Australian Government
Australian Transport Safety Bureau

ATSB TRANSPORT SAFETY INVESTIGATION REPORT
Aviation Occurrence Report – 200506650
Final

AIRPROX: 9 km south of Williamtown Airport, NSW 18 December 2005

VH-VQI

Boeing Company 717-200

VH-LLD

British Aircraft Corporation 167 Strikemaster

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Figure 1 courtesy of Airservices Australia

Abstract

On 19 December 2005 at 0954 Eastern Daylight-saving Time, shortly after departure from Williamtown (Newcastle) Airport, NSW, while operating under common traffic advisory frequency (CTAF (R)) procedures, the pilot of a Boeing Company 717-200 (717) aircraft reported receiving a traffic collision and avoidance system (TCAS) resolution advisory (RA). The other aircraft was subsequently identified as a British Aircraft Corp 167 Strikemaster aircraft.

A review of recorded radar data, after the occurrence, showed that the RA activated when the 717 was 9 km south of the airport. The radar data, in conjunction with TCAS data from the 717, showed that the minimum horizontal distance between the aircraft was 1,500 metres with the Strikemaster about 250 ft above the level of the 717. There had been an AIRPROX.

The investigation found that the Strikemaster pilot's intention had been to avoid routes likely to be used by other aircraft. However, on the day, the pilot misperceived the 717's destination and the Strikemaster had radio problems that led to a reduction in the pilot's situational awareness. A near collision was prevented by the combined use of radar based traffic information and TCAS.

Following the occurrence, the operator of the Strikemaster reviewed and amended procedures, for flights conducted near Lismore and Williamtown Airports to enhance pilots' situational awareness. That review included the standardisation of aircraft radio operating procedures.

Brisbane Centre issued an operational note to controllers advising that the pilots of Strikemaster flights may request a radar information service and controllers are to be prepared to provide a discrete secondary surveillance code.

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 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 is pleased to report positive safety action in its final reports rather than make 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

On 19 December 2005 at 0954 Eastern Daylight-saving Time[1], shortly after departure from Williamtown (Newcastle) Airport, NSW, while operating under common traffic advisory frequency (CTAF (R)) procedures, the pilot of a Boeing Company 717-200 (717) aircraft reported receiving a traffic collision and avoidance system (TCAS) resolution advisory (RA). The other aircraft was subsequently identified as a British Aircraft Corp 167 Strikemaster aircraft. A review of recorded radar data, showed that the RA activated when the 717 was 9 km south of the airport. The radar data, in conjunction with TCAS data from the 717, showed that the minimum horizontal distance between the aircraft was 1,500 m with the Strikemaster about 250 ft above the level of the 717. There had been an AIRPROX[2].

The airspace surrounding the airport was non-controlled Class G designated as CTAF (R). The R indicates that the carriage and use of a radio is required for aircraft that operate into or out of the airport and that a pilot is required to monitor and broadcast on the CTAF frequency prior to, and within 10 NM of the airport. Pilots of aircraft operating in a CTAF (R) are required to make specific radio broadcasts when operating in the vicinity[3] of a non-towered airport. In visual meteorological conditions[4] (VMC) pilots use those broadcasts to visually identify and adjust flight paths to avoid other aircraft in the area of the airport.

Runway 30 was in use at Williamtown Airport and the Strikemaster departed about 3 minutes before the 717. At the time the traffic situation included a Cessna 150 being used to conduct circuit training, a Boeing Company 737 (737) was inbound from the south, a New Zealand Aerospace Ind Ltd CT4 was inbound from the south following a flight over Newcastle City, a Cessna 172 was inbound from the south and a Fairchild Metro 23 was taxiing for a departure to Sydney. Pilot reports of the weather indicated that it was VMC with little or no cloud present.

The Strikemaster is a two seat (side by side) ground attack jet aircraft that was initially developed as a training aircraft. The aircraft involved in the occurrence was civil registered and was being used to conduct a local area joy flight[5], including aerobatic manoeuvres, under the visual flight rules (VFR) up to 8,000 ft above mean sea level (AMSL). The pilot had extensive military jet fighter experience and during the flight was required to provide commentary to the passenger. The flight

1 The 24-hour clock is used in this report to describe the local time of day, Eastern Daylight-saving Time (EDT), as particular events occurred. Eastern Daylight-saving Time was Coordinated Universal Time (UTC) + 11 hours.

2 An occurrence in which 2 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.

3 Aircraft are operating is in the vicinity of a non-towered airport if it is within a horizontal distance of 10 NM and within a height above the airport reference point that could result in conflict with operations at the airport.

4 Visibility greater than 5 km and aircraft are able to be flown 1,500 m horizontally and 1,000 ft vertically clear of cloud.

5 Operations are conducted in accordance with Civil Aviation Safety Authority, Civil Aviation Regulation 262AM, Limited category aircraft – operating limitations.

was one of three flight profiles that were available. While the three profiles were essentially standard, the intention was, when possible, to accommodate requests by a passenger for repeat or specific manoeuvres.

After the occurrence, the Strikemaster pilot reported it was the first flight for the day and that he normally checked what fare paying passenger flights where expected to depart and arrive during the period of a flight before he left the terminal. He reported that he would normally amend his area of operation to avoid any routes to be used by other aircraft operating to/from the airport. On the day of the occurrence he did not check the expected flights but thought that the 717 was bound for Brisbane, Qld.

At 0943, the pilot of the Strikemaster broadcast on the CTAF frequency that the aircraft was taxing for runway 30 for a local flight. That radio call was heard by the crew of the 737 as 30 seconds later they called the Strikemaster pilot requesting his intentions on departure. That radio call was co-incident with another radio call on the frequency. The pilot of the Strikmaster did not respond to the radio call from the pilot of the 737. At 0944, the pilot of the 717 broadcast that the aircraft was taxiing to runway 30 for a departure to Melbourne and at the same time the pilot of the 737 called the pilot of the Strikemaster for a second time. The pilot of the Strikmaster did not respond to the second radio call from the pilot of the 737. The pilot of the 737 reported to the pilot of the 717 that the 737 was 14 miles from the airport. That radio transmission was acknowledged by the pilot of the 717.

At 0945, the pilot of the Strikemaster broadcast on the CTAF frequency that the aircraft was entering runway 30 in preparation for a departure with a ‘left hand turn out climbing to eight thousand [ft] overhead the coast’. The Cessna 150 was on final for runway 30 and the pilot of that aircraft attempted twice to call the pilot of the Strikemaster and advise that the Cessna 150 was on short final. The pilot of Strikemaster heard the second radio transmission and manoeuvred the jet off the runway threshold to enable the Cessna 150 to conduct a touch and go. While waiting for the Cessna to land, the pilot of the Strikemaster confirmed the operation of the aircraft’s radio with the pilot of another aircraft. He received a response from the other pilot indicating that the radio was operating okay. The pilot of the Strikemaster reported later that the aircraft’s two radios operated satisfactorily for all other flights conducted that day.

At 0946, the pilot of the Strikemaster broadcast that the aircraft was lining up on runway 30. At 0948, the pilot of the Strikemaster broadcast that the aircraft was passing 2,500 ft AMSL on departure, on climb to 8,000 ft AMSL and was tracking to the coast.

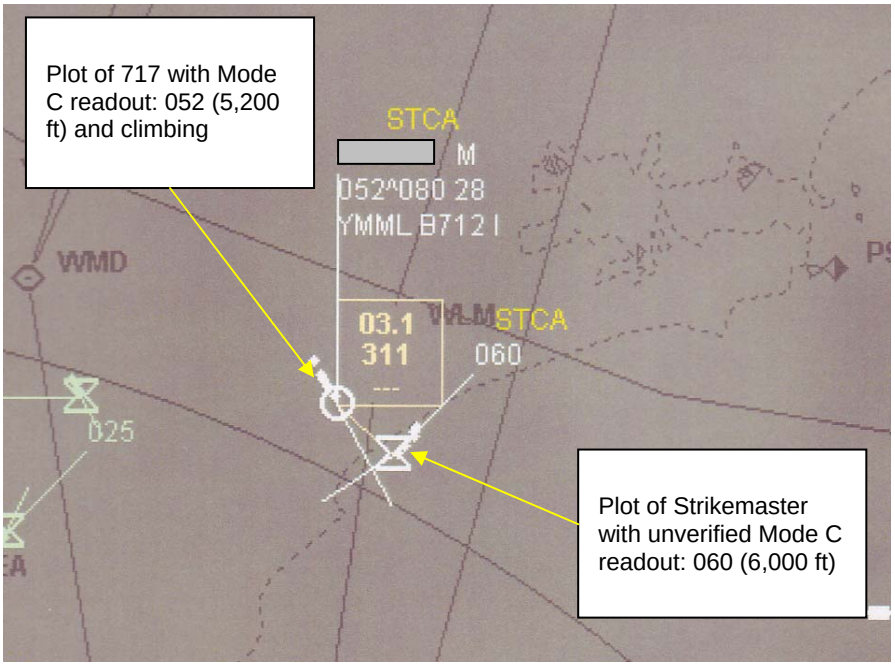
The 717 was on a scheduled fare paying passenger instrument fight rules (IFR) flight to Melbourne Vic. At 0949, the pilot of the 717 broadcast that the aircraft was lining up runway 30 for a departure to the south. At 0951, the pilot of the 717 broadcast that the aircraft was airborne from runway 30 and that when the aircraft reached 1,500 ft AMSL it would turn left to intercept the 161 track reference the non directional beacon (NDB) navigation aid. At 0953, while still monitoring the CTAF frequency, the pilot of the 717 reported to the Brisbane Centre sector controller that the aircraft had departed at five one and was on climb to flight level three six zero.

The pilot of the Strikemaster reported later that he saw the 717 airborne, upwind and turning left. At the time he could not understand why it was turning left if it

was going to Brisbane. He lost sight of the 717 shortly after and continued with his flight. The pilot also advised that he was monitoring the CTAF but believed that the previous 5,000 ft upper limit for CTAF areas still applied. This was not the case, as new airspace procedures[6], implemented 24 November 2005, required pilots of aircraft in Class G airspace, within 10 NM of a CTAF (R), to monitor the designated frequency regardless of the aircraft's altitude.

The sector controller was aware of the departure of the 717 as The Australian Advanced Air Traffic Control System (TAAATS) had correlated the aircraft's flight plan with the secondary surveillance radar (SSR) code assigned to the flight as that aircraft passed 2,400 ft AMSL. The controller reported to the pilot of the 717 that there was a radar return of an unidentified aircraft 3.5 NM in his eleven o'clock position[7] (see Figure 1) and its altitude was an unverified[8] 6,000 ft AMSL. The controller also received a short term conflict alert (STCA) on the radar display indicating that the 717 and the unidentified were in potential conflict. The unidentified aircraft was operating on SSR code 1200. That code is designated for use by pilots of aircraft operating a VFR category flight in Class G airspace. About 8 seconds later, the pilot of the 717 received a TCAS RA to adjust the rate of climb of the aircraft to no greater than 2,000 feet per minute. The pilot complied with the advisory and at 0953:40 the RA ceased.

Figure 1: Replay of recorded radar data at 0953:30[9]



6 Aeronautical Information Publication (Supplement) H51/05 issued 24 November 2005.

7 A means to relate the direction of an aircraft relative to another aircraft – 12 o'clock is in front of an aircraft, 9 o'clock is to the left and 3 o'clock is to the right.

8 An aircraft's SSR Mode C readout has to be confirmed to be within 200 ft of a pilot reported level to be deemed to be verified.

9 The orange text box lists the distance between the aircraft plots (3.1 NM) and the bearing from the unidentified aircraft to the 717 (311 degrees M).

After the occurrence, the pilot and copilot of the 717 reported that they were aware of the unidentified aircraft on the TCAS as their aircraft turned left to intercept the outbound track. They lowered the nose of the 717 to assist them in seeing the other aircraft and received the RA at about the same time. Analysis of the 717 flight data recorder information showed that immediately prior to the RA the aircraft's rate of climb decreased in conjunction with an increase in indicated airspeed from 230 kts to 250 kts.

The Brisbane Centre controller was required to provide traffic information to pilots of IFR category flights on other IFR category flights in non-controlled Class G airspace below 8,500 ft around Williamtown Airport. There is no requirement to provide traffic information on VFR category flights. When within radar coverage the traffic information service can be based on radar data.

A radar information service (RIS) is available on request to pilots of VFR category flights in non-controlled airspace, 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 very high frequency radio communication with air traffic control and the aircraft has to have a serviceable SSR transponder.

Normally, TAAATS receives SSR data from the Williamtown Air Traffic Control radar located near the airport. That data enables near ground level coverage for flights at the airport. During November, there were problems with the Williamtown radar data received by Brisbane Centre and while the situation was being

investigated, that data was not used. A notice to airmen (NOTAM) reviewing and re-issuing a previous NOTAM advised 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 issued 26 November 2005.

ANALYSIS

Had the pilot of the Strikemaster confirmed what fare paying passenger operations were expected for the period of the joy flight before leaving the terminal the occurrence possibly would have been prevented.

There were a number of following events that probably prevented the pilot of the Strikemaster either hearing or appreciating what was being broadcast on the common traffic advisory frequency (CTAF) by the pilot of the taxiing 717. It is possible that the pilot of the Strikemaster missed some broadcasts because of intermittent radio operation or reception anomalies. The investigation was unable to determine whether the initial missed calls were due to a technical problem or as a result of shielding of some of the other pilots' radio broadcasts. However, the coincident radio transmission from the pilot of the 737 to the pilot of the Strikemaster, as the pilot of the 717 reported that he was taxiing for runway 30, probably over rode the latter's radio transmission. Consequently, the pilot of the Strikemaster remained unalerted about the fact that after departure the 717 would track to the south. Had the pilot of the Strikemaster become aware at that stage that the 717 was going to track to the south he most likely would have amended his area of operation to avoid the 717's departure track.

The pilot of the Strikemaster had another opportunity to understand that the 717 may possibly conflict with his operations when the pilot of that aircraft broadcast intentions, when lining up and after departing. On lining up, the pilot reported his intention to turn left and following departure he reported that the aircraft was turning left to intercept the one six one non-directional beacon navigation aid track. At that time the pilot of the Strikemaster had commenced his manœuvres at an altitude that prior to 24 November 2006 would have been outside the CTAF. It is possible that because he thought he was outside the CTAF area, the pilot was less attentive to radio transmissions on the CTAF. This aspect combined with distraction due to passenger commentary and workload requirements may have prevented the pilot from appreciating the developing situation.

The pilot of the Strikemaster could have clarified the intention of the pilot of 717 when he saw the aircraft turning left instead of right, as he expected. Again however, his high workload in the conduct of the flight probably caused him to dismiss the issue as a low priority at that time, and the situation remained unresolved. Overall, the pilot's situational awareness of the 717's departure track was diminished.

The pilot of the 717 also had an opportunity to query the pilot of the Strikemaster regarding his operation. However, that lack of any query by the pilot of the Strikemaster, with respect to the 717 CTAF broadcasts, indicated that there was no apparent problem with the 717's intended track. Compliance with the radio broadcast procedures by all pilots did not prevent the occurrence.

The limited radar coverage was not a factor in the occurrence. The Brisbane Centre controller had sufficient information from the Strikemaster radar returns to provide traffic information about the Strikemaster to the pilot of the 717. That traffic information, in conjunction with information from the Traffic Alert and Collision Avoidance System (TCAS) fitted to the 717, assisted the pilot to prepare to avoid the Strikemaster when alerted by the TCAS. Similarly, had the pilot of the Strikemaster requested a radar information service (RIS) it is likely that the

controller would have provided traffic information on the departing 717 to the pilot in time to avoid that aircraft's track. A request by the pilot of the Strikemaster for a RIS was a preventative risk control that was available subject to controller workload. While provision of a RIS might possibly increase the pilot's workload, it should, when used in conjunction with monitoring of the CTAF frequency, improve situational awareness.

The Strikemaster pilot's original intention to avoid routes likely to be used by other aircraft during a local flight was the preferred risk mitigator for the operation. However, on the day the pilot's lapse in not checking the expected operations of fare paying passenger flights to/from Newcastle Airport, his misperception about the 717's destination and the radio problems negated that mitigator. A near collision was prevented by the combined use of radar based traffic information and TCAS.

SAFETY ACTIONS

Strikemaster operator

Following the occurrence, the operator of the Strikemaster reviewed and amended procedures for flights conducted near Lismore and Williamtown Airports. In the future:

- pilots will contact the Brisbane Centre controller on taxi to obtain a discrete SSR code (to be retained for the day)
- pilots will confirm the area of operations for each flight to the Brisbane Center controller to assist in the provision of traffic information to pilots of IFR category flights
- the Brisbane Centre controller will provide traffic information to the pilot while airborne.

That review included the standardisation of aircraft radio operating procedures.

Brisbane Centre local safety action

Brisbane Centre issued an operational note to controllers advising that the pilots of Strikemaster flights may request a radar information service and controllers are to be prepared to provide a discrete SSR code and traffic information.