Transportation Safety Board of Canada

Bureau de la sécurité des transports du Canada

AVIATION INVESTIGATION REPORT
A04O0092

RISK OF COLLISION

NAV CANADA
LONDON INTERNATIONAL AIRPORT 5 nm N
LONDON, ONTARIO
07 APRIL 2004

Canada

Aviation Investigation Report

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Summary

WestJet flight 107 (WJA107), a Boeing 737-200 aircraft, was on a scheduled flight from London, Ontario, to Winnipeg, Manitoba. The flight was cleared for take-off from Runway 33 on a London One standard instrument departure, requiring a climb on runway heading to 4000 feet above sea level (asl). The tower controller advised that there was visual flight rules (VFR) traffic approximately 8 nautical miles (nm) to the northwest at an altitude of 3500 feet asl. WJA107 took off at approximately 1433 eastern daylight time and contacted the Toronto area control centre (ACC); again, WJA107 was advised of VFR traffic. WJA107 then received a traffic advisory on the traffic alert and collision avoidance system, followed by a resolution advisory to monitor vertical speed. The aircraft was levelled at 3000 feet asl and, shortly thereafter, the ACC controller advised WJA107 to maintain 3000 feet. WJA107 had visual contact with the traffic, a Cessna 172 aircraft, as the two aircraft passed. Radar data indicate that at 1434:53 the two aircraft flew within 0.6 nm laterally and 500 feet vertically of each other.

Ce rapport est également disponible en français.

Other Factual Information

The visual flight rules (VFR) aircraft involved was a Cessna 172, registration C-GFEJ, on a training flight with an instructor and student on board. With authorization from the London control tower, the Cessna was conducting a simulated instrument flight rules (IFR) approach to Runway 15, opposite to the active runway, Runway 33. The Cessna crossed the London non-directional beacon (NDB) outbound for the approach at 1427:01 eastern daylight time.[1]

At 1431:24, the tower controller advised the Cessna that a Boeing 737 would be departing Runway 33 shortly. The tower controller requested that the Cessna pilot maintain the minimum approach speed and avoid cutting the corner on the turn inbound to the airport. This would delay the turn inbound in an effort to increase spacing with WJA107 (see Appendix A).

At 1431:51, the tower controller advised WJA107 of a Cessna 172, "TCAS[2] traffic," 8 miles to the northwest at 3500 feet above sea level (asl).[3] The crew of WJA107 acknowledged the information. On this model of Boeing 737, TCAS information is not displayed to the crew until after the aircraft is airborne. At the time this traffic information was provided to WJA107, the Cessna was on a procedure turn inbound for the instrument landing system approach to Runway 15.

At 1432:27, WJA107 was cleared for take-off on Runway 33. The standard instrument departure called for a climb on runway heading to 4000 feet, with a note to expect radar vectors. At this time, the Cessna was approximately 8 nm northwest of the airport at 3500 feet, heading toward the inbound track for Runway 15. The tower controller did not advise WJA107 or the area control centre (ACC) controller that the Cessna was conducting an approach to Runway 15. After WJA107 departed, the tower controller attempted to provide further spacing between the two aircraft by instructing the Cessna to continue through the final approach course rather than turn inbound.

At 1433:43, WJA107 contacted the ACC controller to report leaving 1700 feet for 4000 feet. In the climb, the aircraft passed through intermittent cloud conditions. The ACC controller radar identified WJA107, issued a clearance to 11 000 feet, and cleared the aircraft to proceed directly to the APNEL intersection. The direct track to APNEL required a right turn of approximately 20 degrees. The ACC controller did not advise the tower controller of the route change, nor was this required.

At 1434:08, the ACC controller, who had spotted the VFR traffic on his radar display, advised WJA107 of traffic 3 miles directly ahead at 3500 feet. The crew of WJA107 saw the traffic on the TCAS display, and shortly thereafter received a traffic advisory, followed quickly by a resolution advisory (RA) to monitor vertical speed. The crew reported the RA to the ACC and levelled the aircraft at 3000 feet. A few seconds later, the ACC controller advised WJA107 to level at 3000 feet. WJA107 was flying through cloud tops and was at times in cloud. Because of the

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1 All times are eastern daylight time (Coordinated Universal Time minus four hours).

2 TCAS stands for "Traffic Alert and Collision Avoidance System."

3 All altitudes are above sea level.

potential conflict with the Cessna, WJA107 continued the right turn beyond the heading to the APNEL intersection. The crew saw the Cessna traffic to their left, 500 feet above them and in close proximity. After receiving a clear-of-conflict on the TCAS display, WJA107 continued the climb on course.

At 1434:15, in an effort to ensure that the Cessna would clear WJA107's initial departure path, the tower controller instructed the Cessna to turn left to a heading of 090 degrees. The tower controller was unaware that WJA107 had been instructed to make a right turn on course, and the heading of 090 degrees actually increased the risk of collision by increasing the time the two aircraft were in conflict.

At 1434:26, the ACC controller learned that the Cessna pilot had reported WJA107 in sight and that the Cessna had remained at 3500 feet throughout the simulated approach. The two aircraft passed with 500 feet vertical spacing and 0.6 nm lateral spacing, on a converging course, 4 nm north of London International Airport. WJA107 was still in the London Class D control zone at 3000 feet, and the Cessna was in Class E airspace at 3500 feet. There is a requirement for air traffic control (ATC) to provide traffic information, workload permitting, but not conflict resolution between IFR and VFR traffic operating entirely in Class E airspace. In this incident, both aircraft had authority to operate in the control zone.

The tower controller was controlling seven aircraft in the 10-minute period before the incident, including the Cessna on the reciprocal approach, WJA107 departing Runway 33, and a helicopter flying left-hand circuits to the button of Runway 09. The workload was considered moderate with some complexity.

At the time of the occurrence, the staffing level in the London tower was in accordance with local procedures. The airport and ground positions were operational, with three controllers available for duty. The London tower is equipped with a radar display to assist the controller in maintaining situational awareness of aircraft operating in the vicinity of the airport.

The control zone at the London International Airport includes the airspace within a radius of 5 nm from the surface to 3000 feet, and is designated as Class D airspace. The *Canadian Aviation Regulations* (CARs) state that when air traffic control services are provided to aircraft flying in Class D airspace, they shall include traffic information and separation between IFR aircraft. The *Aeronautical Information Publication* expands on the procedures to be employed for aircraft flying in Class D airspace, including the following:

- a VFR aircraft must establish two-way radio communication with the appropriate ATC agency prior to entering Class D airspace,
- ATS separation is provided only to IFR aircraft; aircraft will be provided with traffic information, and
- conflict resolution will be provided between IFR and VFR aircraft, equipment and workload permitting.

The airspace surrounding the London control zone below 12 500 feet is designated Class E airspace in which ATC provides separation between IFR aircraft. There are no special communication requirements for VFR aircraft flying in this airspace, and the aircraft are not subject to air traffic control, except that ATC will provide traffic information, workload permitting. The flight path for the instrument approaches to the London International Airport are largely contained within Class E airspace, except for the final approach portion between the NDBs and the threshold of the runway. The weather-related requirements for VFR flight in controlled airspace (Class D and E) are as follows:

- the aircraft is to be flown clear of cloud and within sight of the ground,
- visibility must be not less than 3 statute miles (sm), and
- the distance from cloud must be at least 1 sm horizontally and 500 feet vertically.

The London International Airport is 912 feet asl. The weather at 1400 was as follows: wind 310° True at 10 knots, visibility 15 sm, cloud ceiling 1800 feet above ground level, altimeter 2989. At 1500, the weather was as follows: scattered cloud at 1500 feet above ground level, thin broken cloud at 20 000 feet, visibility 15 sm, altimeter 2989. The weather was improving, with fewer clouds and no ceiling. The Cessna pilot could maintain VFR but, at times, could not see the airport.

NAV CANADA management at the London International Airport has provided specific guidance in the *London Control Tower Unit Operations Manual* (UOM) to better manage VFR aircraft operations in Class D and E airspace in the vicinity of the airport. Specifically, the UOM states:

> (Controllers) shall not approve or shall cancel a simulated approach for a runway to be used by an IFR aircraft unless, through coordination with Toronto ACC, the position of the IFR aircraft can be determined and action is taken to ensure that conflict resolution is effected. At least 5 miles visibility and a ceiling that is at least 500 feet above the procedure turn altitude must exist before simulated approach operations may be conducted.

With respect to reciprocal operations, Section 4.15.6.2 of the London UOM states the following:

> When there is a simulated approach in progress on the reciprocal end of an active runway, there will be no IFR or high performance aircraft allowed to depart on the active runway until the simulated approach is completed or told to remain clear of the zone. Coordination with Toronto ACC, which allows for control action (e.g. a turn) to be taken to ensure safety is not jeopardised may be utilised.

The tower controller did not adhere to the above procedures.

To minimize the impact on other air traffic using the active runway, an informal but routine practice has been used at the London Airport to allow helicopters conducting training to fly circuits to the threshold of an out-of-wind runway. There are no written procedures for helicopter pilots or tower control staff to follow: headings, altitudes, traffic information, contingencies, and simultaneous operations with aircraft using the active runway.

The access to Taxiway B, leading to the threshold of Runway 09, is an uncontrolled taxiway. There are no procedures in place to ensure that other aircraft or vehicles do not infringe on the landing areas being used by helicopters. At the time WJA107 was cleared for take-off, a helicopter was on the ground on the threshold of Runway 09 with a valid touch-and-go clearance issued by the tower controller. The helicopter departed at the same time as WJA107. The tower controller did not provide traffic information to either aircraft about the operation of the other.

Air Traffic Control Manual of Operations (ATC MANOPS), paragraph 353.1, allows controllers to "issue take-off or landing clearance to a helicopter provided the operation takes place on the manoeuvring area," that is, a runway or a taxiway. The same paragraph also states, "because of their operational characteristics, it is not always necessary that helicopters adhere to the standard traffic circuit, land or take off on the same runway or follow the flight path used by fixed-wing aircraft."

The *Air Traffic Services Administration and Management Manual*, paragraph 211.2, states that managers "shall coordinate the development of unit procedures if helicopter operations are routinely carried out." Section 4.8 of the UOM describes helicopter operations at the London International Airport. It states that "arrivals/departures of helicopters will be to/from a runway only." There are no published guidelines or procedures for conducting helicopter circuits to an out-of-wind runway threshold at the same time as fixed-wing operations are being conducted from the active runway.

A London tower Operations Bulletin, 03-21 issued on 21 August 2003, titled "Exchange of Traffic Information," instructed controllers not to make reference to TCAS equipment when exchanging traffic information and, instead, to follow directions contained in the ATC MANOPS. The bulletin was scheduled to expire on 21 September 2003. It was written in response to information provided by NAV CANADA's head office to the London tower manager.

The manager of the London tower received management support from staff of NAV CANADA's Eastern Regional Office to review and revise existing procedures and to develop new ones. An ATC specialist from the regional office routinely conducted an analysis of operational unit recordings and provided the London tower manager with observations. In the London tower, there are no supervisory positions established, and the unit operations specialist position had not been staffed on a permanent basis for the previous two years. Proficiency checks and training were being carried out by operational controllers without direct operational oversight.

Analysis

Pilots flying in the vicinity of the London Airport can expect to receive varying levels of air traffic control (ATC) service, depending on the classification of the airspace within which they are flying. The primary roles of ATC are to prevent collision and to expedite traffic. Therefore, pilots expect that when they communicate with the London tower, they will receive instructions or clearances from the ATC to steer them clear of known traffic or, at a minimum, receive sufficient information to acquire the traffic visually so they can take appropriate action themselves.

When a pilot transitions from one class of airspace to another, there may be changes to the level of service, such as a change from control service to advisory, or vice versa. As a result, pilots may be under a misconception about how much information and/or control action is being provided by the ATC. They may come to expect a higher level of service from the ATC than is authorized for the particular class of airspace. At the same time, ATC personnel may, in some cases, expect pilots to take action on their own based on received traffic information and not wait for specific ATC clearances or instructions.

In this occurrence, the tower controller provided traffic information to both the instrument flight rules (IFR) departure (WJA107) and the visual flight rules (VFR) arrival (the Cessna 172). Based on the controller's view of a clear sky in the vicinity of the airport, he would have anticipated that the Cessna could maintain visual separation with the departing aircraft. The pilots of WJA107, on the other hand, expected the ATC to take the required action to provide a conflict-free departure path out of the control zone, especially in light of the instrument meteorological conditions encountered in the climb-out. Because the pilot of WJA107 was not informed that the Cessna was flying an opposite-direction simulated-IFR approach to Runway 15, he would not have been aware that the traffic mentioned to him earlier posed a risk of collision. The area control centre (ACC) controller also did not expect conflicting traffic to be on the departure path of WJA107 without prior coordination from the tower controller.

The tower controller passed traffic information to WJA107 about a VFR aircraft 8 miles to the northwest, using the term "TCAS traffic," contrary to locally published information contained in an earlier operations bulletin. The tower controller would not have been aware that TCAS information was not displayed in WJA107 until after the aircraft was airborne.

The position of Unit Operations Specialist had not been staffed at the London ATC unit for a considerable time. Therefore, there was limited support for the London tower manager who is responsible for overseeing the operation, reviewing or revising existing procedures, and developing new procedures. A Unit Operations Specialist on staff may have detected and corrected instances of routine use of non-conforming and ad-hoc procedures, including the following:

- The airport controller authorized a simulated IFR approach when the official 1400 weather was less than the prescribed limits. Although the conditions observed by the controller seemed adequate for the simulated IFR approach, there was no flexibility included in the published procedure for conducting this type of operation based on other than the official weather report.

- The tower controller did not follow published procedures for authorizing reciprocal approaches when there is an IFR departure planned, nor did the tower controller coordinate the simulated IFR opposite-end approach with the ACC controller.

- There was an informal local practice to accommodate helicopter training using the threshold of an out-of-wind runway to conduct circuits parallel to, and simultaneously with, traffic on the active runway. There were no published procedures, either for the control tower or the helicopter training school staff, to ensure that the appropriate level of safety had been factored into this type of operation.

Findings as to Causes and Contributing Factors

1. The tower controller did not inform WJA107 that the Cessna was conducting an approach to the opposite end of the departure runway.

2. The tower controller instructed the Cessna to fly eastbound through the on-course for Runway 15, not aware that the area control centre (ACC) controller had cleared WJA107 to turn to the right after departure. This increased the time the two aircraft remained in conflict.

3. The tower controller did not advise the ACC controller of a potential conflict on the departure path for Runway 33, which delayed the initiation of ACC control action to resolve the conflict between the two aircraft.

4. The Cessna pilot, while operating in Class E airspace and flying a simulated approach to Runway 15, received traffic information from the tower controller on a departure from Runway 33. The pilot took no action to avoid entering the departure path area.

Finding as to Risk

1. A number of published procedures were not followed by the tower control staff, and an ad-hoc helicopter circuit procedure had become the norm at the London International Airport. The tower manager did not have any supervisory personnel or a unit operations specialist to assist him to oversee the operation, to review or revise existing procedures, or to develop new procedures.

Other Findings

1. Pilots may not be aware of the differences in the air-traffic service that may be provided to them in different classes of airspace and may come to expect a greater-than-authorized level of service when in communication with an air traffic control facility.

2. Procedures published in the *London Control Tower Unit Operations Manual* require controllers to provide conflict resolution and impose restrictions to aircraft operating in Class E airspace, for which they have no authority to provide a control service.

Safety Action Taken

Since this incident, NAV CANADA has developed and implemented procedures detailing helicopter operations at the London International Airport. Local helicopter operators have been briefed on the procedures. As well, NAV CANADA has staffed the position of Unit Operations Specialist at the London control tower.

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board authorized the release of this report on 19 October 2005.

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Appendix A – Sequence of Events