

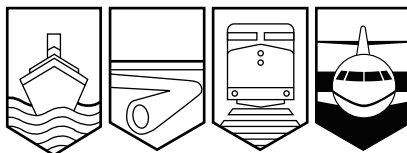
Transportation Safety Board
of Canada



Bureau de la sécurité des transports
du Canada

AVIATION INVESTIGATION REPORT

A02C0043



OPERATING IRREGULARITY

NAV CANADA WINNIPEG AREA CONTROL CENTRE

LA RONGE, SASKATCHEWAN 33 nm N

05 MARCH 2002

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

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Summary

Transwest Air Flight 203 (TW203), a Beech 1900D was en route from Stony Rapids to La Ronge, Saskatchewan. West Wind Flight 780 (WEW780), a Hawker Siddeley HS 748, was en route from Points North Landing to La Ronge. Both aircraft were operating under instrument flight rules (IFR) and would arrive in La Ronge within minutes of each other. At the time of the occurrence, Nav Canada did not provide low level radar service at La Ronge and procedural control was required to facilitate the approach and arrival of TW203 and WEW780.

At approximately 2031 Universal Coordinated Time (UTC), the crew of WEW780 advised Winnipeg air traffic control that they had departed Points North Landing at a time of 0003 UTC. This time was not correct and it was not checked for accuracy by the controller who received it. The flight progress strip for WEW780 was not properly sequenced for arrival at La Ronge and a separation plan was not established for the two aircraft. There was no loss of separation. However, safety was not assured and an air traffic control operating irregularity occurred.

Ce rapport est également disponible en français.

Other Factual Information

The Nav Canada Winnipeg Area Control Centre (ACC), North Specialty, is responsible for air traffic control of flights that operate in northern Saskatchewan, Manitoba, and Ontario. The specialty consists of several subsections or positions known as sectors. Depending on traffic levels, all sectors may be staffed. During low traffic levels, some sectors are combined. This report will focus on events which took place at the combined La Ronge/north low (north low) sector position of the Winnipeg North Specialty.

North low may be staffed by either one or two controllers. At times of lower traffic volumes, one controller assumes responsibility for both the radar and data positions. The radar position communicates with aircraft via radio, and where radar is available, monitors aircraft progress on a radar indication module. The data position is responsible for sequencing flight progress strips, computing and entering data onto the strips and into the computer, and communicating with other sectors within and outside the ACC. When one person fills both positions, he or she carries out all duties for the data and radar positions.

Until just before the occurrence, the duties of both radar and data positions in the north low sector were being performed by one controller. A position handover briefing was being conducted when West Wind Flight 780 (WEW780) first contacted the north low controller, and shortly thereafter a second controller joined the north low sector. A review of the company's documentation revealed that all personnel were adequately rested prior to this occurrence and were qualified to perform the duties assigned to them.

When flight crews file instrument flight rules (IFR) flight plans, information from the flight plan is entered into the national flight data processing system (NFDPS) computer. The computer uses this information and generates flight progress strips for use by controllers. Two strips for each aircraft were printed, one to provide the controller with departure and en route airspace information, the other for arrival information at the destination. The printed strips are slotted into plastic holders and placed in a pending, non-active bay on the flight data board until activated upon receipt of an estimate by the north low specialty controller. The active strip is then sequenced with others on the flight data board in order of arrival times.

The flight data board is divided into a number of sections headed by a fix designator. The objective is to post each strip depicting an aircraft's route under the most appropriate fix designator, so that potential conflicts can be more easily recognized and accurately assessed.

At 2007 UTC¹, the north low controller received, from Edmonton ACC, a Stony Rapids departure time of 2002 for Transwest Air Flight 203 (TW203). The north low controller then entered the departure time and an estimated time en route (ETE) for abeam Key Lake of 29 minutes on the departure flight progress strip and placed it under the Wollaston/Key Lake header. The controller also entered an ETE of 24 minutes on TW203's arrival strip and sequenced this strip under the La Ronge header of the flight data board. At 2028:35, the crew of TW203 advised Winnipeg ACC that they were passing abeam Key Lake en route to La Ronge (see Appendix A) at flight level (FL) 250. The north low controller entered the abeam Key Lake time on the TW203

¹ All times are Universal Coordinated Time (central standard time plus six hours) unless otherwise noted.

en route strip and calculated an estimated time of arrival (ETA) of 2054 for La Ronge. The level of air traffic in the sector was starting to increase from light to moderate at this time, and the complexity was judged to be moderate.

At 2031:22 the crew of WEW780 called Winnipeg ACC directly on the air traffic control frequency. The north low controller did not hear the call sign of the aircraft and asked the caller to repeat. The pilot of WEW780 stated that the flight had departed Points North at 0003 and was at 15 000 feet, 100 nautical miles north of La Ronge. In fact, WEW780 had departed Points North at 2003. The first north low controller had started a position handover briefing to the relieving controller and asked WEW780 to standby for a clearance. The first north low controller did not detect the time discrepancy and the second controller had not heard the radio communication between the pilot and the controller because he was waiting for the handover briefing to be completed prior to plugging in his headset.

The first north low controller interrupted the handover briefing and wrote the pilot reported departure time of 0003—without considering that this was about 3½ hours in the future—and aircraft position on the departure strip, and placed it in the bay of the flight data board under the Wollaston/Key Lake header.

Nav Canada's *Air Traffic Control Manual of Operations* (ATC MANOPS) requires that air traffic controllers determine estimates and confirm pilot reported estimates, but the ATC MANOPS does not specifically require controllers to check the accuracy of pilot reported departure times. Controllers normally check the accuracy of times communicated to them as a standard safety practice. ATC separation is based on controller calculated times. The ATC MANOPS contains procedures that require a controller to place (cock) progress strips in an angled, conspicuous manner in the bay when further action is required. In this occurrence, all actions concerning WEW780 had not been completed at the time the second north low sector controller assumed responsibility for the sector. It could not be determined whether the first north low controller intended any further action with respect to the flight progress strips for WEW780 or if he cocked either of them to indicate that further action was required.

A review of the Nav Canada tape recordings and transcripts revealed much radio and inter-specialty communication taking place between 2031 and 2040. Significant background noise could also be heard on the audio tapes. During this time period, the first north low controller attempted to complete his handover briefing but was interrupted several times. Extraneous communication can increase a person's thought and workload process to the point where it becomes difficult for an individual to concentrate on the task at hand. Interruptions in a sequential process may result in some actions not being taken. At the point in the handover briefing where he was to discuss WEW780, the first controller pointed to the flight progress strips and expressed his relief that WEW780 had checked in and was standing by for a clearance. On completion of the handover briefing, the first controller stood back, confirmed that he had completed all required action for the handover briefing in accordance with the transfer of position checklist, then left. Both controllers were satisfied that the handover (transfer of position checklist) had been completed satisfactorily. The transfer of position checklist requires that a relieving controller be advised of any conflicting traffic. However, the information with respect to WEW780 and TW203 had not been analysed and potential conflict was not detected at the time of the handover.

Nav Canada's checklist requires a certain level of analysis and relies on knowledge-based methodology to accomplish its intended purpose. That is, the categories in the transfer of position checklist are composed of broad-based concepts rather than a detailed, step-by-step list. Human factors studies have shown that knowledge-based problem solving can facilitate the performance of extremely complex tasks. However, in heavy workload or high stress situations knowledge-based task management is more susceptible to error than is rule- or procedure-directed task management.²

At 2033:08, the second north low controller cleared WEW780 to La Ronge and assigned the flight an altitude of 15 000 feet. Shortly thereafter, he calculated WEW780's ETA for La Ronge, using the ETE from Points North to La Ronge of 54 minutes that the first controller had calculated with the Winnipeg inertial navigation simulator. Adding the ETE to the departure time of 0003, the second controller wrote the arrival time for La Ronge of 0057 onto the WEW780 arrival strip and sequenced this strip at the top of the La Ronge bay. As with the first controller, the second controller did not consider that the departure time was about 3½ hours in the future. Also, the second controller did not recognize that the aircraft would not land for over 4 hours and 20 minutes.

To assist the second controller, a third controller arrived at the sector at approximately 2035:40 and took over the duties of the radar position. The second controller then assumed responsibility for the data position.

Approximately two minutes later, TW203 requested a descent clearance, and the third controller issued a clearance to maintain 9000 feet above sea level (asl). This clearance authorized TW203 to descend through the altitude of WEW780. At this point, the data (second) controller asked the radar (third) controller to request WEW780's estimate for La Ronge. At 2039:15, the pilot of WEW780 replied that they were estimating La Ronge in 15 minutes. The data controller then corrected the ETA on WEW780's arrival strip to 2055, but did not re-sequence the strip in the La Ronge bay according to the appropriate order of arrival at La Ronge. At this point, neither controller detected the potential conflict between the aircraft.

ATC MANOPS 901.8 requires controllers to ensure that flight progress strips are arranged in the "appropriate" order when data has been entered onto them.

At 2043:35, the north low radar controller issued TW203 an approach clearance for La Ronge.

At 2045:13, after TW203 had been issued an approach clearance, WEW780 called ATC and requested a descent clearance. At this point the radar controller realized that these two aircraft were in close proximity to each other. After determining the passing altitude for TW203, he instructed TW203 to stop the descent at 16 000 feet. The radar controller then asked both aircraft for their distance from La Ronge: TW203 was 34 DME³ north of La Ronge, and WEW780 was 40 DME north. The minimum spacing required before clearing one aircraft to descend through the altitude of another aircraft was 5 DME. Once TW203 acknowledged the descent altitude of 16 000 feet, the minimum required separation was achieved.

² James Reason, *Human Error*, 1990.

³ Distance Measuring Equipment - the distance (translated into nautical miles) measured by electronic aircraft and ground equipment. Distance information is slant range distance and not actual horizontal distance.

Situational awareness is a term used to describe the level of understanding displayed by an individual in a given situation. Two of the components of situational awareness are the individual's perception of the situation, and the reality of the situation. When a person's perception of the situation differs from reality, he or she is said to have experienced a loss of situational awareness.

ATC MANOPS 471.A requires controllers to have a plan to ensure separation between aircraft that are operating in such proximity of each other as determined by ATC MANOPS separation standards. Formulation and implementation of such a plan requires awareness of the specified aircrafts' proximity, which the controllers involved in this occurrence lacked.

Analysis

The incorrect departure time passed by the crew of WEW780 initiated a sequence of events which led to a 15-minute loss of situational awareness by the north low controllers. This analysis will focus on why air traffic control procedures and personnel did not detect or correct this loss of situational awareness.

If the first controller had intended any further action or verification of information with respect to the data on WEW780's arrival strip, the ATC MANOPS required him to cock the strip, thereby increasing its visibility. Cocking the strip may have then prompted the second controller to verify WEW780's position and altitude much earlier. However, it was not established whether the first controller cocked the strip.

The position information provided by the pilot of WEW780 on initial contact with Winnipeg ACC at 2031 (100 nautical miles north of La Ronge) and written on the departure flight progress strip by the first controller was likely not taken into consideration by the second controller in determining the arrival time for WEW780 at La Ronge.

The communication workload, noisy environment and handover activities at the time WEW780 initially reported its position and departure time likely prevented primary analysis of WEW780's departure information by the first north low controller and may have precluded him from finalizing all action with respect to WEW780's arrival strip. Because there was a lot of noise and communication taking place in and around the north low sector, the initial controller had difficulty completing an uninterrupted handover briefing. Due to the multiple handovers of position within a short period of time, the second and third controller may not have had sufficient time to become thoroughly familiar with the traffic situation before the operating irregularity occurred. These factors may have reduced the two controllers' ability to maintain their situational awareness at a high level.

After calculating the ETA at La Ronge for WEW780, based on the incorrect departure time on the departure strip, the second controller then sequenced the arrival strip in the La Ronge bay. This resulted in the second controller's perception of the relative positions of the two aircraft to differ from their actual positions, which then led to a loss of situational awareness.

One of the primary purposes of the Nav Canada transfer-of-position checklist, is to ensure that all of the information required to provide separation is passed to the relieving controller. Because the relieving controller was unaware of WEW780's actual position, the transfer of position briefing was not effective and the checklist did not serve its purpose.

Because the transfer-of-position checklist requires an assumed level of analysis to achieve its intended purpose, it is more susceptible to human error in situations of higher controller workload. Under high workload situations, a simple, more specific checklist would likely decrease the potential for error.

An ATC operating irregularity occurred because there was no plan in place to ensure that at least the minimum spacing required was maintained between these two aircraft at the time descent clearance was issued to TW203. Because the controllers involved were not aware of the relative positions of the two aircraft, they did not plan for, or apply, an appropriate separation standard. Consequently, safety was not assured.

Findings as to Causes and Contributing Factors

1. The crew of WEW780 passed an incorrect departure time to the first north low controller, which the controller did not detect and which he entered on the flight progress strip.
2. The second north low controller did not detect that an incorrect departure time had been entered on the flight progress strip. He used the incorrect time for his calculations, obtaining an unrealistic arrival time.
3. The controllers did not re-sequence the arrival strip for WEW780 when the revised estimated time of arrival (ETA) for La Ronge was received, as was required by published procedures. This reduced the probability that the conflict would be detected in time to prevent a loss of separation.
4. The first north low controller did not sufficiently brief the second controller regarding the incomplete status of the calculations and sequencing of the arrival flight progress strip for WEW780.
5. Nav Canada's transfer-of-position checklist did not effectively assist the north low controllers in identifying a flight progress strip data entry error. As a result, a potential conflict between two arriving aircraft was not briefed.

Findings as to Risk

1. Nav Canada's transfer-of-position checklist relies on air traffic controller experience and skill. Both of these human attributes have been found to be highly susceptible to failure during periods of high workload.

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board authorized the release of this report on 07 January 2003.

Appendix A - Route of Flight

