

Transportation Safety Board
of Canada



Bureau de la sécurité des transports
du Canada

AVIATION INVESTIGATION REPORT

A03O0213



LOSS OF SEPARATION

NAV CANADA
TORONTO AREA CONTROL CENTRE
TORONTO, ONTARIO
05 AUGUST 2005

Canada

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 Investigation Report

Loss of Separation

NAV CANADA
Toronto Area Control Centre
Toronto, Ontario
05 August 2003

Report Number A03O0213

Summary

American Airlines Flight 183 (AAL183), a Boeing 767, was on a west-northwesterly heading, en route from Boston to San Francisco at flight level (FL) 350. American Airlines flight 581 (AAL581), a Fokker 100, was on a south-southwesterly heading, en route from Montreal to Chicago at FL350. AAL183 responded to a traffic alert and collision avoidance system (TCAS) resolution advisory (RA) when the aircraft were approximately 5-6 miles apart. The flight crew followed the TCAS instructions to climb. The Toronto Area Control Centre controller was advised immediately of the manoeuvre. The controller then advised AAL581 to descend. AAL581 also reported a TCAS RA. The aircraft passed with approximately 1200–1300 feet of vertical spacing in airspace where 2000 feet vertical or five miles radar separation is required.

Ce rapport est également disponible en français.

Other Factual Information

Oakville sector is part of the west high specialty of Toronto Area Control Centre (ACC). Other sectors in the specialty are Centralia, which controls traffic from FL 240 to FL 290 immediately below Oakville, and Lucan sector, which controls traffic at FL 370 and above, immediately above Oakville. The Lucan sector was combined with Oakville at the time of the occurrence (Appendix A). The fourth west high sector is Mitchell, to the north of Oakville. The Oakville radar controller is responsible for sequencing all traffic flying through the west high specialty destined for Chicago. All equipment was reported to be operating as required.

The staffing complement for the west high specialty at the time of the occurrence consisted of six controllers plus the specialty supervisor. In the period leading up to the occurrence, the Mitchell, Centralia, and Oakville sectors were staffed by radar controllers. One controller, who was also the specialty supervisor, was dividing his time performing the data duties for the three sectors, Mitchell, Centralia and Oakville since three controllers had been sent on a break to take advantage of the relatively quiet interval between 1000 and 1100¹. The data controller was unable to provide as much support to the Oakville radar controller as may have been required by the traffic situation. At 1101, approximately three minutes before the loss of separation, a new data controller relieved the supervisor who had been occupying the data position during breaks. The replacement data controller was briefed by the supervisor on issues related to the Oakville data board. The replacement data controller reviewed the information on the board but did not have the opportunity to review the radar situation prior to being advised by the radar controller of the loss of separation.

Coordination for aircraft travelling between sectors in Cleveland and Toronto has to take place before the aircraft cross the common boundary so that flight data strips can be placed in the appropriate position for use by the sector radar controller before the transfer of control. The Oakville Sector Manual, articles 104.1 and 104.3, specify that the duty of passing and receiving control estimates and flight data with adjacent sectors or facilities belongs to the sector data controller, when that position is staffed.

There are circumstances, however, in which the radar controller must be and is fully able to perform coordination and hand-off duties. It was discovered during the investigation that the necessary pre-coordination for traffic between Cleveland and Toronto is often omitted, leading to numerous near simultaneous "estimate-hand-offs". West high supervisors have talked directly with their counterparts in Cleveland centre in an effort to ensure compliance with the coordination requirement; however, the simultaneous passing of the estimate and coordination of the hand-off continues to occur. This can present a significant additional distraction for the radar controller, particularly when working alone in the sector and dealing with several such situations simultaneously. NAV CANADA management is also aware of this problem.

¹ All times are eastern daylight time (Coordinated Universal Time [UTC] minus four hours) unless otherwise noted.

All hand-offs of aircraft between Toronto and Cleveland are performed manually, requiring the identification and confirmation of the required information concerning the position, altitude, and transponder code of each aircraft. This is accomplished by means of a position point out, a confirmation of the aircraft altitude and a confirmation of the secondary surveillance radar (SSR) code carried by the flight. The correct code automatically correlates the aircraft identification with flight plan information held in the Toronto data base and assigns the aircraft call-sign to the radar target on the radar display. As with traffic flying into the Cleveland sector, if the pre-coordination has not been completed at some prior period and the radar controller is performing both the radar and data tasks for the position, he must divert his attention from the radar display to find the flight data strip in the pending strip bay, confirm the information, and insert the flight data strip in the appropriate location in the active strip bay. There are also times when the SSR code is different from that held in the data base. The controller must then perform a flight plan alteration to assign a new and appropriate code to the target. In the period of approximately seven minutes leading up to the loss of separation, the attention of the data controller, who was dividing his time between three sectors, was diverted to other tasks. The Oakville radar controller had to deal with the duties of both the radar and data positions.

At 1056, AAL581 was about 40 miles northwest of Toronto at FL350 following jet route 553 en route to the Peck VOR (very high frequency omni-directional range). To create the required longitudinal spacing for the sequence of aircraft bound for Chicago, the crew was asked to steer a heading of 200 degrees. At the time, AAL183, also at FL350, was south of Toronto following jet route 63 on a northwesterly heading.

At approximately 1058, the Oakville radar controller received an estimate and hand-off for a flight through the Oakville sector from Chicago. The flight had not been previously coordinated, so the radar controller searched for and found the flight data strip in the pending bay, annotated it as required, and posted it in the active traffic bay. As well, the flight had been assigned an SSR code in United States airspace; the code was not held in the Toronto flight plan data base. The assigned code was permanently reserved in Toronto ACC for another use, resulting in the aircraft target being tagged with the wrong call sign. The radar controller was forced to perform a manual change to assign an alternate code. Shortly thereafter, at approximately 1100, a second flight was handed off and again the radar controller had to alter the SSR code. At about 1103, the second aircraft, well to the southwest of the position of the approaching conflict, requested a diversion to avoid the tops of clouds; the Oakville radar controller could not approve this request.

At 1103 there were 17 radar targets (Appendix A) on the Oakville radar display with the Oakville radar controller jurisdiction symbol (CJS). These aircraft were in the process of checking-in on the Oakville radar frequency, of being handed-off to Cleveland, or of being vectored by the Oakville controller to provide spacing for the Chicago flow. At 1104, approximately 40 miles northeast of London, Ontario, AAL183 advised that they were climbing in response to a TCAS RA.

At the time of the incident, the automated conflict alert software had not yet been certified for the Oakville sector. The conflict alert software has since been installed and is operational in Toronto ACC from 14 000 feet and above, excluding terminal airspace.

Analysis

The Oakville radar controller was distracted from the evolving conflict situation by the various demands on his attention created by the requirement for him to perform both the radar and data controller duties during a busy time. Those combined duties are manageable but are routinely performed by radar controllers only during periods of reduced traffic. However, the extra workload created by near simultaneous receipt of "estimate-hand-offs" and the requirement to change a number of SSR code assignments for aircraft entering his sector was enough to capture the controller's attention long enough to permit the potential conflict to develop into a loss of separation. Only the TCAS warning to the crew of the involved aircraft prevented a possible mid-air collision.

Findings as to Causes and Contributing Factors

1. The Oakville sector radar controller did not detect that the routes of AAL183 and AAL581, at the same altitude, conflicted until advised by the crew of AAL183 of the TCAS RA. By that time, the standard instrument flight rules separation had been lost.
2. The Oakville sector radar controller was performing the radar controller duties as well as the majority of the duties usually performed by the sector data controller. This contributed to the heavy workload and diverted the controller's attention away from the radar display.
3. The radar controller's need to deal with the extra work created by the "estimate-hand-offs", in addition to his other duties, captured the controller's attention for a prolonged period time which reduced his ability to detect the impending conflict between AAL183 and AAL581.

Findings as to Risk

1. The provision of attentive flight monitoring to active traffic on the radar display is jeopardized when a controller is performing the duties of both the data controller and the radar controller.
2. While efforts have been made by west high supervisors to ensure compliance by Cleveland centre controllers with coordination requirements, "estimate-hand-offs" continue to occur and can pose a significant additional distraction.

Safety Action

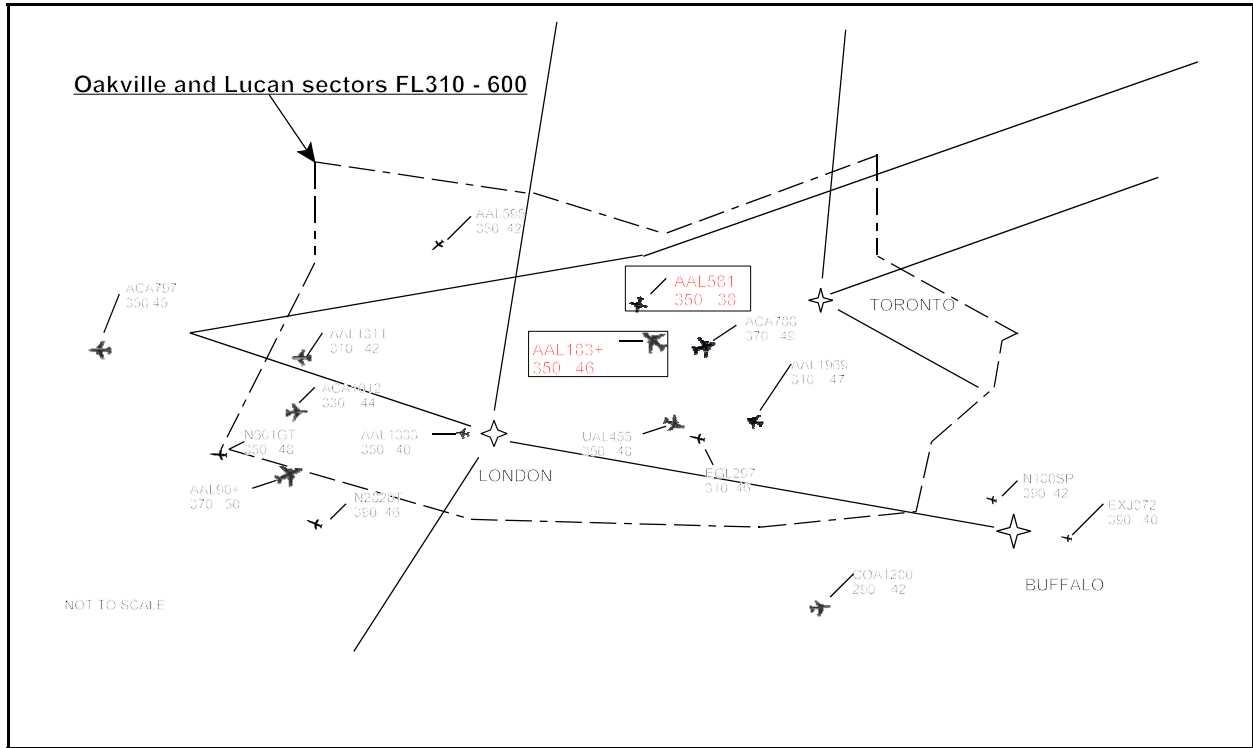
Since this occurrence, conflict alert has become operational in Toronto ACC at 14 000 feet above sea level and above, excluding terminal airspace.

NAV CANADA has added one controller on the day shift to avoid the situation in which one controller works more than one data board.

Toronto ACC and Cleveland ARTCC (Air Route Traffic Control Center) held discussions which resulted in the staffing of additional full-time day and evening data controllers in both units to manually pass hand-off data.

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board authorized the release of this report on 16 September 2004.

Appendix A - Oakville Traffic Situation at 1103



Aircraft carrying Oakville controller jurisdiction symbol in and near Oakville and Lucan sectors at 1103

- | | |
|---------|--------------------------------------|
| AAL581 | - American Airlines flight 581 |
| AAL183+ | - American Airlines flight 183 heavy |
| AAL595 | - American Airlines flight 595 |
| AAL1311 | - American Airlines flight 1311 |
| ACA797 | - Air Canada flight 797 |
| ACA1012 | - Air Canada flight 1012 |
| N601GT | - Private |
| AAL90+ | - American Airlines flight 90 heavy |
| N282OT | - Private |
| AAL1333 | - American Airlines flight 1333 |
| UAL455 | - United Airlines flight 455 |
| ACA788 | - Air Canada flight 788 |
| AAL1969 | - American Airlines flight 1969 |
| EGL297 | - Eagle flight 297 |
| COA1280 | - Continental flight 1280 |
| N180SP | - Private |
| EXJ372 | - Executive Jet 372 |