

AVIATION OCCURRENCE REPORT

LOSS OF SEPARATION

BETWEEN

CENTRAL MOUNTAIN AIR  
BEECHCRAFT 1900D C-GCML

AND

AIR BC DE HAVILLAND DHC-8-300 C-FACV  
VANCOUVER, BRITISH COLUMBIA

17 MAY 1997

REPORT NUMBER A97P0135

The Transportation Safety Board of Canada (TSB) investigated this occurrence for the purpose of advancing transportation safety. It is not the function of the Board to assign fault or determine civil or criminal liability.

## Aviation Occurrence Report

### Loss of Separation

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### *Summary*

The AirBC DHC-8 (ABL819) departed runway 26 left (L), at Vancouver, on an instrument flight rules (IFR) flight for Prince George, British Columbia. The Vancouver tower controller initially cleared the aircraft to climb on the runway heading and contact Vancouver departure control. When ABL819 reported on the departure frequency, the departure controller issued a standard clearance to the aircraft to maintain runway heading until 3,000 feet, and then turn right to a heading of 335°; this clearance is to protect the missed approach area for the north parallel runway. At the time that the clearance was issued, the Vancouver air traffic control (ATC) radar indicated that the ABL819 was climbing at a speed of about 150 knots. A short time after ABL819 departed, the tower also cleared a Central Mountain Air Beechcraft 1900D (GLR738) to depart runway 26L, and to climb on the runway heading and contact Vancouver departure control. GLR738 acknowledged the clearance, took off from runway 26L, and accelerated rapidly to a speed of about 190 knots. The spacing between the two aircraft quickly reduced as a result of this airspeed differential, and a loss of separation occurred when the aircraft closed to within

2 nautical miles (nm) horizontally and 300 feet vertically in an area where either 3 nm or 1,000 feet is required. In response, the controller instructed GLR738 to reduce speed to 140 knots in an attempt to stabilize the spacing that remained and to prevent it from reducing further.

*Ce rapport est également disponible en français.*

## *Other Factual Information*

The Vancouver tower controller was responsible for establishing the initial separation between the two departing IFR aircraft under procedures authorized by ATC *Manual of Operations* (MANOPS) article 551.4. Under those procedures, the tower controller can apply separation between an aircraft taking off and other radar-controlled aircraft provided that, in the controller's judgement, the departing aircraft will be radar identified within one nm off the end of the runway, and that radar separation will be established at that point. However, because aircraft have a range of performance characteristics, the initial spacing applied by the tower controller to meet the MANOPS criteria varies and is based on the controller's judgement.

Controllers become accustomed to the initial climb profiles of different aircraft types through continual on-the-job exposure, and are normally able to judge the initial horizontal spacing that will be required to ensure the IFR separation standard will be met; in most cases, this spacing will not be less than three nm. When controllers are unsure of an aircraft's performance characteristics, they can refer to applicable ATC flight data strips which provide information on the aircraft types as well as their cruise speeds. In this incident, the en route speed of the DHC-8, on the flight data strip, was about five knots faster than that of the following Beechcraft 1900D.

The Beechcraft 1900D aircraft type had only recently begun operating in the Vancouver area, and air traffic control personnel were not yet fully familiar with its performance characteristics. The aircraft has good acceleration and climb performance and, although the aircraft operating manual recommends that initial climbs be conducted at 160 knots, a pilot may elect to climb at some other speed depending on operational conditions or personal preference. In this occurrence, the tower released GLR738 when the preceding aircraft (ABL819) was about 3¼ nm west of the airport, but south of the extended centre-line of the runway. There were no speed or climb rate restrictions in GLR738's departure clearance, and the pilot elected to climb out at about 190 knots, and with a high vertical speed; the use of this climb profile was motivated by a desire to keep the aircraft moving quickly, so as not to disrupt the flow of faster jet traffic.

GLR738 first appeared on the departure controller's indicator module (IM) as an uncorrelated target, and the data tag, which would normally show the aircraft's speed, was not available. Additionally, the departure controller had not been expecting a high-overtake situation immediately after take-off and, by the time he recognized the rapid closure rate, the loss of separation had already occurred.

After this loss of separation occurred, other controllers in the terminal specialty reported that they had seen similar "run-down" events involving the Beechcraft 1900D. However, these prior events had not resulted in losses of separation, and had not been formally reported to the supervisory staff at Nav Canada.

In the week following this loss of separation, two more similar incidents occurred. In both cases, the involved controllers anticipated the problem, were adequately prepared, and responded in time to ensure the separation was maintained. After the Vancouver supervisory staff became aware of the repetitive nature of this problem, they took action to ensure that adequate initial separation would be provided, and they issued operations letters in both the Vancouver Area Control Centre (ACC) and the Vancouver tower. Those letters laid out a plan based on what was coordinated between Nav Canada and the airline companies that were operating the Beechcraft 1900D.

Twenty-six days after this occurrence, a similar loss of separation was reported in Calgary, again involving a Beechcraft 1900D departing behind a DHC-8 (Transport Canada CADORS No. 97C0345). Nav Canada conducted a preliminary investigation into this Calgary event; there were no formal reports to other units regarding the results of that investigation.

## *Analysis*

The Beechcraft 1900D aircraft was new to the Vancouver area, and air traffic control personnel were not yet familiar with its performance characteristics. The tower controller noted, on the flight data strip, that GLR738 had filed a slightly slower cruise speed than ABL819. Based on that information, he judged that GLR738 could depart with about minimum spacing from the preceding aircraft. As a result, he released GLR738 with an initial spacing of about 3¼ nm, just above the separation standard of 3 NM.

After being released by the tower, GLR738 took off from runway 26L, accelerated rapidly, and began a steep climb profile. By the time the crew of GLR738 had contacted the departure controller, the Beechcraft 1900D's climb speed was about 40 knots faster than that of the preceding DHC-8, and the initial spacing that had been provided by the tower had eroded.

Three miles ahead, ABL819 had drifted south of the extended runway centre-line while tracking west from the airport. When the crew of ABL819 reached 3,000 feet, they initiated a right turn to 335° in accordance with their clearance; that northbound turn, coupled with the aircraft's south offset from the runway centre-line, caused the flight paths of ABL819 and GLR738 to converge, and further reduced the spacing between the two aircraft.

The departure controller was not anticipating a separation problem immediately after take-off and had very little time to recognize and react to the high closure rate. When he became aware that a loss of separation was occurring, he attempted to apply speed control to stabilize the situation. The controller did not attempt to level the Beechcraft 1900D at 2,000 feet because, in his judgement, the separation would be re-established more quickly by allowing the aircraft to continue the climb rather than by levelling or descending it.

Some controllers were previously aware of problems related to the Beechcraft 1900D's initial climb profile. These prior situations had not been formally reported so the repeat nature and impact of the problem was not captured by the Nav Canada reporting system; therefore, not all controllers were aware of the situation.

Nav Canada supervisors at Vancouver were quick and effective at resolving the Beechcraft 1900D separation

problem at a local level. Operations Letters were disseminated in both the ACC and the tower to ensure controllers were aware of the performance characteristics of the Beechcraft 1900D, and the resolution of the initial spacing was coordinated with local carriers that are using the new model Beechcraft 1900D . However, information related to this local problem, and its regional fix, was not disseminated within the Nav Canada network.

## *Findings*

1. The tower controller is required to judge the initial spacing between successive IFR departures; other than operational experience, the controller has limited data on which to make this judgement.
2. The tower controller was unaware of the initial climb performance of the Beechcraft 1900D and based its initial separation from the preceding aircraft on a comparison of their en route speeds; these speeds were not representative of the aircraft's initial climb profile.
3. GLR738 was given no climb-rate restrictions, and the pilot allowed the aircraft to accelerate to about 190 knots after take-off; this higher speed caused the aircraft to close rapidly on the preceding DHC-8.
4. The departure controller was not anticipating a separation problem immediately after take-off and, when the Beech 1900D took off, the controller had very little time to recognize and react to its high closure rate with the preceding aircraft.
5. Although other controllers had seen similar “run-down” events, the Nav Canada reporting systems were unable to capture this data before the loss of separation incident occurred.
6. Once aware of the repetitive nature of the problem, Nav Canada supervisory personnel were quick and effective in resolving the issue at a local level.
7. Information related to this local problem, and its regional fix, was not disseminated between the Nav Canada units.

## *Causes and Contributing Factors*

The departure controller had insufficient time to recognize and react to an unexpected high-overtake situation immediately after take-off. Contributing to this occurrence was a lack of awareness, by the involved controllers, of the initial climb performance capabilities of the Beechcraft 1900D.

## *Safety Action*

### *Safety Action Taken*

The Vancouver ACC and Tower supervisors issued operations letters to resolve the problem of initial spacing

for the Beechcraft 1900D. Those letters were based on a plan that was coordinated between Nav Canada and the airline companies that are operating the Beechcraft 1900D.

Central Mountain Air has instructed its pilots to adhere to a 160 knot climb speed when following DHC-8 aircraft.

Nav Canada has developed and implemented a new reporting system and database effective January 1, 1998; this new system will allow the company to conduct better trend analysis and to identify system deficiencies.

*This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board, consisting of Chairperson Benôt Bouchar, and members Maurice Harquail, Charles Simpson and W.A. Tadros, authorized the release of this report on 10 September 1998.*