Australian Government
Australian Transport Safety Bureau

ATSB TRANSPORT SAFETY INVESTIGATION REPORT

Aviation Occurrence Report – 200604809

Final

Airprox – 22 km south of Williamtown, NSW
19 August 2006
VH-HPB
Fairchild Industries Inc. SA227 Metroliner
Unknown light aircraft

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Airprox – 22 km south of Williamtown, NSW – 19 August 2006 – VH-HPB Fairchild Industries Inc. SA 227 Metroliner, Unknown light aircraft

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Abstract

The crew of a Fairchild Industries Ltd. SA227 Metroliner were inbound to Williamtown, NSW, when the control zone and restricted airspace were not active. The copilot made an inbound broadcast on the common traffic advisory frequency (CTAF) at 20 NM south, to which no response was heard. The crew reported that at 10 NM south of Williamtown, as they were descending through 3,000 ft, they passed within an estimated 30 m of a low-wing, retractable landing gear, single-engine aircraft travelling in the opposite direction. The pilot in command, who was the pilot flying, reported that his attempt to avoid the other aircraft would not have been timely enough to affect separation and there was an Airprox.

The investigation was unable to identify the other aircraft and determine why its pilot had not used the radio to provide positional information when operating in the vicinity of an airport for which the use of a radio was required and to determine if the aircraft transponder equipment (if equipped) was serviceable.

The investigation found that since November 2005, the provision of radar services in the Williamtown area had been reduced when the military airspace was not active. That was due to an unresolved technical problem with the military secondary surveillance radar at Williamtown, which impacted the civilian air traffic control system. A replay of the military radar data showed that the Metroliner's radar return merged with the primary return (no identification or altitude information) of another aircraft travelling in the opposite direction, overhead Newcastle.

The occurrence demonstrated the limitations of the see-and-avoid concept as an adequate means of achieving safe separation from other traffic in an unalerted traffic environment. It also demonstrated the arbitrary hand played by good fortune in avoiding a mid-air collision over a populous area, when just one pilot in an airspace system that relies on the cooperation of all pilots, either cannot or does not choose to participate.

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

Sequence of events

On the morning of 19 August 2006, a Fairchild Industries Inc. SA227 Metroliner, registered VH-HPB, was being operated on a scheduled passenger service between Sydney and Williamtown Airport, NSW, with two crew and 14 passengers. The flight was conducted in accordance with the instrument flight rules (IFR) although visual meteorological conditions (VMC) were reported. The crew reported that the controller advised them that there was no IFR traffic for their descent into Williamtown from 9,000 ft above mean sea level (AMSL) and cleared the crew to leave controlled airspace. The controller also advised that due to degraded radar performance a radar based traffic information service was not available below 6,000 ft. The Metroliner left controlled airspace and descended into uncontrolled Class G airspace at 8,500 ft.

The military control zone at Williamtown and its associated restricted airspace was not active. The crew reported that, in accordance with non-controlled airspace procedures, the copilot broadcast an inbound advisory at 20 NM south of Williamtown on that airport's common traffic advisory frequency (CTAF). There was no response to this broadcast or to a further inbound broadcast made by the copilot at about 10 NM south of Williamtown.

The crew reported that, at 0952 Eastern Standard Time[1], while descending through 3,000 ft, they briefly saw an unidentified, low-wing, retractable landing gear, single-engine aircraft as it passed to their right at an estimated distance of 30 m. That aircraft was flying in the opposite direction and banking left. Although the pilot in command (PIC), who was the pilot flying, reported that he instinctively banked left, the manoeuvre was far too late to have affected separation and there was an Airprox[2].

The crew attempted unsuccessfully to make contact with the pilot of the other aircraft by radio on the Williamtown CTAF, the adjacent Aeropelican CTAF and the Brisbane Centre frequency.

Radar data

The Australian Defence Air Traffic System (ADATS) at Williamtown displayed the secondary surveillance radar (SSR) information from transponder-equipped aircraft within the vicinity of Williamtown. Recorded radar data from the Williamtown

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.

2 An occurrence in which two or more aircraft come into such close proximity that a threat to the safety of the aircraft exists or may exist, in airspace where the aircraft are not subject to an air traffic separation standard or where separation is a pilot responsibility.

ADATS showed the transponder Mode C return[3] of the Metroliner as it descended toward Williamtown. A primary radar return[4] of an unidentified aircraft was also observed tracking south-west along the coast and passed about 3 NM south of the airport at its closest point. The radar derived groundspeed of the Metroliner was 250 kts and the groundspeed of the unidentified aircraft was calculated to have been 160 kts.

A replay of the recorded radar display showed that at 10 NM south of Williamtown and when the Metroliner was at a Mode C altitude of 3,000 ft, the two aircraft were on almost reciprocal tracks as the Metroliner's radar return merged with the primary radar return of the unidentified aircraft. The unidentified aircraft's radar return disappeared from the radar display at a position 12 NM south of Williamtown, soon after it had passed the Metroliner.

Provision of traffic information

The Brisbane Centre controller was required to provide traffic information to the crew of the Metroliner on other IFR category flights in non-controlled, Class G airspace below 8,500 ft around Williamtown Airport. There was no requirement to provide traffic information on VFR category flights. However, where radar coverage is available, a controller can use radar based traffic information on those flights. Additionally, pilots of VFR category flights operating in non-controlled airspace can request a radar information service (RIS), subject to air traffic control workload. The service is available to improve a pilot's situational awareness and to assist in avoiding other aircraft. To receive a RIS, a pilot of a VFR category flight must be in direct VHF communication with air traffic control and the aircraft has to have a serviceable transponder with Mode C capability.

Normally, The Australian Advanced Air Traffic System (TAAATS) receives SSR (but not primary radar) data from the Williamtown ADATS radar located near the airport. That data enabled near ground level radar coverage for flights in the vicinity of the airport. In late November 2005, the Williamtown radar data input to TAAATS was disconnected pending resolution of a radar problem that resulted in a high level of false short-term conflict alerts being displayed to controllers. The Williamtown radar was not connected to TAAATS during the period of the incident for that reason. A notice to airmen (NOTAM) was issued on 26 November 2005 advising that Brisbane Centre radar information services and radar based traffic information services below 6,000 ft in the vicinity of Williamtown Airport were unreliable due to limited radar coverage. That NOTAM was subsequently reviewed and re-issued, extending its effectiveness as the problem had not been resolved.

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3 The encoding of an aircraft transponder signal with atmospheric pressure information into the SSR radar.

4 The primary radar return is the reflected image of the aircraft that appears as a 'raw' image on the radar display. Unlike an aircraft equipped with a transponder capable of Mode A and Mode C. operation, that when interrogated by ground-based SSR equipment, displays the aircraft's identification and altitude information on a controller's air situation display.

Radio broadcasts

When the control zone was not active Williamtown Airport was designated a CTAF(R)[5]. All aircraft operating in the vicinity of Williamtown Airport were required to have a serviceable very high frequency (VHF) radio and were required to make positional broadcasts on the designated CTAF.

Aeronautical Information Publication procedures for operations in Class G-Airspace (ENR 1.1-75) stated:

> To achieve the greatest degree of safety it is essential that pilots of radio-equipped aircraft monitor and broadcast on the CTAF by 10 NM of a non-towered aerodrome.

Recorded transmissions on the Williamtown CTAF of 118.3 MHz were obtained for the period 15 minutes before the copilot of the Metroliner made the first inbound transmission until after he reported that the flight had landed. That audio recording contained transmissions from other aircraft that were either on the ground at Williamtown or not near the Metroliner's intended flight path and therefore not conflicting traffic. There were no apparent broadcasts from the pilot of the unidentified aircraft. There were no responses to the two inbound broadcasts made by the copilot of the Metroliner.

See and avoid

To enable pilots to visually acquire other aircraft and take avoiding action, the Aeronautical Information Publication limits aircraft operating in non-controlled Class G airspace to a maximum speed limit of 250 kts indicated airspeed, when below 10,000 ft AMSL. In areas of higher traffic density, such as the CTAF(R), the use of radio for alerting pilots to other traffic and directing their lookout, enhances safety.

The crew reported that the task of scanning for other traffic, when flying in visual meteorological conditions, was carried out by both pilots in conjunction with their other crew duties. There were no specific company procedures for traffic lookout, but the physical cockpit dimensions of the Metroliner meant that each pilot scanned the area ahead and to their respective side of their aircraft for other traffic. They reported that although the downward view from the cockpit of the Metroliner on descent was good, the small frontal profile of the other aircraft against the background of terrain, together with its almost stationary image in their field of view, would have made it all but impossible to see.

In 1991, the then Bureau of Air Safety Investigation published a research report titled Limitations of the See-and-Avoid Principle. The report listed the many limitations of reliance on the human eye for the detection and avoidance of other aircraft, especially in circumstances similar to those described in this incident. The report found that pilots should attempt to obtain all available traffic information, whether from air traffic services or via a listening watch, to enable them to conduct a directed traffic search.

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5 CTAF(R) indicates carriage and use of radio is required when operating in the vicinity of aerodromes so designated.

To assist with visual identification of aircraft, the National Airspace System Implementation Group initiated a voluntary safety program named 'Operation Lights-On' prior to airspace changes in November 2003. In guidance material issued to pilots, it recommended that external aircraft lights be displayed when operating below 10,000 ft, particularly near aerodromes. The crew of the Metroliner reported that in accordance with company procedures, they displayed the aircraft identification lights below 10,000 ft AMSL, but had not seen any lights displayed on the other aircraft.

Traffic Alert and Collision Avoidance System

The Metroliner was not equipped with a traffic alert and collision avoidance system (TCAS), nor was it required to be. The TCAS processes transponder signals from other nearby aircraft and depicts that traffic on a cockpit TCAS display. When a collision risk exists, the system provides the crew, visually and aurally, with traffic alerts and conflict resolutions.

The system can only provide traffic alert and collision avoidance information from aircraft with operating transponder equipment with Mode C (altitude information) capability. There was no requirement for VFR aircraft operating in non-controlled, Class G airspace to be transponder-equipped. However, for aircraft with serviceable transponders, there was a requirement to have them turned on with Mode C operation selected.

ANALYSIS

The investigation was unable to establish all of the circumstances leading to this occurrence, as the pilot of the unidentified aircraft could not be contacted. However, the known circumstances indicate that the following defences against the possibility of a mid-air collision in non-controlled, Class G Airspace were not available:

- the Brisbane centre controller was unable to provide a radar information service below 6,000 ft above mean sea level due to an unresolved fault in the Williamtown secondary surveillance radar data that had resulted in its disconnection from The Australian Advanced Air Traffic System
- there was no active Mode C signal from the unidentified aircraft[6]
- there was no response to the broadcast made by the Metroliner's copilot on the Williamtown Common Traffic Advisory Frequency at 20 NM inbound, to alert the crew of conflicting traffic
- the Metroliner was not equipped with a Traffic Alert and Collision Avoidance System (TCAS)[7].

6 Brisbane Centre controllers are unable to provide a radar information service in the vicinity of Williamtown to and about aircraft that are not fitted with a functioning transponder as Williamtown primary radar data is not fed to the Brisbane ATS centre.

7 TCAS cannot provide alerts of conflicting traffic from aircraft that are not fitted with a functioning transponder.

SAFETY ACTION

Royal Australian Air Force/Airservices Australia

On 5 October 2006, Airservices Australia accepted the Williamtown Australian Defence Air Traffic System (ADATS) radar data feed into The Australian Advanced Air Traffic System (TAAATS) after ADATS engineers located and repaired an antenna fault. Subsequently, TAAATS radar coverage over the Williamtown area allowed the RIS service below 6,000 ft to be re-established and the notice to airmen, advising of the radar information service (RIS) restriction, was cancelled.