Australian Government
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ATSB TRANSPORT SAFETY INVESTIGATION REPORT

Aviation Occurrence Report – 200602115

Final

Traffic alert and collision avoidance system (TCAS) Resolution Advisory (RA)

100 km north-east of Perth – 19 April 2006

VH-NXF

Boeing Company 717–200

VH-WBA

Fairchild Industries Inc SA227–DC

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Traffic alert and collision avoidance system (TCAS) Resolution Advisory (RA) – 100 km north-east of Perth - 19 April 2006, VH-NXF, Boeing Company 717–200, VH-WBA, Fairchild Industries Inc SA227–DC

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Abstract

On 19 April 2006, a Fairchild Industries Inc SA227–DC (Metro) aircraft was being operated from Newman, WA to Perth, WA at flight level (FL) 200. A Boeing Company 717–200 (717) was being operated from Karratha, WA to Perth at FL320. Both aircraft were in controlled airspace and were on tracks that converged.

The crew of the 717 had been provided with a clearance to descend to FL210 by the air traffic controller managing the airspace the aircraft were operating in. This level provided the required minimum vertical separation standard of 1,000 ft with the Metro.

As the crew of the 717 were approaching FL225 the traffic alert and collision avoidance system (TCAS) provided a traffic advisory relating to the Metro. A few seconds later the crew received a TCAS 'reduce descent rate' resolution advisory (RA). The crew advised the controller 'we've got a TCAS resolution advisory we're leaving F210 on descent'. The controller responded by instructing the crew of the 717 to maintain FL210.

Later analysis of Airservices Australia recorded radar data and audio recordings demonstrated that the crew of the 717 had descended to, and maintained, FL210. There was no infringement of separation standards.

The crew of the 717 maintained a high rate of descent approaching their assigned level, which resulted in the TCAS 'reduce descent rate' resolution advisory. The controller did not recognise the rate of descent of the 717, together with the relative positions of the two aircraft, may have generated a RA.

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. Accordingly, the ATSB also conducts investigations and studies of the transport system to identify underlying factors and trends that have the potential to adversely affect safety.

The ATSB performs its functions in accordance with the provisions of the *Transport Safety Investigation Act 2003* and, where applicable, relevant international agreements. The object of a safety investigation is to determine the circumstances in order to prevent other similar events. The results of these determinations form the basis for safety action, including recommendations where necessary. As with equivalent overseas organisations, the ATSB has no power to implement its recommendations.

It is not the object of an investigation to determine blame or liability. However, it should be recognised that an investigation report must include factual material of sufficient weight to support the analysis and findings. That material will at times contain information reflecting on the performance of individuals and organisations, and how their actions may have contributed to the outcomes of the matter under investigation. 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.

Central to the ATSB's investigation of transport safety matters is the early identification of safety issues in the transport environment. While the Bureau issues recommendations to regulatory authorities, industry, or other agencies in order to address safety issues, its preference is for organisations to make safety enhancements during the course of an investigation. The Bureau prefers to report positive safety action in its final reports rather than making formal recommendations. Recommendations may be issued in conjunction with ATSB reports or independently. A safety issue may lead to a number of similar recommendations, each issued to a different agency.

The ATSB does not have the resources to carry out a full cost-benefit analysis of each safety recommendation. The cost of a recommendation must be balanced against its benefits to safety, and transport safety involves the whole community. Such analysis is a matter for the body to which the recommendation is addressed (for example, the relevant regulatory authority in aviation, marine or rail in consultation with the industry).

FACTUAL INFORMATION

The report presented below was prepared principally from information supplied to the Bureau.

On 19 April 2006, a Fairchild Industries Inc SA227–DC (Metro) aircraft was being operated on a charter flight from Newman, WA to Perth, WA at flight level (FL) 200. A Boeing Company 717–200 (717) was being operated on a scheduled passenger service from Karratha, WA to Perth at FL320. Both aircraft were in controlled airspace and were on tracks that converged at Instrument Flight Rules (IFR) waypoint TASKA, located 100 km on a bearing of 029 degrees magnetic from Perth Airport.

At 1935[1], the crew of the 717 were provided with a clearance to descend to FL210 by the air traffic controller managing the airspace the aircraft were operating in. This level provided the required minimum vertical separation standard of 1,000 ft with the Metro. At 1936, the controller informed the crew of the Metro about the 'faster following jet traffic converging at TASKA'. The controller instructed the Metro crew to turn right onto a radar heading, across the track of the 717. The heading was intended to provide lateral spacing between the two aircraft for sequencing. It was also to allow further descent for the 717 when the minimum radar separation standard of 5 NM was established between the aircraft. At 1938, the controller informed the crew of the 717 that due to 'converging turbo-prop traffic there may be a delay for lower levels'. The controller did not provide any additional traffic information to either crew. The controller was not required to provide directed traffic information as the instructions issued to the crews should have resulted in a vertical separation standard between the aircraft.

The 717 crew reported that at about 1939, they received a traffic alert and collision avoidance system (TCAS)[2] traffic advisory (TA) relating to the Metro, as they were approaching FL225. A few seconds later they received a TCAS 'reduce descent rate' resolution advisory (RA). Recorded radar data revealed that the crew of the 717 maintained a descent rate of over 3,000 ft per minute until the aircraft had descended through FL213. The crew advised the controller 'we've got a TCAS resolution advisory we're leaving F210 on descent'. The controller responded by instructing the crew of the 717 to maintain FL210. The crew acknowledged that transmission and stated that they were maintaining FL210. The minimum lateral distance between the two aircraft reduced to 0.78 NM. At 1940, the crew of the 717 reported 'clear of conflict'. At 1941, the controller had observed a radar separation standard with the Metro and he provided the crew of the 717 with a clearance for further descent.

The crew of the Metro later reported sighting an aircraft 'close to their level, who had informed air traffic control they had a TCAS alert and were climbing to FL210'. This information, together with the report from the crew of the 717 about leaving FL210, indicated that the TCAS RA may also have resulted in, or from, an

1 The 24-hour clock is used in this report to describe the local time of day, Western Standard Time (WST), as particular events occurred. Western Standard Time was Coordinated Universal Time (UTC) + 8 hours.

2 TCAS is an independent onboard collision avoidance system. It is designed as a backup to the air traffic control system and the 'see and avoid' concept.

infringement of the vertical separation standard. The Metro was not fitted with TCAS.

The controller later reported that he did not believe that there had been a breakdown of separation. Analysis of Airservices Australia recorded radar data and audio recordings demonstrated that the crew of the 717 had descended to, and maintained, FL210. This was also later confirmed by the crew of the 717 in their report of events at the time of the incident. The pilot in command (PIC) of the 717 also later acknowledged that the transmission about 'leaving FL210' was probably incorrect and should have been reported as 'leaving FL220'. There was no infringement of separation standards.

The tracks of the two aircraft, together with the night time conditions, would have made accurate assessment of the altitude of the 717 difficult for the crew of the Metro. The information provided by the crew of the Metro about observing the 717 'close to their level' was understandable in this situation.

The manual of air traffic services (MATS) detailed air traffic controllers' actions in response to TCAS events 'so that they do not interfere with manoeuvres in response to an RA'. It stated:

> Do not attempt to modify the flight path of an aircraft responding to an RA – provide traffic information as appropriate.

The MATS also stated:

> Nuisance Advisories can occur even though standard separation exists. Controllers should therefore not immediately assume that separation has been lost, or that they are at fault, when a pilot reports manoeuvring in response to an RA.

While the report from the crew of the 717 about receiving a TCAS RA was clearly discernable on the audio replay, the controller indicated that he did not hear, or was not aware of, the pilots' RA advice. The workload of the controller at the time of the occurrence was reported by Airservices Australia to be moderate in nature, with some distraction caused by communication with pilots of other aircraft, in relation to an active emergency locator beacon.

The controller did not recognise that the rate of descent of the 717, together with the relative positions of the two aircraft, may have generated an RA. The controller had provided some information to the crews that should have enhanced their situational awareness. However, the crew of the 717 maintained a descent rate of over 3,000 ft per minute approaching their assigned level, which resulted in the TCAS 'reduce descent rate' RA. The PIC of the 717 later reported that this descent rate was normal for the aircraft type. He stated that crew had very little idea of the proximity of the Metro until the TA was received, as the TCAS display only showed 'targets' within 2,000 ft vertically of their aircraft. By that by that time 'it was too late to manually intervene and change our descent rate.'

The 717 aircraft was fitted with a flight data acquisition and management system (FDAMS) that sent aircraft data to the flight data recorder (FDR). The FDAMS also incorporated a quick access recorder (QAR) function of continuous flight data recording to a removable PC-card. Due to a delay in notification of the incident to the Australian Transport Safety Bureau, the information on the FDR had been over-written and was no longer available. Information from the FDAMS PC-card was downloaded by the operator and provided to the Bureau for analysis. The

information recorded on the PC-card was incomplete and did not contain any information relating to the incident flight, together with a number of other flights that should also have been recorded.

The aircraft operator advised that they had worked with the FDAMS manufacturer to determine the reason for the missing data and had rectified the situation. They reported that the download data reliability had improved to 100% for the aircraft.