Aviation Safety Investigation Report 200205540

Boeing Co 717-200 de Havilland Canada DHC-8-315

16 November 2002

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NOTE: All air safety occurrences reported to the ATSB are categorised and recorded. For a detailed explanation on Category definitions please refer to the ATSB website at <u>www.atsb.gov.au</u>.

Occurrence Nu Location: Date: Highest Injury Injuries:	umber: Level:	er: 200205540 Mackay, Aerodrome 16 November 2002 vel: Nil				Occurrence Type: Serious Incident Time: 1503 EST		
injui ies.					Fatal	Serious	Minor	None
			Crew		0	0	0	0
			Grou	nd	0	0	0	-
			Passe	nger	0	0	0	0
			Tota	1	0	0	0	0
Aircraft Details:	Boeing Co 717-200			de Havilland Canada DHC- 8-315				
Registration: Serial Number:	VH-VQC			VH-SB	σT			
	Air Transport High			Air Transport High				
<b>Operation Type:</b>	Capacity Scheduled			Capacity Scheduled				
	Domestic Passenger			Domestic Passenger				
Damage Level:	Nil			Nil				
<b>Departure Point:</b>	Brisban	e Qld		Townsville Qld				
<b>Departure Time:</b>	1451							
Destination:	Mackay Qld			Mackar	y Qld			

### Approved for Release: 07 June 2004

#### FACTUAL INFORMATION

### History of the flights

A de Havilland DHC-8-315 (Dash 8) was being operated on a scheduled service to Mackay from Townsville under the instrument flight rules (IFR). The crew had been authorised by Brisbane Centre air traffic control to descend their aircraft to 6,000 ft. The duty runway at Mackay was 14 and, at 1503:00 Eastern Standard Time, the crew reported that they were tracking on the 304 degree radial of the Mackay VHF omni-directional radio range (VOR) navigation aid and were 30 NM from Mackay. The Mackay aerodrome controller (ADC) instructed the crew to `Report approaching 6,000 ft with DME [distance measuring equipment] distance'.

An IFR category Boeing 717-200 (717) was being operated on a scheduled service to Mackay from Brisbane. Its crew reported at 1503:22 that they were tracking on the 130 degree radial of the Mackay VOR, also on descent to 6,000 ft. The Brisbane Centre controller had assigned both crews 6,000 ft prior to instructing them to transfer to the Mackay ADC radio frequency. The assignment of the same level was an authorised practice, because the Brisbane Centre controller would continue to radar monitor the separation of all arriving aircraft until the first aircraft was at or below 5,000 ft. The ADC subsequently instructed the 717 crew to descend to 4,000 ft. The crew asked whether they could expect a left base and the ADC responded saying that they could expect a left base to runway 14.

The Dash 8 was in cloud, and at 1506:17 the ADC instructed that crew to descend to 4,700 ft. There was no separation standard being applied between the Dash 8 and the 717 and separation was no longer assured. The infringement of separation was not recognised by the Mackay ADC.

The ADC instructed the 717 crew to descend to 3,000 ft and to reduce speed. The crew was told that they were number two to a Dash 8 from the north and the ADC asked them to report when visual. The Dash 8 crew reported approaching 4,700 ft at 14 DME and was instructed to descend to 2,000 ft, not below the DME steps.

At 1507:53, the crew of the 717 reported visual at 7 NM and advised that they were able to track for left base. The ADC told them to maintain 3,000 ft and to track for left downwind. The crew was asked to sight a helicopter in front of them at 2,000 ft and 4 miles east of the aerodrome. The crew replied `for the base runway 14 and looking'.

The crew of the Dash 8 reported visual (clear of cloud) and was cleared to make a visual approach straight in to runway 14 at 1508:38. The crew of the 717 was cleared for a visual approach at 1508:51. The crew of the 717 responded by reading back the clearance. The controller then said `and maintain downwind heading, the Dash 8's currently at 9 mile'. The 717 crew neither heard, nor responded to, this subsequent transmission. The ADC did not query the lack of acknowledgment of that requirement.

Approximately 90 seconds later, the ADC observed the 717 turning left base and converging with the Dash 8 on final approach. This was a second, and more critical, infringement of separation between the two aircraft.

The crew of the Dash 8, on final approach, observed the 717 turn onto base towards their aircraft. The ADC instructed the crew of the Dash 8 to turn right, away from the 717. The ADC issued traffic information to the 717 crew who, after sighting the Dash 8, elected to maintain 1,500 ft. The ADC confirmed with the Dash 8 crew that they could see the 717 and authorised them to continue the approach. The ADC subsequently instructed the crew of the 717 to climb to 2,000 ft and make a left circuit before returning for landing.

### Weather

The weather, reported as Information Golf on the automatic terminal information service, was runway 14, wind 100 degrees M at 16 kts, crosswind 10 kts, visibility greater than 10 kms, cloud scattered at 2,000 ft, showers in the area, temperature 27 degrees C and the barometric pressure at 1012 hectopascals.

The investigation report prepared by Airservices Australia indicated that although the conditions included some haze, conditions were suitable for the application of visual separation.

# Airspace

Air traffic controllers from Airport Services Group, Airservices Australia, staffed Mackay Tower, which was a nonradar Class D tower. The Manual of Air Traffic Services (MATS) 9.1.2 stated that Class D airspace encompassed control zones of defined dimensions, and associated control area steps generally below 4,500 ft above mean sea level around designated aerodromes. Some of the lower levels of the Class D airspace at Mackay were below radar coverage. Airspace in the vicinity of Mackay above 4,500 ft was Class C.

In Class C and Class D airspace, an air traffic control service was provided for all IFR aircraft. In Class C airspace, a separation standard was required to be provided between all IFR aircraft, and between IFR aircraft and Visual Flight Rules (VFR) aircraft. In Class D airspace, a separation standard was required to be provided between all IFR aircraft and a separation service was required to be provided between IFR aircraft and Visual Flight Rules (VFR) aircraft.

# Equipment

For most of the 1990s, controllers sought the provision of a radar display in towers where radar coverage was suitable. This was based on evidence that similar procedures were used in the UK in Class D towers, and in the USA in VFR Towers. Prior to the Sydney Olympics, a Tower Situational Awareness Display (TSAD) was installed in Bankstown Tower and during December 2000 test units were installed in Mackay and Rockhampton towers.

At Mackay, radar data was received by a dedicated personal computer located in the Mackay Maintenance Services division building and, after the data was processed, was relayed for display in the tower cabin. The unit displayed secondary radar returns only. The Mackay TSAD, although operating in the tower, was not approved for operational use because a safety case had not been completed. The Temporary Local Instruction (TLI AS/02/076) stated:

`Controllers are reminded that until formal commissioning takes place, TSAD shall not be used in any operational sense (notwithstanding aircraft emergencies).'

### Procedural separation

There was no evidence that the incident aircraft were provided with any form of procedural separation. Moreover, there was no evidence to show that the Senior Controller at Mackay or the subsequent investigation conducted by Airservices Australia identified that the ADC had not applied procedural separation standards. This oversight is not unusual, as procedural separation is a highly conceptual, rule-based air traffic control skill that demands cognitive rigour.

All IFR category aircraft in Class D airspace were to be provided with an air traffic control service. MATS defined an air traffic control service as follows:

`A service provided for preventing collisions between aircraft, between aircraft and obstructions, and to expedite and maintain an orderly flow of air traffic'.

Radar control is the provision of air traffic control services using radar-derived information. Where radar is not available, procedural control is used. Procedural control is the provision of air traffic control services using information derived from sources other than radar. Such information is usually derived from pilots accurately reporting their aircraft's position in three dimensions.

MATS stated that in a non-radar environment `controllers shall ensure that position reports are received from all aircraft in Class C and Class D airspace and for IFR flights in Class E airspace, unless:

a. otherwise instructed by Air Traffic Control, or

b. radar identified, or

c. if the flight is specifically exempted'.

The crews of the incident aircraft were never instructed to provide a position report, which would have facilitated the selection and establishment of an appropriate procedural separation standard.

Despite the controller's oversight in not obtaining aircraft position reports from the crews involved, the controller did provide position information about aircraft to crews. Information such as `traffic for you to sight is a Kawasaki

helicopter, he'll be in your one o'clock low at 2,000, he is 4 miles east of the field at the moment'. Another example was `maintain downwind heading, the Dash 8's currently at 9 mile'.

### Visual separation

Clearances for simultaneous visual approaches were authorised in MATS subject to certain criteria. These criteria were that the flight paths were to be greater than 90 degrees apart and that there was no significant cloud at or below the levels assigned to the aircraft. In addition, actual visibility was to be 30 km or more and both aircraft instructed to report at a distance outside the point at which lateral separation would be infringed and at which distance it was known that visual separation could be applied. The 717 and Dash 8 crews were not instructed to report outside of a lateral separation point.

After the controller had sighted both of the aircraft, the controller was authorised to separate them using visual separation as defined in MATS 4.5. Each crew was required to report when visual as a criterion to be met before they could be assigned a visual approach.

The crew of the Dash 8 was cleared for a straight in visual approach, while the crew of the 717 was tracking to join the circuit on left downwind, maintaining 3000 ft. The 717 crew was trying to sight a helicopter at 2000 ft, when they were also cleared to make a visual approach. The clearance for a visual approach authorised the crew to descend their aircraft below 3,000 ft.

### MATS 4.5.2.3 stated:

`When aircraft are operating visually as aerodrome traffic or in an Aerodrome Traffic Zone, ATC shall issue clearances designed to maintain separation and/or sequencing instructions, and provide traffic information'.

The controller only partially met the MATS requirement. Although the controller immediately followed up the visual approach clearance and issued a sequencing instruction: `and maintain downwind heading, the Dash 8's currently at 9 mile', a readback of the sequencing instruction was neither received nor requested. Traffic information on the Dash 8 was not issued to the crew of the 717.

# Clearance readbacks

Air traffic controllers were required by MATS 6.1.13 to ensure that crews read all clearances, or amendment to clearances, back correctly. The accuracy of the readback was to be confirmed by the transmission of the aircraft's callsign. Key elements of the clearances, instruction or information were to be read back. This included heading instructions.

### Organisational aspects

In April 2003, Airservices Australia amended MATS to remove the requirement to pass traffic information to aircraft operating visually in the Aerodrome Traffic Zone (see Visual separation). The change was not reflected in the Manual of Standards Part 172 published by CASA and a safety case was determined to be not required. The amendment was considered by Airservices to be a more flexible requirement for traffic information when a tower controller was visually separating aircraft.

# The MATS 4.5.2.3;

When aircraft are operating visually as aerodrome traffic or in an aerodrome traffic zone, ATC shall issue;

- (a) clearances designed to maintain separation; and/or
- (b) sequencing instructions; and/or
- (c) relevant traffic information.'

The previous version of MATS did not have the `and/or' for traffic information, it stated `and', which indicated a mandatory rather than an optional requirement.

### ANALYSIS

The 717 crew asked for and was expecting a clearance for left base. When the controller instructed the crew to make a visual approach, they were effectively approved to track for a left base. The infringement of separation standards in the circuit area was a consequence of the 717 crew not hearing the heading instruction issued by the aerodrome controller. The controller should have requested the crew to read back the requirement to maintain the downwind heading. That action would have identified any communication misunderstanding.

Although the ADC did not ask either crew to report their position, he did issue accurate position information regarding aircraft locations to them. Such information could only have been obtained from a plan-position information display such as a radar console or a TSAD. The TSAD at Mackay was not approved for operational use and the ADC should not have used the displayed information. The provision of traffic information should have been based on either crew position reports or the position of aircraft as observed by the ADC.

The earlier infringement in procedural separation standards posed no immediate threat to the safety of the aircraft. However, by not asking the crews to report their positions, the ADC had no capability to determine exactly where the aircraft were. Position reports would have enabled him to formulate and establish a separation standard. The safe resolution of the situation was dependent on both crews becoming visual and the ADC being able to see both aircraft in sufficient time to act. Consequently, the separation between the aircraft was never assured.

The April 2003 amendment of MATS 4.5.2.3 to give controllers the option of including traffic information or not, may reduce flight crew situational awareness.

### SIGNIFICANT FACTORS

1. The ADC did not separate the 717 and Dash 8 using procedural separation standards before the aircraft were separated visually.

2. The 717 crew did not hear the sequencing instruction for them to maintain a downwind heading.

3. The controller did not obtain a readback of the sequencing instruction for the 717 crew to maintain a downwind heading.

4. The controller did not provide the 717 crew with accurate traffic information about the Dash 8.

SAFETY ACTION

Local safety action

Following the incident, Airservices Australia conducted an internal investigation and subsequently mandated generic refresher training regarding the application of AIP GEN 3.4-13 paragraph 4.4.1. (Read-Back Requirements). The training was to focus on, and include, examples of readbacks concerning, instrument approaches, holding, traffic, and circuit instructions. All Mackay controllers were required to complete the radiotelephony module on Visual Separation, which was completed on 9 January 2003.

With respect to TSAD, Airservices Australia's Airport Services added the requirement for the use of this tool to Mackay Tower's Local Instructions. The amendment became active from 27 November 2003 and stated: `Mackay Tower is equipped with a Tower Situational Awareness Display (TSAD). The TSAD must not be used to provide radar services'.

### ATSB safety action

As a result of this and other investigations, the Australian Transport Safety Bureau has identified a safety deficiency. The deficiency relates to the inconsistent application of procedural separation standards for IFR aircraft in non-radar Class C and D airspace. The ATSB issues the following recommendations:

### R20040062

The Australian Transport Safety Bureau recommends that Airservices Australia review the effectiveness of its check and training program in the area of procedural control services.

### R20040063

The Australian Transport Safety Bureau recommends that Airservices Australia review the MATS amendment decision that removed the mandatory requirement to provide traffic information to aerodrome traffic.