

AVIATION OCCURRENCE REPORT

LOSS OF SEPARATION - NO RISK OF COLLISION

BETWEEN CANADIAN REGIONAL AIRLINES LTD.

DE HAVILLAND DHC-8-300A C-FTAK

AND

VANCOUVER PROFESSIONAL FLIGHT CENTRE

CESSNA 172M C-GHNV

VANCOUVER, BRITISH COLUMBIA 15 NM S

16 MAY 1997

REPORT NUMBER A97P0133

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.

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Summary

The Cessna 172 departed Boundary Bay airport, British Columbia, on an instrument flight rules (IFR) flight to Nanaimo and climbed to 2,000 feet above sea level (asl) in accordance with a clearance issued from the Vancouver departure controller. About the same time, a Canadian Regional de Havilland DHC-8, flight number 1360 (CDR1360), was inbound to Vancouver from Victoria at 3,000 feet asl and was nearing Boundary Bay. CDR1360 was operating IFR under the control of the Vancouver arrival controller, and the Cessna was operating IFR under the control of the Vancouver departure controller; the Cessna 172 departure clearance had not been coordinated with the Vancouver arrival controller. The arrival controller saw the Cessna 172 in level flight at 2,000 feet asl and assumed that it was operating under visual flight rules (VFR). The arrival controller issued a clearance to CDR1360 for a visual approach to runway 26 right, with a restriction to maintain 2,500 feet until established on final approach. CDR1360 descended out of 3,000 feet and passed $\frac{1}{2}$ to $\frac{3}{4}$ nautical miles (nm) behind, and about 500 feet above the Cessna 172, and both aircraft were in level flight as they passed. The separation standard required is 3 nm or 1,000 feet vertically. There was no risk of collision.

Ce rapport est également disponible en français.

Other Factual Information

At the time of the incident, the Vancouver area control centre (ACC) terminal specialty was operating with the following five control positions open: arrival; departure; data; VFR Terminal Area; and, coordinator. The terminal specialty was short two staff members at the time of the occurrence, and the supervisor was attempting to schedule relief breaks for the various control positions. The arrival position was being used to conduct training with a qualified on-job-instructor (OJI) remaining responsible for the position, while overseeing the actions of the trainee. During on-job-instruction, the attention of an OJI must be divided between monitoring information on the radar scope and monitoring the student's actions. Throughout a training session, it remains the responsibility of the OJI to ensure that all control actions are taken in accordance with approved standards and procedures. In addition to his control responsibilities, the OJI must determine when would be the best time to make a teaching point with the student, or to debrief some situation that they may have recently encountered. This range of activities requires high levels of attention and vigilance as well as an ability to effectively manage available time. However, human attention is a limited resource, and an OJI will not be able to adequately process as many information sources, in a divided attention situation, as he could otherwise process in a routine control situation. The air traffic services (ATS) network attempts to mitigate this risk by directing that all control activities are to take precedence over training functions.

There are several small airports in the vicinity of the Vancouver International Airport (VIA) and movements to and from these airports must be integrated into the VIA traffic flow. Boundary Bay is one of these small airports and is located about 10 nm southeast of VIA. The Boundary Bay airport has a control zone that extends out to 3 nm and up to 1,500 feet.

The runway in use at VIA, at the time of the incident, was runway 26. When runway 26 is in use, the Boundary Bay control zone underlies the Vancouver arrival controller's airspace. Under these conditions, the Vancouver terminal specialty procedures, Article 350.3, require that any IFR departures out of Boundary Bay be controlled by the arrival controller. Changes can be made to a published procedure, but these changes must be coordinated between the involved controllers. In this incident, article 350.3 of the terminal procedures was not followed; it was the departure controller who received the flight data strip for the Cessna 172 and planned to control the aircraft from the departure position. Under these circumstances, because the departing aircraft would be required to enter the arrival controller's airspace, it was necessary to coordinate the flight with the arrival controller. Information obtained during interviews following this occurrence showed that this work practice was not uncommon, and that the procedural defence provided by article 350.3 was routinely being circumvented by an internal coordination between the departure and arrival controller.

Article 300.2 of the Vancouver terminal specialty procedures states, in part, that "coordination is the sole responsibility of the coordinator...and shall not be initiated by other control positions." In this incident, the departure controller informed the coordinator about the departing Boundary Bay aircraft, and the coordinator provided a release authority for the flight. The coordinator was then required to inform the arrival controller about the Boundary Bay departure; however, the coordinator had noticed that the arrival controller was busy debriefing his trainee about another issue, and, because he was aware that there is often a delay of up to 10 minutes between the time of release and the actual takeoff time, the coordinator decided that it would be more effective to pass information regarding the Boundary Bay departure after the aircraft was airborne.

At this point, the supervisor returned to the terminal specialty from a break and initiated several position changes to allow some relief for the controllers. As one of these changes, the coordinator was moved to the departure control position. During the hand-off, the outgoing coordinator omitted to brief his replacement about the un-coordinated departure from Boundary Bay.

A position hand-off guideline is posted at each control position and is available for use as a memory aid when transferring the responsibility of a control sector to another controller. The first item on the hand-off guideline requires the departing controller to brief on “potential conflicting, and arrival/departure traffic information...”. The published hand-off guideline was not used by the departing coordinator when he was relieved. Instead, he used a mental checklist as the basis for covering the essential items of information; the resultant briefing did not include information related to the un-coordinated Boundary Bay departure and the potential conflict that it could cause. It is generally accepted by the terminal controllers and supervisors interviewed, that use of this type of formal job-aid is not essential, and that the use of a mental checklist is adequate.

There were no visual cues or job aids at the coordinator’s work station that would have highlighted that the coordination of the Boundary Bay departure had not been completed. As a result, the incoming coordinator was forced to rely on the memory and thoroughness of the departing coordinator to update him on the expected activity from Boundary Bay.

Air traffic control (ATC) use various visual displays to communicate information that will enable a controller to make decisions or take action. In the design of an ATC display, it is important that the symbols used be easily recognized and understood. Additionally, it is important that these symbols are interpreted in a consistent way by all controllers, otherwise there may be an elevated risk of error if the same symbol has one meaning for one controller but a different meaning for another.

In the Vancouver ACC, there is no consistent, single method of identifying a VFR flight using the information provided in the aircraft’s data tag. In some circumstances VFR flights may be assigned an abbreviated identifier; or they may be assigned a full identifier with a “V” included in a separate field in the tag; or, occasionally, they may be assigned a full identifier, without the “V”, in which case they may be distinguishable as VFR aircraft by noting the controller’s jurisdiction symbol (CJS). On the other hand, IFR flights are consistently assigned full 5-letter identifiers to make them distinguishable as operating IFR. The Cessna 172 departing from Boundary Bay had displayed an aircraft identifier of C-GHNV.

When the Cessna 172 departed from Boundary Bay, the departure controller believed that the data tag clearly indicated it was an IFR flight because of its full 5-letter data tag, coupled with the departure controller's CJS. When the aircraft reached 2,000 feet agl, the departure controller overheard the arrival controller discussing with the trainee both the presence of the Cessna 172 and the wake turbulence separation requirements that would have been relevant between it and CDR1360. As a result, the departure controller concluded that it would be unnecessary to point the aircraft out, or to inform the arrival controller that the Cessna 172 was operating under IFR.

The Vancouver terminal specialty is physically located near the main entrance to the operations room. Space is limited, and all control positions are situated near, or adjacent to, each another. It is common in this environment for one controller to observe and overhear the activities taking place at another control position. In general, the close proximity of the control positions appears to have influenced the development of a number of informal work practices; communication between work stations is often accomplished without the use of the ACC interphone system, and some controllers are apparently adjusting their work practices based on activities that are being conducted at other control positions. The departure controller did not hear the arrival controller issue the approach clearance for a visual approach to runway 26 right with a restriction to maintain 2,500 feet until established on final approach to CDR1360, but did note that CDR1360 had begun a descent. He quickly interceded to inform the arrival controller of the problem.

Analysis

The coordinator did not immediately inform the arrival controller about the impending departure out of Boundary Bay. The coordinator's duties do not state specifically when that coordination must occur. In this incident, the coordinator was aware that the OJI had been debriefing the trainee and decided that he would delay the coordination until the Cessna 172 was airborne. This decision to delay the coordination appears to be based on an intent to reduce interruptions to the OJI, thus aiding in the training of the student. In effect, the coordinator's actions were adversely influenced by his intent to facilitate training.

The terminal specialty was two staff members short, and the supervisor was attempting to schedule relief breaks for the controllers. These changes are routine and necessary to provide rest to the controllers throughout their shifts. Hand-off briefings are required during all position changes, and a checklist is available at each position to aid in the transfer of essential information between controllers during these changes. Because the use of the published hand-off guidelines, in general, is not considered essential, controllers consider the mental checklist to be adequate. In this instance, the outgoing coordinator omitted to brief his replacement about essential information related to the un-coordinated departure out of Boundary Bay.

Because there were no other visual cues or job aids at the coordinator's work station that could highlight the fact that the coordination had not been completed, the incoming coordinator was forced to rely on the memory and thoroughness of the departing controller to update him on the expected activity out of Boundary Bay airport. This type of situation results in a passive rather than active transfer of information, reduces defences that rely on redundancy, and increases the risk of error.

After being relieved as coordinator and assigned to the departure control position, the controller again became aware that he had not completed the coordination action regarding the Boundary Bay departure. However, because he was now controlling that aircraft, he decided to monitor the situation and deal with any conflicts as they may develop. In effect, however, the departure controller was routing one of his aircraft through the arrival controller's airspace without having first coordinated this action.

As the Cessna 172 climbed to 2,000 feet, the departure controller overheard the arrival controller discussing, with the trainee, both the presence of the aircraft and the wake turbulence requirements that were necessary between it and CDR1360. This information fortified the departure controller's mental model that the arrival controller was aware of the aircraft and was handling the situation, with reference to the arriving CDR1360.

The departure controller based his actions on a belief that the data tags associated with specific aircraft are displayed in a way that clearly distinguishes whether the aircraft is operating under visual or instrument flight rules. However, the arrival controller was aware of numerous exceptions to the way the data is displayed and, as a result, did not use the display format as an indicator of a flights operating rules; rather, he relied more heavily on being informed in advance that IFR aircraft would be entering his airspace.

In this incident, the arrival controller was aware of the presence of the Cessna 172. However, because he had not been informed that an IFR aircraft would be entering his airspace, he concluded that the aircraft was a VFR flight, operating above the Boundary Bay control zone. Although the display indicated a full data block with the departure controller's CJS, this information was apparently not compelling enough for him to recognize the developing conflict. It is also possible that the controller's ability to actively monitor all aspects of the arrival control position was degraded by an increased workload brought on by his responsibilities and activities as an on-job-instructor.

Based on a compelling mental model that the Cessna 172 was operating under VFR, the arrival controller provided an approach clearance to CDR1360 that allowed the aircraft to descend to 2,500 feet; that altitude would provide a minimum spacing of 500 feet between the inbound IFR flight and what he perceived to be a VFR aircraft. The arrival controller's concerns related to wake turbulence separation requirements were discussed with the trainee and resolved by ensuring that CDR1360 passed behind the Cessna 172.

A loss of separation did occur, but there was no risk of collision because a minimum of 500 feet of vertical spacing had been assured by the clearance and because CDR1360 passed behind and clear of the departing Cessna 172.

Findings

1. The arrival position was being staffed by one qualified controller and a trainee; in addition to his control responsibilities, the arrival controller was acting as an on-job instructor (OJI).
2. **The coordinator did not inform the arrival controller about the Cessna 172 departing Boundary Bay airport.**

3. Because the outgoing coordinator relied on a mental checklist during the hand-off briefing to the incoming coordinator, essential information regarding the Cessna 172 was omitted.
4. There were no visual cues or job aids at the coordinator's work station that would have highlighted that the coordination had not been completed.
5. There is no consistent, single method of identifying a VFR flight using the information provided in the aircraft's data tag.
6. The arrival controller believed that the Cessna 172 was operating VFR and issued a clearance to CDR1360 that allowed the spacing between the aircraft to be ½ to ¾ nm and about 500 feet.
7. The procedural safeguard provided by terminal procedures, article 350.3, was routinely being circumvented by an internal coordination procedure between the departure and arrival controllers.

Causes and Contributing Factors

A loss of separation occurred because the arrival controller issued a clearance to CDR1360 that allowed the separation to reduce below 1,000 feet and 3 nm between CDR1360 and the Cessna 172. Contributing to this loss of separation were an incomplete departure coordination, an incomplete hand-off briefing, inconsistent interpretation and use of data tags between controllers, the use of local work practices that are not consistent with published procedures, and the arrival controller's belief that the Cessna 172 was flying under VFR.

Safety Action Taken

The following action was taken by Nav Canada after the occurrence:

1. An Operations Bulletin was issued restating and emphasizing the coordination required for Boundary Bay departures when runways 26 R and L are active;
2. The position hand-off guidelines, previously found on an Operational Information Display System (OIDS) page, have been added to the Video Information Display System (VIDS) as a screen saver for easier access; and,

3. In response to the lack of visual displays to the controllers informing them of Boundary Bay traffic, flight data strips are now generated for both the Arrival and Departure positions. Controllers are directed to post these strips until the aircraft is clear of their airspace.

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board, consisting of Chairperson Benoît Bouchard, and members Maurice Harquail, Charles Simpson and W.A. Tadros, authorized the release of this report on 26 August 1998.