

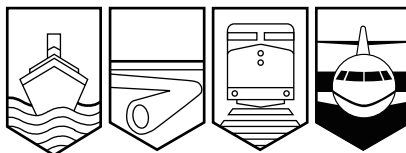
Transportation Safety Board
of Canada



Bureau de la sécurité des transports
du Canada

AVIATION INVESTIGATION REPORT

A02P0007



AIR PROXIMITY - RISK OF COLLISION

BETWEEN

PACIFIC COASTAL AIRLINES

SHORTS SD-3-60 C-GPCJ (PCO909)

AND

CENTRAL MOUNTAIN AIR

BEEHCRAFT 1900D C-FCMR (GLR689)

CAMPBELL RIVER, BRITISH COLUMBIA

08 JANUARY 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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Pacific Coastal Airlines

Shorts SD-3-60 C-GPCJ (PCO909)

and

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Beechcraft 1900D C-FCMR (GLR689)

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Summary

At about 0800 local time, Shorts SD-3-60 (C-GPCJ), operated by Pacific Coastal Airlines as PCO909, and Beechcraft 1900D (C-FCMR), operated by Central Mountain Air as GLR689, were both on scheduled flights from Vancouver to Campbell River, British Columbia. PCO909 was operating in accordance with visual flight rules (VFR), intending to land on Runway 29. GLR689 was operating in accordance with instrument flight rules (IFR), and had been cleared by the Comox terminal controller for a straight-in LOC(BC)/DME approach to Runway 29. The flight crews of both aircraft were in contact with the Campbell River Flight Service Station (FSS) on the mandatory frequency. PCO909 had reported on a right base leg to arrive first but, at the shoreline, the flight encountered weather conditions below VFR limits. The crew aborted the visual approach by turning left and climbing to the east. GLR689 then received a resolution advisory (RA) from the on-board traffic alert and collision avoidance system (TCAS) and executed a missed approach with an avoidance manoeuvre to the left of track. Both aircraft were in each other's proximity as they climbed in opposite directions. Each flight crew then contacted Comox for radar vectors to IFR approaches and landed at Campbell River without further event.

Ce rapport est également disponible en français.

Other Factual Information

The Shorts SD-3-60 aircraft was operating in accordance with Canadian Aviation Regulation (CAR) part 705, which applies to airline operations. The Beechcraft 1900D aircraft was operating in accordance with CAR part 704, which applies to commuter operations. *Canadian Aviation Regulations* (CARs) do not limit air carriers to flight solely in accordance with instrument flight rules (IFR). When weather conditions along selected routes meet the minima specified in the operator's Transport Canada-approved operations manual, many operators realize time and cost savings by conducting flights in accordance with visual flight rules (VFR), which allow for more direct routing. The crew of PCO909 chose to conduct the flight in accordance with VFR and departed Vancouver, British Columbia from Runway 30. GLR689 departed Vancouver in accordance with IFR from Runway 08R and was subsequently handed off to the Comox military terminal control unit.

When aircraft, operating in accordance with instrument flight rules (IFR), depart Vancouver from Runway 08L or 08R on northwest-bound flights, air traffic control (ATC) usually vectors them south of Vancouver, then to the west and northwest to cross below the final approach paths for Runways 08L and 08R. This routing ensures terrain clearance, but increases the flight distance. Although flying VFR can result in more-direct flights, the practice bypasses several safety defences in the air traffic management system. By operating VFR, aircraft do not automatically receive the benefits of ATC services, such as radar identification, flight monitoring, VFR traffic advisories, and positive separation from other radar-identified aircraft en route and during their approach at destination.

Safety defences for VFR flight consist primarily of the following elements: the principle of see-and-avoid; communications on recommended VHF frequencies; Flight Service Station (FSS) airport and traffic advisories on mandatory frequencies; and, published en route and circuit procedures. The installation of a traffic alert and collision avoidance system (TCAS) in aircraft is an additional defence against traffic conflicts. This equipment remains optional for flight within Canadian airspace. GLR689 was equipped with a TCAS, while PCO909 was not.

The Campbell River FSS is a staffed facility and all specialists are qualified weather observers. The 0800 regular weather observation was as follows: scattered cloud at 900 feet above ground level (agl); broken cloud¹ at 5500 feet; and visibility 10 miles. The weather was changeable in the 30 minutes since this report and for this reason (not included in any communications) the FSS was in the process of taking a special weather observation² at the time. The incident occurred at about 0831 Pacific standard time (PST)³. A special weather report was issued at 0835 indicating that the height of the lower cloud layer at the airport had reduced and its sky coverage had increased from scattered to broken, which resulted in a reduction in the ceiling from 5500 feet to 800 feet. This observation resulted in an amendment to the terminal area forecast for Campbell River being issued at 0838.

¹ A broken cloud condition constitutes a ceiling, whereas a scattered condition does not.

² A special weather observation is required to report changes in specified elements, which change by specified amounts, since the last observation (A.I.P. Canada - MET 3.15.4).

³ All times are PST (Coordinated Universal Time minus eight hours).

The Campbell River airport elevation is 346 feet above sea level (asl) and is located within an associated control zone of 5 nautical miles (nm) radius, designated as Class E airspace. In such airspace, the weather minima applicable to VFR flight require a ceiling of 1000 feet agl and visibility of three miles. Lower ceilings and/or visibilities restrict such airports to Special VFR (SVFR) or IFR operations, at which time ATC authorization is required to operate aircraft in the airspace. Information gathered after the incident reveals that the lower cloud layer extended over the land along the shoreline in the vicinity of Campbell River. The areas over the adjacent coastal waters to the east were in good visual meteorological conditions (VMC). When near the same level as a cloud layer, a pilot cannot visually determine the actual amount of sky coverage until the aircraft reaches the cloudy area.

At 0824, the crew of GLR689 had contacted the Campbell River FSS on the mandatory frequency (MF), 29 nm from the airport. They provided their position, an estimated time of arrival, the intended arrival procedure, and requested the present weather conditions. When GLR689 was 12 nm final on the localizer for Runway 29 (heading 294 degrees), the Comox terminal controller advised the crew of an unidentified VFR aircraft proceeding toward Campbell River from the east. This target later proved to be PCO909. The Comox terminal controller cleared GLR689 for the approach to Campbell River, terminated radar service, and instructed the crew to contact the Campbell River FSS on the MF. The crew contacted the FSS at 0829 and twice requested a confirmation of the cloud ceiling height. For each request, the FSS specialist provided GLR689 with the 0800 regular weather report, and remarked in his transmissions that the laser ceilometer showed the lower (scattered) cloud at 700 and 800 feet agl.

At 0821, the crew of PCO909 had contacted the Campbell River FSS on the en route frequency of 126.7 MHz; they reported being 35 nm east and requested an update on the weather conditions. They were provided with the 0800 regular report. Also, while en route, PCO909 was cleared by the Comox tower controller through the northeast corner of the Comox airport control zone. When PCO909 was exiting the control zone, the tower controller informed PCO909 of the Beechcraft 1900D aircraft, then 10 miles on final for Runway 29 at Campbell River. At 0830, after listening to the communication on the MF between GLR689 and the Campbell River FSS regarding the weather, the crew of PCO909 reported to the FSS that the flight was passing Oyster River, which is a commonly used landmark about 7 nm southeast of the airport. The report did not include an altitude or ETA. An arrival procedure was included (right base for Runway 29); however, the route flown was not consistent with this procedure. This report was the first contact on the MF for PCO909.

Canadian Aviation Regulation (CAR) 602.101 requires that all flights operating under VFR and arriving at an aerodrome within a MF area provide an advisory of their position, altitude, ETA, and arrival procedure intentions at least five minutes (where possible) prior to entering the MF area.

When PCO909 reported by Oyster River, the specialist immediately requested a position report from GLR689; GLR689 was then 9 nm on final for Runway 29. The FSS specialist gave PCO909 an airport advisory, which included the position of GLR689. The specialist ascertained from PCO909 that they were at the shoreline on a right base for Runway 29 and planned to land first. The crew of GLR689 did not yet have PCO909 in sight and, when queried as to whether they were in VMC, the pilot (GLR689) replied that they were on top of a cloud layer.

The version of the *Canada Flight Supplement* in effect at the time did not specify a circuit direction for

Runway 29 at the Campbell River airport. Therefore, left-hand circuits applied. Under the existing level of air traffic service being provided by the Campbell River FSS, the crew of PCO909 arriving VFR from the east—the upwind side—had two standard arrival options. They could join straight-in on the final leg, or they could cross the airport at mid-field and turn left to join the left downwind leg⁴ on the west side of the airport. After reporting on a right base leg for Runway 29, PCO909 maintained an altitude of 800 feet and continued on a track of about 265 degrees directly to the airport. At about 3 nm from the airport, the crew reported that they were below low cloud and were turning back out to the ocean—no direction of turn was given—and confirmed they were clear of the approach. During this manoeuvre, however, the left turn brought PCO909 onto the localizer for Runway 29 in a direction opposite to the approach path on which GLR689 was established.

GLR689 had descended into cloud and was within 5 nm of the airport when the crew responded to the TCAS resolution advisory (RA). During these manoeuvres, the crew of each aircraft established visual contact with the other. Both aircraft climbed through 1300 feet asl at the same time, in opposite directions, with spacing between the two aircraft increasing through 0.6 nm. The cloud tops at the time were at about 1200 feet asl.

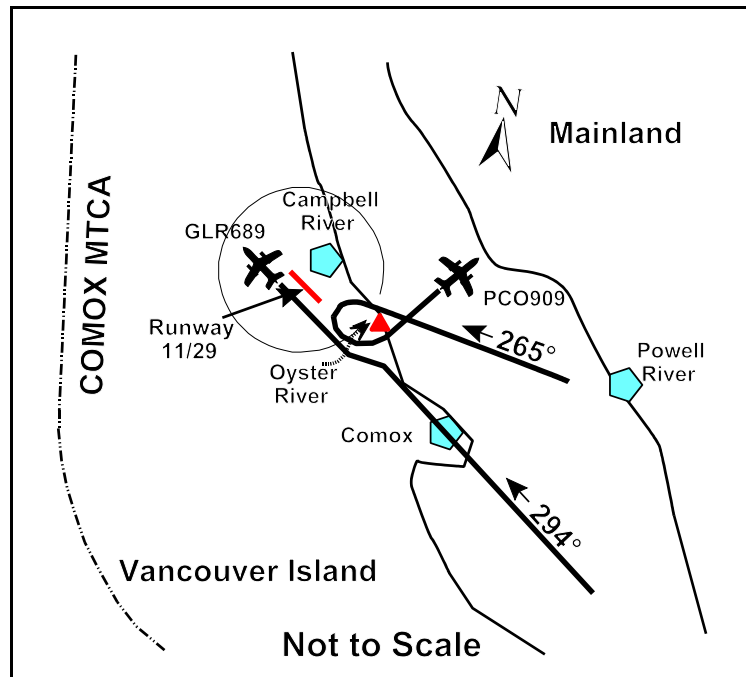


Figure 1 - Flight paths for PCO909 and GLR689

⁴

A.I.P. Canada Section 4.5.2 describes traffic circuit procedures at uncontrolled aerodromes

Section RAC 4.5.1 of the Transport Canada *Aeronautical Information Publication* (A.I.P. Canada) states the following:

When conducting flight operations in the vicinity of uncontrolled airports, alertness for other traffic, flying in accordance with published procedures and communicating effectively are essential to safe flight.

Mid-air collisions have been investigated in the past in which the findings included non-adherence to published procedures and ineffective communications⁵.

Analysis

Instrument flight rules and associated procedures are developed to enhance the safety of flight. The air carrier practice of operating some flights in accordance with VFR to save time bypasses these safety defences in the air traffic management system. This places greater responsibility for traffic detection and spacing on the flight crew.

Based on the latest Campbell River weather report (0800), the ceiling was well above the VFR minimum. The difference between a scattered and a broken cloud (ceiling) condition may be as little as 1/8 of total sky coverage, as judged by the observer. When cloud height is near VFR limits, the implication can be significant, whether VFR flight is permitted or not. In the interests of safety, the Nav Canada *FSS Manual of Operations*, sections 411.9 and 411.10, discusses the airport advisory service and provides for specialists to include weather and other advisory information, as they deem appropriate. Had the crew of PCO909 been advised that the weather may have deteriorated to less than VFR minima, the crew could have formulated an alternate arrival plan, thereby avoiding the resulting conflict.

TSB investigations into mid-air collisions have identified ineffective communications as a contributing factor. If an arriving flight does not include all of the prescribed information on initial contact with the FSS, the defence provided by communications on the MF is compromised. Timely and complete reports of position and intentions improve situational awareness for all concerned and provide the opportunity for conflict detection and resolution.

Non-adherence to published circuit procedures have also contributed to midair collisions. Although regulations do not define the dimensions of a circuit, the A.I.P. Canada, Section RAC 4.5.2.(a)(vi), describes joining the circuit straight-in on the final leg as an approved technique under prescribed conditions. Reporting on a right base implies that the aircraft will fly a heading perpendicular to the runway and make a right-hand, 90-degree turn onto the final approach course. If the actual flight path flown is not characteristic of the stated or implied procedure, ambiguity and confusion for other airport traffic can result in conflict.

When the crew of PCO909 found themselves facing deteriorating weather and traffic closing in on their position, the decision was made to abort their VFR arrival. As there are no established procedures for such a situation and the missed approach briefing conducted by the crew did not

⁵ TSB investigation reports A99P0056 and A99P0108.

include routing and altitude details, as it would have for an IFR approach, there were three abort options available, each with potential consequences: continue straight ahead across the airport; turn to the right; or turn to the left.

By continuing straight ahead or turning to the right, the flight crew would have been faced with weather conditions below VFR limits and a possible regulatory infraction for entering the Campbell River MF area under VFR while in instrument flight conditions. A left turn would involve briefly proceeding toward the other traffic. Faced with making this sudden and unanticipated decision and assessing the traffic position, the flying pilot concluded that a left turn presented the lowest risk of adverse consequences.

The crew of GLR689 had reduced their speed to remain behind PCO909. Because the aircraft was equipped with TCAS and was being monitored, the crew continued with their approach. When PCO909 aborted the visual arrival by making a left turn, the element of surprise and a TCAS RA resulted in GLR689 deviating slightly to the left and executing the missed approach procedure. In summary, the TCAS RA was the only remaining defence during this risk of collision. It was the catalyst for the evasive action and missed approach by GLR689.

Findings as to Causes and Contributing Factors

1. The reported 0800 weather conditions allowed for visual flight rules (VFR) flight at Campbell River. Deteriorating weather conditions went unreported. As PCO909 entered the control zone, the flight encountered weather conditions below VFR minima, resulting in the crew aborting the arrival. The flight encountered a risk of collision in the process.
2. The crew of PCO909 had to unexpectedly abort their planned arrival under VFR. In the flying pilot's judgement of traffic spacing, a left turn was assessed to be the option of least consequence, but it resulted in a risk of collision with GLR689, which was established on final approach.

Findings as to Risk

1. A delayed and incomplete inbound report from PCO909 reduced situational awareness for all concerned and, thereby, reduced the opportunity for conflict detection and resolution.
2. Deviations from published procedures or stated intentions can create ambiguity and confusion for other airport traffic and result in an increased risk of conflict.
3. Potential delays induced by flight under instrument flight rules (IFR) motivate some air carriers and pilots to fly VFR whenever possible. However, this bypasses some of the safety defences associated with IFR flight in controlled airspace.

Other Findings

1. The traffic alert and collision avoidance system (TCAS) resolution advisory (RA) was the last defence in this risk of collision and was the catalyst for the evasive action and missed approach by GLR689.

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board authorized the release of this report on 30 January 2003.