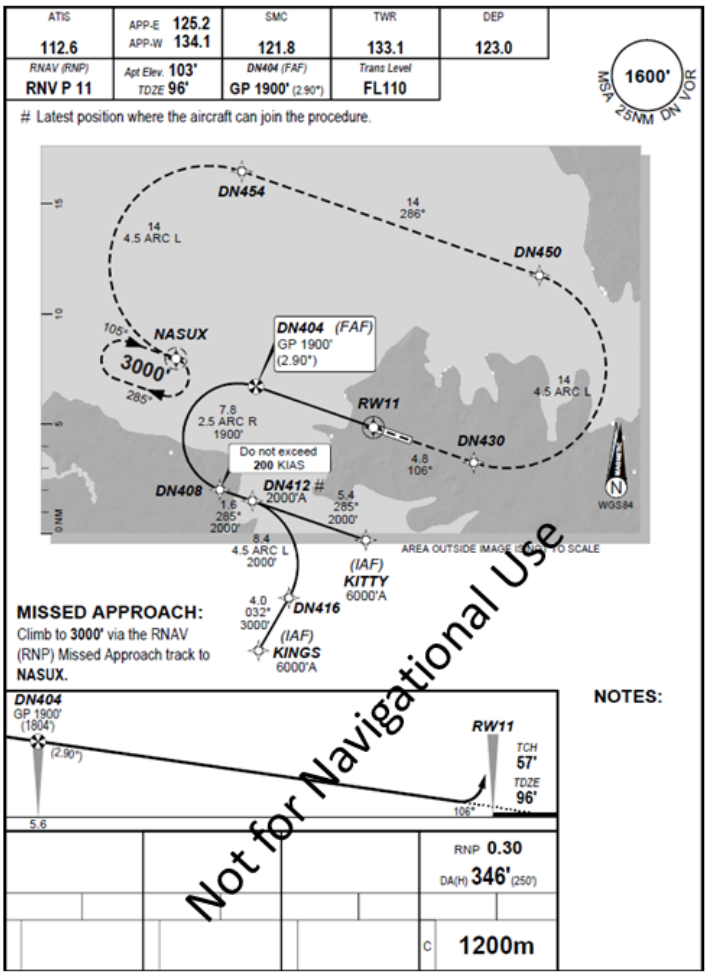
Loss of separation assurance involving a Boeing 737, VH-XZA and a Fairchild SA227, VH-ANW

What happened

On 2 June 2014, at about 1200 Central Standard Time (CST), the approach controller at Darwin Airport, Northern Territory, was processing the arrival of a Qantas Boeing 737 aircraft, registered VH-XZA (XZA), and an Airnorth Fairchild SA227, registered VH-ANW (ANW). When about 34 NM south-east of Darwin on a standard arrival route (STAR), XZA was cleared by the approach controller to descend to 3,000 ft and to conduct an Area Navigation 'P' (RNAV-P) approach to runway 11, via the 'KITTY' initial approach fix (IAF) (Figure 1).

Figure 1: Darwin RNAV-P (RNP) RWY 11[1]



Source: Airservices Australia

[1] Figure 1 is an excerpt from the Airservices Australia RNAV – P (RNP) runway 11 approach chart. The crew involved in this incident were using a chart provided by Jeppesen, but relevant details are identical.

About 40 seconds after the clearance was issued to XZA, ANW was tracking direct to Darwin on the 245 radial,[2] south-west of Darwin passing about 14,000 ft on descent and was cleared to descend to 7,000 ft. About 2 minutes later, when about 34 NM from Darwin, ANW was cleared by the approach controller to descend to 3,000 ft. This resulted in a loss of separation assurance[3] as both aircraft were at a similar distance from the runway, tracking for runway 11, assigned the same altitude, with no assurance that vertical or radar separation would be maintained.

The approach controller then conducted a handover, using a standard checklist, to an incoming controller. During the handover, the approach controller explained that both aircraft (ANW and XZA) were on descent to 3,000 ft. The approach controller advised the incoming controller to monitor the situation, particularly as XZA would slow during the base leg turn for runway 11 and thereby potentially increase the closure rate between the two aircraft. The incoming controller accepted the handover, took over the approach controller position and the outgoing controller exited the control room.

The approach controller observed that XZA was sequenced, and had been coordinated to Darwin tower, as the first aircraft to arrive; and anticipated that it would arrive before ANW. As XZA was tracking via the RNAV-P approach, the controller identified the potential confliction point between it and ANW to be at the base turning point (at about DN408 in Figure 1). The controller then monitored both aircraft as they approached the potential confliction point. As ANW was tracking direct to the airfield via an inbound radial, the controller anticipated that the pilot of ANW would be required to sight and follow XZA.

About 1 minute after taking over as approach controller, the controller observed ANW maintaining a higher speed than anticipated. When ANW was about 19 NM from the airfield, the controller instructed the pilot to turn left onto a heading of 360°. As the pilot did not immediately read back the instruction, the controller repeated the turn direction and heading and the pilot subsequently read back 'Left 360'. About 20 seconds later, the controller advised the pilot of ANW that relevant traffic was a Qantas 737, currently in his 12 o'clock[4] position and at about 6 NM, and to report sighting that aircraft. The pilot replied that he was looking for the aircraft.

The controller then received a 'predicted conflict alert' (PCA)[5] on the situation data display. Just as the controller commenced transmitting an instruction to ANW to turn further left onto a heading of 320°, the pilot of ANW reported having the 737 in sight. The controller then instructed the pilot of ANW to follow the 737 and cleared ANW for a visual approach to runway 11.

When the PCA sounded, the Air Traffic Control supervisor checked that the approach controller had separation standards in place, and heard the pilot of ANW report sighting XZA and the controller issue the instruction to sight and follow that aircraft. At that time, about 1,300 ft of vertical separation and 4.5 NM laterally existed between the two aircraft. As the radar separation standard of 3 NM laterally and 1,000 ft vertically applied at the time, a loss of separation between the aircraft did not occur.

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2 A radial is a magnetic bearing line extending from a point-source navaid such as a VOR (VHF Omni Directional Radio Range).

3 A separation standard existed; however, ATC planning, or ATC or flight crew execution of those plans, did not ensure that separation could be guaranteed.

4 The clock code is used to denote the direction of an aircraft or surface feature relative to the current heading of the observer's aircraft, expressed in terms of position on an analogue clock face. Twelve o'clock is ahead while an aircraft observed abeam to the left would be said to be at 9 o'clock.

5 The Australian Defence Air Traffic System (ADATS) is equipped with conflict alerting functionality for aircraft under radar surveillance, in the form of Predicted Conflict Alert (PCA) and Conflict Alert (CA) functions. The parameters and enablement of these alert functions vary between military ATS locations. The PCA, when enabled, is generally set to activate 30 seconds prior to the proximity between aircraft reducing to within 2.8 NM and/or 750 ft.

Controller comments

Incoming approach controller

The incoming approach controller provided the following comments:

- The controller expected ANW to approach at a slower speed than it did.
- The controllers were taught to apply tactical separation assurance fairly rigidly and, if there was ever any consideration of a confliction, to ensure either vertical separation was in place, or to assign a heading to avoid the confliction. Separation assurance was very important and considered compulsory.
- The controller assumed that the plan in place would guarantee separation based on the expected speed of the two aircraft; however ANW reached the point of confliction faster than anticipated.
- The controller was surprised when the PCA sounded, because the controller was confident separation had been maintained between the aircraft and that 3 NM would not be infringed. However, the PCA was based on the predicted track, and ANW then turned to follow the 737.

Outgoing approach controller

The outgoing approach controller provided the following comments:

- The controller would have had separation assurance if they had cleared ANW via the waypoint 'NASUX' (9 NM west of the field), however the controller omitted to do that. As XZA was turning a 5 NM final, the direct inbound track of ANW was going to cross the predicted path of XZA. Redirecting ANW via NASUX would have ensured it remained clear of that path.
- Due to speed requirements for predicted tracking, XZA would have been not above 250 kt and reducing in the turn; ANW was required to be not above 250 kt below 10,000 ft.
- The flight progress strips for the two aircraft were towards the bottom of the strip bay, with XZA number one in the sequence and ANW number two. Box 4 about half way along each strip contained the assigned levels, with '3000' entered for each aircraft.
- When the PCA sounds, if a separation standard is not in place, the controller immediately commences compromised separation recovery actions. If a standard is in place, the controller states 'sight and follow', or 'vertical' or 'traffic', or whichever is in place, so when the supervisor hears the audible tone, they know which standard it is.
- Because the complexity and workload was low, the controller allowed the situation to continue; however the controller should have immediately put something in place after accepting the handover, to establish separation assurance.

Separation Assurance

According to the Manual of Air Traffic Services (MATS) Version 28, 10.1.2.2, tactical separation assurance places greater emphasis on traffic planning and conflict avoidance rather than conflict resolution and requires that controllers: a) be proactive in applying separation to avoid rather than resolve conflicts; b) plan traffic to guarantee rather than achieve separation; c) execute the plan so as to guarantee separation; and d) monitor the situation to ensure that plan and execution are effective.

A compromised separation situation can be detected before there is a loss of separation either through controller or pilot observation, or through ATC systems alert such as the PCA, or within the aircraft (such as the traffic collision avoidance system – TCAS).

Department of Defence investigation

The Department of Defence conducted an internal investigation into the incident and found that it highlighted how experience may sometimes negatively influence controllers from putting in timely

safeguards to provide separation assurance based on expectation of aircraft performance. They also found the following:

- Separation was maintained throughout the incident, however there was no separation assurance. The controllers reported the incident as they believed there was educational value in its investigation.
- Both controllers were aware that assignment of the same level had created a conflict and elected to monitor the situation rather implement a plan to guarantee separation.
- The tactical separation applied was reactive, and the solution implemented by the controller may potentially not have maintained radar standard. As the controller commenced a subsequent transmission to adjust the aircraft (ANW) heading, the pilot transmitted reporting the traffic in sight. The situation was assessed as being stressful for the controller and may have appeared haphazard and unplanned from the pilot's perspective.
- Controllers were required to adopt practices that assure separation.

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.

Department of Defence

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

Safety awareness poster

A safety awareness poster was created with the facts and learning points from the incident. It has been displayed in prominent locations for Darwin based controllers to view.

Safety message

This incident highlights the importance of having tactical separation assurance in place. In this incident where two aircraft were on converging tracks, applying vertical separation or altering the heading, and therefore the track, of the second aircraft may have guaranteed separation between them. When taking over from another controller, if the oncoming controller is concerned that separation assurance may not exist, they may request that the controller establishes separation assurance prior to accepting the handover.

The Australian Transport Safety Bureau (ATSB) research report AR-2012-032 titled *Loss of separation between aircraft in Australian airspace January 2008 to June 2012* found that aircraft separation is a complex operation with many levels of defences to avoid errors and to safely manage the results of errors made by air traffic controllers and pilots. The report is available at www.atsb.gov.au/publications/2012/ar-2012-034.aspx.

In this LOSA incident, the timely activation of the PCA and the controller technique used ensured that the separation standards were not infringed.

General details

Occurrence details

Date and time:	2 June 2014– 1138 CST	
Occurrence category:	Incident	
Primary occurrence type:	Loss of separation assurance	
Location:	near Darwin Airport, Northern Territory	
	Latitude: 12° 31.58' S	Longitude: 130° 44.98' E

Aircraft details: VH-ANW

Manufacturer and model:	Fairchild Industries SA227-DC	
Registration:	VH-ANW	
Operator:	Air North	
Serial number:	DC-873B	
Type of operation:	Air transport low capacity	
Persons on board:	Crew – Unknown	Passengers – Unknown
Injuries:	Crew – Nil	Passengers – Nil
Damage:	Nil	

Aircraft details: VH-XZA

Manufacturer and model:	The Boeing Company 737-838	
Registration:	VH-XZA	
Operator:	Qantas Airways Limited	
Serial number:	39367	
Type of operation:	Air transport high capacity	
Persons on board:	Crew – Unknown	Passengers – Unknown
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.