AVIATION OCCURRENCE REPORT

RISK OF COLLISION

BETWEEN
AIR TRANSAT
LOCKHEED L-1011 C-FTNC
AND
INTER-CANADIEN
AÉROSPATIALE ATR 42 C-GXCP
QUEBEC VOR 19 nm SW
06 JUNE 1995

REPORT NUMBER A95Q0098

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

Air Transat flight TSC 234 took off from the Mirabel Airport around 00:01:00 Coordinated Universal Time (UTC) for a flight to Charles de Gaulle Airport, France. The initial route included a climb to flight level (FL) 280 on air route V316 to the Quebec VHF omni-directional range (VOR), then directly to the MIILS way-point, located 195 nautical miles (nm) east of the Quebec VOR. Inter-Canadien flight ICN 1647 from Bagotville, Quebec, was approaching the Quebec VOR in cruise flight on FL 200 to intercept air route V98 and proceed to Montreal.

At 42 nm from the Quebec VOR, TSC 234 was cleared to FL 290 and to proceed directly to MIILS. On FL 200 and 19 nm southwest of the Quebec VOR, TSC 234 executed an avoidance manoeuvre following a resolution advisory (RA) from the Traffic Alert and Collision Avoidance System (TCAS). At the same time, ICN 1647, which was about 19 nm southwest of the Quebec VOR, also received an RA from the TCAS and executed an avoidance manoeuvre.

Separation between the two aircraft was 300 feet vertically and 2.25 miles horizontally. Required separation was 1,000 feet vertically or 3 miles horizontally. The two crews visually observed one another during their avoidance manoeuvres.

Ce rapport est également disponible en français.

Other Factual Information

TCAS is an independent system designed to support the air traffic control system and complement the "see and avoid" concept. TCAS continuously scans the airspace around an aircraft and seeks a response from the transponders of nearby aircraft. TCAS monitors flight paths based on the responses from the transponders. The system generates a traffic advisory (TA) or resolution advisory (RA) when any flight path is going to enter the collision zone around the aircraft.

A TA is displayed 35 to 48 seconds from the time it is predicted that an aircraft will enter the collision zone. Traffic information includes the distance, bearing, and altitude of the other aircraft. The flight crew must use this information as an aid in visually locating the other aircraft to avoid conflict.

An RA normally consists of a vertical manoeuvre that must be executed to increase or maintain separation from the other aircraft. The RA is generated visually and audibly. It consists of a suggested correction to change the aircraft vertical speed or a suggested preventive measure to limit changes in vertical speed.

For control purposes, airspace is divided into different sectors. At the time of the occurrence, the Air Transat aircraft was to transit the Rawdon, Quebec, and Lévis sectors.

The Rawdon sector extends east of the Mirabel Airport to about 18 nm from the Quebec VOR. The sector also extends to the north and south of air route V316; flights are controlled up to FL 280.

The Quebec sector is bounded on the west by the Rawdon sector. It includes all of the Quebec Airport and extends further north, south, and east. In the Quebec sector, flights are controlled up to FL 280.

In the Lévis sector, flights are controlled at FL 290 and higher. This sector extends above the Rawdon and Quebec sectors and beyond.

On departing from Mirabel, TSC 234 contacted the Rawdon sector at 00:04:31. The aircraft was radar identified and cleared to FL 280. At 00:12:58, the Rawdon controller plotted the radar target with the Quebec controller, who accepted it. This procedure meant that the aircraft might enter the Quebec sector, but that radio communication was not transferred to the Quebec controller, although the Quebec controller was still responsible for ensuring proper separation. Meanwhile, at 00:13:48, ICN 1647 reported arriving at the Quebec VOR.

Flight TSC 234 was handed off to the Lévis controller when the aircraft was 43 nm west of the Quebec VOR at an altitude of 17,000 feet. In accordance with procedures, the Lévis controller was using a 5,000 feet altitude filter, which allowed him to observe aircraft only at FL 240 and higher; therefore, the Lévis controller was unable to see either TSC 234 or ICN 1647. At 00:13:32, the Lévis controller

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All times are UTC unless otherwise noted.

cleared TSC 234 to FL 290 and directly to MIILS, which requires a 12-degree right turn, in accordance with established procedures. The Lévis controller contacted the Quebec controller, who replied that he was verifying TSC 234. From that moment on, the two aircraft were on collision paths, and this triggered their TCAS around 00:16:37, according to radar data.

The Quebec controller stated that he did not think the aircraft could be in conflict. Believing that TSC 234 would continue as anticipated to the VOR, he had calculated that, given the closing speed of the aircraft and an assumed rate of climb of 1,000 feet per minute for TSC 234, vertical separation of the aircraft could not be less than 1,500 feet. He had also calculated that, when TSC 234 flew over the VOR, ICN 1647 would have already cleared it. The climb rate of TSC 234 was lower than the Quebec controller had anticipated because of high aircraft weight and high external temperature.

The Quebec controller was alone in the radio and data position while his co-worker was on break. He stated that, shortly before the occurrence, he performed an important coordination task with the Quebec tower due to the arrival of a medical evacuation flight on runway 06 while runway 24 was active. The controller's attention was focused to the east of the Quebec VOR, while the risk of collision was occurring southwest of the Quebec VOR. His workload was moderate with moderate to high complexity.

The Quebec controller was working his third shift since requalifying. He had spent the previous six months at the Montreal terminal. He was returning to his former position, but, during his absence, the upper limit of the Quebec sector had been raised from 17,000 feet to FL 280. The controller stated that, at the time of the occurrence, he was not familiar with overflights; he had not had specific classroom training on this subject but had received on-the-job training. The controller also said that he had previously managed overflights, although at lower speeds, when the Quebec sector airspace was limited to 17,000 feet.

Analysis

The air traffic controllers were qualified for the positions they occupied.

The Quebec controller had just requalified in his position and was familiar with all his duties. He acknowledged having previously managed, albeit at lower speeds, overflights at altitudes below 17,000 feet; however, he said he was not familiar with overflights because his airspace had been modified during his absence and it now extended up to FL 280.

The Quebec controller was alone when the workload suddenly increased. During the period prior to the risk of collision, the increased attention that the controller directed to coordinating the arrival of a medical evacuation flight at the Quebec Airport precluded his perceiving the risk of collision that existed between the two aircraft. In addition, although he was responsible for providing proper separation between the two aircraft, the controller accepted the hand-off of communications to the Lévis sector. Thus, the two

aircraft had to execute avoidance manoeuvres 19 miles southwest of the Quebec VOR following a TCAS resolution advisory.

Findings

1. Minimum separation between the two aircraft was not ensured by air traffic control.

2. The crews executed an avoidance manoeuvre following a TCAS resolution advisory.

3. The air traffic controllers were qualified.

4. At the time of the occurrence, the Quebec controller's attention was directed to coordinating the arrival of a medical evacuation flight at the Quebec Airport.

5. The Quebec controller was alone in the radio and data position while his co-worker was on break.

6. The Quebec controller was responsible for providing proper separation for TSC 234, but he was not in communication with the aircraft.

Causes and Contributing Factors

The Quebec sector controller did not ensure that minimum separation was maintained between the two aircraft. Factors contributing to the occurrence were the absence of direct communication, the sudden increase in workload due to the arrival of a medical evacuation flight, and the lack of a second controller at the position.

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board, consisting of Chairperson Benoît Bouchard, and members Maurice Harquail and W.A. Tadros, authorized the release of this report on 27 August 1996.

APPENDIX A

RISK OF COLLISION BETWEEN L-1011 (TSC 234) AND ATR 42 (ICN 1647)

L-1011 (TSC234) and ATR 42 (ICN1647)