

Transportation Safety Board
of Canada



Bureau de la sécurité des transports
du Canada

AVIATION INVESTIGATION REPORT

A01P0305



AIRCRAFT MISIDENTIFICATION—SAFETY NOT ASSURED

NAV CANADA

VANCOUVER ACC - TERMINAL SPECIALTY

REGENCY EXPRESS CESSNA 208B C-GRXZ

REGENCY EXPRESS PIPER PA-31 C-GRXX

VICTORIA AIRPORT, BRITISH COLUMBIA, 10 nm N

11 DECEMBER 2001

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

Rexair 403 (RXX403), a Cessna 208B Caravan (C-GRXZ), was en route from Victoria to Vancouver heading 340° at 3000 feet. At the same time, Rexair 407 (RXX407), a Piper PA-31 Navajo (C-GRXX), was en route from Nanaimo to Vancouver also heading 340° at 3000 feet. Both aircraft were flying in accordance with instrument flight rules (IFR) and being radar-vectorred by a Victoria Terminal controller. At 0702:26 Pacific standard time, the Victoria controller instructed RXX407 to contact Vancouver Arrival on another radio frequency, and then handed the aircraft off to the Vancouver Arrival High controller. RXX407 acknowledged this instruction, but remained briefly on the Victoria frequency while he set up his navigational equipment. RXX403, believing the instruction was for him, changed to the Vancouver Arrival frequency and contacted the controller before RXX407 changed frequency. The Vancouver controller acknowledged this transmission from RXX403 at 0703:09 and, believing he was communicating with RXX407, instructed RXX407 to carry out a 270° left turn and join the localizer for the ILS approach to runway 08L at Vancouver. RXX403 acknowledged these instructions. Shortly after, at 0703:40, RXX407 contacted the Arrival controller. Continuing misidentification and confusion resulted in RXX403 penetrating a 3500-foot minimum radar vectoring area at 3000 feet before being issued corrective instructions. There was no risk of collision between the aircraft; however, terrain clearance for RXX403 was not assured. Both aircraft then continued to destination without further incident.

Other Factual Information

The controller for the Victoria sector is located in the Victoria Terminal specialty of the Vancouver Area Control Centre (ACC). The controller for the Vancouver Arrival High sector is located in the Vancouver Terminal specialty of the Vancouver ACC.

At the time of this incident, the Vancouver Arrival High controller was actively controlling seven aircraft. Vancouver airport weather was a 200-foot ceiling with 1 nautical mile (nm) visibility. Complexity of terminal operations was moderate to high, normal for the Vancouver Terminal specialty for this time of day. (See Appendix A - Sequence of Events.)

At 0702:26 Pacific standard time (PST)¹, the Victoria controller instructed RXX407 to change to Vancouver Arrival frequency; the pilot acknowledged this instruction, but before changing frequency, he set up his on-board navigation equipment. When RXX407 was instructed to change to Vancouver Arrival, RXX403, believing that this transmission was for him, changed to the Vancouver Arrival frequency and called the controller at 0703:04. The air traffic control (ATC) communication tape reveals no acknowledgment from RXX403 when he intercepted the Victoria controller's instruction to RXX407 to change to the Vancouver frequency. When RXX407 did change to the Vancouver Arrival frequency, the frequency was active with transmissions from other aircraft, and it was not until 0703:40 that RXX407 contacted the Vancouver controller.

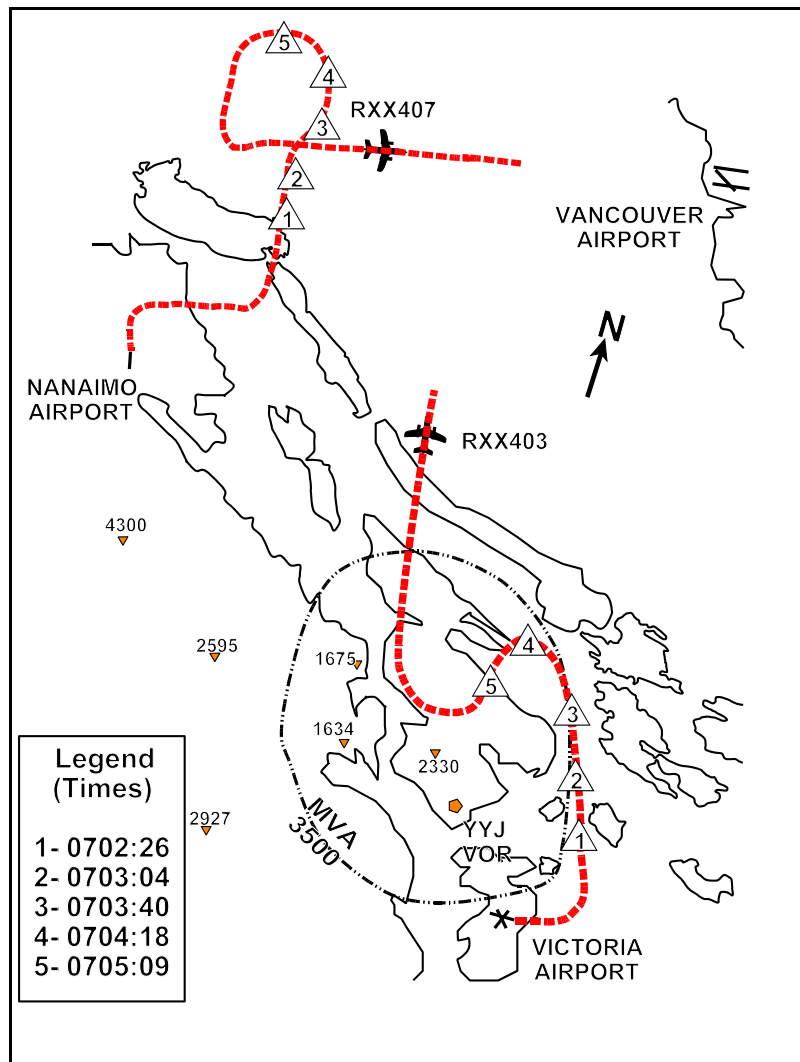


Figure 1. Flight paths for RXX403 and RXX407

When RXX407 made his initial call to Vancouver Arrival, he advised the controller that he was at 3000 feet on the Nutbe Arrival. The controller assumed he

¹ All times are PST (Coordinated Universal Time minus eight hours) unless otherwise noted.

was talking to the same Rexair aircraft as before, and told RXX407 that he had wanted the aircraft to complete a 270° turn to the left for the localizer. The pilot then read back an instruction to maintain a heading of 270°. Twenty-four seconds later, at 0704:18, RXX407 asked the controller to confirm the assigned heading, adding that his flight was from Nanaimo. Without responding to the confirmation request, the controller instructed RXX407 to turn left to a heading of 170°, which the pilot acknowledged. Shortly after, both RXX407 and RXX403 stopped their left turns and began to track south.

At 0704:43, RXX403 informed the controller that he had given him that two-seventy originally. After determining where RXX403 was, the controller realized that RXX403 was on his frequency in error and instructed RXX403 to return to the Victoria Terminal frequency. RXX403 contacted Victoria Terminal at 0705:09. The Victoria controller, who had been trying repeatedly to contact RXX403 since 0703:08, instructed RXX403 to climb immediately to 4000 feet since the aircraft was now in a 3500-foot minimum radar vectoring area (MVA), and issued a right turn to heading 360°.

At the time of the frequency change instruction, 0702:26, the Vancouver controller did not have a flight data strip for either Rexair aircraft and, since he was receiving an automated system hand-off for RXX407, he was only aware of RXX407. At this time, he saw that the present position symbol (PPS) data tag on his radar situational (RSiT) display for RXX407 was flashing, and that the aircraft symbol was in the correct geographical position. These two factors satisfied aircraft identification criteria for a valid system hand-off; accordingly, RXX407 was properly handed off to the Vancouver controller and radar-identified. However, the Vancouver controller believed he was communicating with RXX407, despite the pilot using the call sign of RXX403.

In the five minutes before the pilot of RXX403 initially checked in with Victoria Terminal, six radio transmissions took place between RXX407 and Victoria Terminal. RXX403 had not heard any of those transmissions and had no indication that he was not the only Rexair aircraft on the frequency.

When RXX403 made his initial call to Vancouver Arrival using his correct flight number, the controller presumed that the pilot had erred and meant "Rexair 407"; the controller did not question the flight number discrepancy. When the controller replied and called RXX403 as "Rexair 407", the pilot assumed that the controller had erred and meant "Rexair 403"; the pilot also did not question the discrepancy.

The Transport Canada Aeronautical Information Publication (AIP) serves as the source document for reference information essential to aircraft operations in Canadian airspace. Section COM 5.8 prescribes radio telephony standards and gives examples of phrases to be used by pilots to acknowledge messages directed to them. In particular, it directs that radio communications must include the aircraft call sign if confirmation is to be made that clearances and instructions have been received by the aircraft to which they are being directed. In part, section COM 5.8 requires pilots to "*...acknowledge the receipt of all messages directed to them, including frequency changes.*" Section RAC 1.5.2 also states that ATC assumes responsibility for terrain clearance when vectoring IFR flights.

In defining a "hand-off", the Nav Canada ATC Manual of Operations (MANOPS) gives equal importance to the transfer of radio communications and radar identification of an aircraft target,

so that radar service remains uninterrupted. It is implicitly understood that on initial contact, when controllers hand off aircraft on radar vectors, they must establish radio communication with the correct aircraft. While it may seem to be self evident, there is no instruction in MANOPS, or the AIP, requiring that an incorrect flight number at hand-off be challenged. Section 546 of MANOPS also indicates that a controller is normally responsible for providing appropriate terrain clearance for an IFR aircraft under radar vectors.

Mistakes in quoting flight numbers by pilots and controllers are not uncommon, particularly with similar flight numbers of multiple digits which change with each landing and take-off made in the course of a day. Research shows that humans tend to hear what they are expecting—and want—to hear, and often do not hear something that is not anticipated. This expectation helps a person understand a message and place in it meaningful context. If, however, part of the message, such as the call sign, is different from that expected, the expectation may dictate that the receiver reject the anomalous element rather than the entire message. This phenomenon of expectation is particularly common and hazardous in the readback/hearback process, which is the process of mutual verification of information passed between controllers and pilots.

Analysis

Errors with aircraft identification made by both pilot and controller in this readback/hearback process led to the controller issuing instructions intended for RXX407 to the wrong aircraft, namely RXX403, resulting in RXX403 flying into a 3500-foot MVA at 3000 feet.

When RXX403 intercepted the instruction from the Victoria Terminal controller to change radio frequency to Vancouver Arrival, he changed frequency without acknowledging the instruction. An acknowledgement of the instruction would likely have alerted the Victoria controller that RXX403 was responding in error.

When RXX403 contacted Vancouver Arrival, the controller presumed that the call sign he heard, slightly different from what he expected to hear, was an error by the pilot. At the same time, the pilot presumed that the 407 was an error by the controller. It was not determined why RXX403 and the Vancouver Arrival controller both assessed that the use of the wrong flight number was just a simple error of speech on the other's part, and did not question the discrepancy. It is clear that had the Vancouver Arrival controller and RXX403 been more assiduous in their communications and challenged the errors they each detected, misidentification and resulting conflict would not have occurred.

It was not determined why RXX407 misinterpreted the Vancouver controller's instruction to make a 270° turn to the left as a heading of 270°. It was not determined why RXX403 accepted the Vancouver controller's instruction to make a 270° turn to the left to intercept the localizer—a turn which would have placed the aircraft on an easterly heading and in a location that was about 25 nm south of Vancouver airport and the localizer. It was also not determined if RXX403 stopped his left turn as a result of the Vancouver controller's instruction to RXX407 to turn to 170°.

Use of similar flight numbers with multiple digits, which change with each landing and take-off made in the course of a day, will likely continue to cause flight number designation errors by both pilots and controllers. In selected circumstances, this could lead to misidentification of aircraft.

Findings as to Causes and Contributing Factors

1. RXX403 responded to a frequency change instruction directed to RXX407 without making an acknowledgment; an acknowledgment would have alerted the Victoria Terminal controller that RXX403 was responding in error.
2. Upon RXX403 contacting Vancouver Arrival, the controller presumed that the call sign he heard, slightly different from what he expected to hear, was an error by the pilot. At the same time, the pilot assumed that the controller's use of the number 407 was an error on the controller's part.
3. Neither RXX403 nor the Vancouver Arrival controller questioned the readback/hearback discrepancies.
4. RXX403 intercepted the Vancouver controller's instruction to RXX407 to make a 270° turn to the left, resulting in RXX403 entering a 3500-foot MVA at 3000 feet.

Findings as to Risk

1. Use of flight numbers with multiple digits, which change with each landing and take-off made in the course of a day, will likely continue to cause flight number designation errors by both pilots and controllers. In selected circumstances, this could lead to misidentification of aircraft.

Safety Action

On 21 February 2002, TSB forwarded an Aviation Safety Information Letter 622-A020005-1 to Nav Canada describing the risks involved in pilots and controllers not immediately challenging any flight number discrepancies. Nav Canada's response indicates that they are aware of the problem and have published three Air Traffic Services Information Bulletins to alert operational personnel to the risks associated with communication errors.

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board authorized the release of this report on 10 September 2002.

Appendix A - Sequence of Events

Legend: RXX403 - Rexair 403
 RXX407 - Rexair 407
 YYJ - Victoria Terminal controller
 YVR - Vancouver Arrival High controller

Time	Unit	Event
0657:24	RXX407	Initial contact with Victoria Terminal controller
0659:36	YYJ	Instructs RXX407 to fly 340°
0700:03	RXX407	Begins left turn to 340°
0700:14	RXX403	Initial contact with Victoria Terminal controller
0700:19	YYJ	Instructs RXX403 to fly 340°
0700:28	RXX403	Acknowledges 340° heading
0702:26	YYJ	Instructs RXX407 to change to Vancouver Arrival frequency (128.6)
0702:32	RXX407	Acknowledges frequency change
0702:45		<i>RXX403 Changes to YVR frequency</i>
0703:00	YYJ	Instructs RXX403 to fly 350° (Not received by RXX403)
0703:04	RXX403	Initial contact with Vancouver Arrival
0703:09	YVR	Acknowledges RXX403 as RXX407; issues 270° left turn
0703:20	RXX403	Reads back 270° left turn
0703:34		<i>RXX403 begins left turn</i>
0703:36		<i>RXX407 begins right turn to NUTBE</i>
0703:40	RXX407	Initial contact with Vancouver Arrival
0703:47	YVR	Acknowledges RXX407 and repeats instruction for 270° left turn
0703:48		<i>RXX403 enters 3500 MVA at 3,000</i>
0703:51	YYJ	Calls RXX403 - no response
0703:54	RXX407	Reads back "heading" 270°
0703:55	YYJ	Calls RXX403 - no response
0704:00		<i>RXX407 stops right turn and starts left turn</i>
0704:03	YYJ	Calls RXX403 - no response

Time	Unit	Event
0704:06	YYJ	Calls RXX403 - no response
0704:18	RXX407	Asks the controller to confirm heading 270°
0704:22	YYJ	Calls RXX403 - no response
0704:22	YVR	Issues RXX407 left turn to heading 170°
0704:26	RXX407	Acknowledges left turn to 170°
0704:43	RXX403	Informs controller that RXX403 was given the 270 ° turn
0704:49	YVR	Asks RXX403 for position
0704:58	YVR	Instructs RXX403 to return to Victoria Terminal frequency (133.85)
0705:02		<i>RXX403 stops turn on heading 170°</i>
0705:09	RXX403	Contacts YYJ controller (133.85)
0705:11	YJT	Instructs RXX403 to climb immediately to 4000
0705:16	RXX403	Acknowledges climb instruction
0705:24		<i>RXX403 begins to climb</i>
0705:42	YYJ	Instructs RXX403 to maintain 3500 and turn right to 360°
0705:44		<i>RXX403 begins to turn right</i>
0705:49	YVR	Instructs RXX407 to descend to 2000