

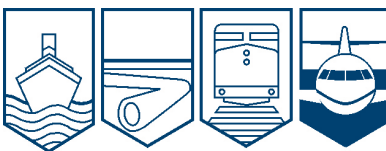
Transportation Safety Board
of Canada



Bureau de la sécurité des transports
du Canada

AVIATION INVESTIGATION REPORT

A08Q0209



RISK OF COLLISION

FIRST AIR / AIR CREEBEC

BOEING 737 C-FNVT / DE HAVILLAND DHC-8 C-GYWX

KUUJJUAQ, QUEBEC

22 OCTOBER 2008

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

The Boeing 737-248C (registration C-FNVT, serial number 21011), operated by First Air as flight FAB866, and the de Havilland DHC-8-102 (Dash-8) aircraft (registration C-GYWX, serial number 175), operated by Air Creebec as flight CRQ502, were both approaching Kuuujuaq, Quebec, as their destination in uncontrolled airspace. CRQ502 was planning a RNAV approach on Runway 31 with an estimated time of arrival (ETA) of 1222 Eastern Daylight Time (EDT) and FAB866 was planning a RNAV approach for Runway 25 with an ETA of 1224 EDT. FAB866 was approximately 12 nautical miles (nm) final when its airborne collision avoidance system (ACAS) indicated the presence of another aircraft. When both aircraft were at the same altitude with 3 nm separation, the Kuuujuaq Flight Service Station specialist informed FAB866 of the traffic and requested CRQ502's intentions. FAB866 proceeded with a missed approach at 1220 just prior to receiving an ACAS traffic alert warning. CRQ502 proceeded northeast away from the approach area. The two aircraft were flying in cloud and came within 2.0 nm laterally and 200 feet vertically of each other. FAB866 subsequently landed at 1235 without further incident. CRQ502 landed at 1252.

Ce rapport est également disponible en français.

Other Factual Information

Kuujuuaq Airport (CYVP) Runway Status

A construction project to improve the drainage along the south side of Runway 07/25 at the Kuujuuaq Airport (CYVP) was started on 20 October 2008 and was to be completed on 09 November 2008. This required Runway 07/25 to be closed, by NOTAM ¹ from 0700 until 1800 daily. The initial NOTAM issued read “CYVP RWY 07/25 CLSD 1100/2200 DLY 0810211100 TIL 0811082200”. ²

Despite the NOTAM, arrangements were made to stop work to allow scheduled First Air and government medevac flights to use Runway 07/25 for their aircraft. Runway 07/25 is 6000 feet long by 150 feet wide with a paved surface. All other aircraft had to use Runway 13/31, which had a gravel surface, 5000 feet long by 150 feet wide.

Sequence of events

FAB866, departed Montréal/Pierre Elliott Trudeau International Airport, Quebec, at 1004 ³ on an instrument flight rules (IFR) flight to CYVP with 4 crewmembers and 31 passengers on board. The captain was the pilot flying (PF) and the first officer was the pilot not flying (PNF); the PNF's duties include radio communications. At approximately 78 nautical miles (nm) south of CYVP, FAB866 was cleared to descend out of controlled airspace. At 1207, in response to a position report from another aircraft, FAB866 broadcast its intentions on the en route frequency 126.7 MHz to conduct a RNAV ⁴ (GNSS) RWY 25 ⁵ approach at CYVP via ETLAB. In a communication a few seconds later, in response to a position report from CRQ502, FAB866 gave its position report and estimated time of arrival (ETA) of 1222. (See Appendix A - Proximity RNAV Approach Fixes Runways 25 and 31 at Kuujuuaq Airport..)

¹ Notice to Airmen - A notice containing information concerning the establishment, condition, or change in any aeronautical facility, service, procedure, or hazard, the timely knowledge of which is essential to personnel concerned with flight operations.

² Times in NOTAM are Coordinated Universal Time (UTC).

³ Times other than in NOTAM are Eastern Daylight Time (Coordinated Universal Time minus four hours).

⁴ RNAV indicates the procedure is based on Area Navigation. The equipment required to fly the procedure is indicated in brackets. Example: RNAV (GNSS) indicates a RNAV procedure requiring GNSS (Global Navigation Satellite System); *Canada Air Pilot Instrument Procedures - General Pages*.

⁵ RNAV (GNSS) RWY 25 abbreviated to RNAV 25 for Runway 25

CRQ502 departed Kangirsuk Airport, Quebec, on an IFR flight to CYVP with 3 crewmembers and 24 passengers on board. The first officer was the PF and captain was the PNF. CRQ502 flew at an altitude of 14 000 feet above sea level (asl) and remained in uncontrolled airspace for the duration of the flight. At 57 nm north of the airport (at 1208), level at 14 000 feet asl, the crew informed the CYVP Flight Service Station specialist (VP FSS) on the mandatory frequency (MF) 122.2 MHz that they were planning an approach for Runway 25. VP FSS provided wind and altimeter information, and advised that Runway 25 was closed by NOTAM. The crew therefore prepared for the RNAV (GNSS) RWY 31 ⁶ IFR approach with an ETA of 1222. At that time, VP FSS requested CRQ502 call 20 nm from CYVP. At 1211, CRQ502 again requested and received confirmation from VP FSS, that Runway 25 was open only to jet traffic.

Approaching CYVP from the south were Air Inuit Flight AIE820, a Dash 8, under IFR, descending from 17 000 feet asl and Pascan Flight PSC102, a King Air, under IFR, descending from flight level (FL) 210, with respective initial ETAs of 1218 and 1224. AIE820 advised VP FSS that it would report on base leg for Runway 31, but did not specify the type of approach they would fly. PSC102 initially intended to execute the RNAV 25 approach for Runway 25, but was told that Runway 25 was closed by NOTAM. PSC102 subsequently revised its plan and at 1218 indicated its intention to fly a contact approach ⁷ to Runway 31.

All four aircraft inbound to Kuujuaq under IFR, including CRQ502 and FAB866, had communicated with the FSS and with each other on 126.7 MHz in accordance with section 602.104 of the *Canadian Aviation Regulations* (CARs) and sections 8.11 and 9.13 of Transport Canada's *Aeronautical Information Manual* (AIM). All had been requested to contact the VP FSS on the MF crossing 20 miles inbound; however, CRQ502 was unable to make contact due to frequency congestion.

FAB866 contacted the VP FSS on the MF at 1210 while 19 DME ⁸ to the southwest, descending through 8000 feet asl. At 1216, FAB866 reported over the RNAV 25 entry point, ETLAB, at 3500 feet asl turning toward SASUT, the initial approach fix (see Appendix A). At 1219, VP FSS provided traffic information to FAB866 on AIE820 flying downwind for Runway 31 and PSC102 14 nm southeast at 3700 feet asl all estimating CYVP around the same time.

⁶ RNAV (GNSS) RWY 31 abbreviated to RNAV 31 for Runway 31

⁷ NAV CANADA *Flight Services Manual of Operations* describes a Contact Approach as: An approach wherein an aircraft on an IFR flight plan, having an ATC authorization and operating clear of clouds with at least 1 mile flight visibility and a reasonable expectation of continuing to the destination airport in those conditions, may deviate from the instrument approach procedure and proceed to the destination airport by visual reference to the surface of the earth.

⁸ The distance (slant range) between the distance measuring equipment (DME) located on the airport and the aircraft's DME antenna.

VP FSS then contacted CRQ502, advised it of FAB866 at 3000 feet asl, 11 nm final Runway 25, and requested a position report. CRQ502 responded that it was 11 nm north of the airport out of 3000 feet asl, planning a RNAV 31 approach via the EPMIB fix (see Appendix A). CRQ502's flight path to EPMIB would take it across the final approach path for Runway 25 between SASUT and LORBI.

FAB866 initially saw CRQ502 on its airborne collision avoidance system (ACAS),⁹ which was set at the time on the 12 nm scale,¹⁰ but did not consider CRQ502 to be a concern at that point. FAB866 was level at 3000 feet asl and was configuring for the approach; CRQ502 was 2000 feet above. Upon seeing CRQ502 continue descent below 4000 feet asl,¹¹ FAB866 attempted to contact VP FSS on the MF. However, FAB866 was requested to standby while VP FSS communicated with CRQ502. Frequency congestion made effective communication extremely difficult.

As FAB866 prepared to turn onto the final approach path for Runway 25 over the SASUT fix, CRQ502 was 6 nm north-northwest of FAB866 on an intersecting flight path. As FAB866 continued the turn, the target for CRQ502 disappeared from the ACAS because of FAB866's attitude, which blocked the transponder signal of CRQ502. At 1220:01, VP FSS advised CRQ502 that FAB866 was currently at the same altitude of 3000 feet asl, at its 12 o'clock position for 3 nm and requested its intentions. At 1220:13, FAB866 reported on the MF that it had conflicting traffic and was commencing a missed approach (see Appendix B - Aircraft Flight Paths - vicinity Kuujuaq Airport). FAB866 received an ACAS traffic advisory (TA)¹² after the missed approach was initiated. Just prior to this call, the NAV CANADA auxiliary radar display system (NARDS) showed FAB866 at 3200 feet asl, and CRQ502, at 3000 feet asl, 2.0 nm apart laterally and approaching at right angles to each other. At 1220:19, VP FSS advised CRQ502 that the Boeing 737 was at its one o'clock position, one nm, at 3300 feet asl, in the missed approach and requested its intended altitude.

⁹ CAR 101.01 Airborne Collision Avoidance System, means an aircraft system based on transponder signals that operates independently of ground based equipment and is intended to provide aural and visual alerts to a flight crew on the risk of collision with an approaching aircraft equipped with a transponder (Referred to as traffic collision avoidance system (TCAS) in the United States.)

¹⁰ The ACAS in the First Air Boeing 737 has a 12 and 6 nm display range, and shows transponder-equipped aircraft within that range and vertically from 2600 feet below to 2600 feet above.

¹¹ The minimum published altitude within 25 nm of the final approach fix of the RNAV 31 approach was 2000 feet asl.

¹² Traffic advisory (TA) means aural and visual alerts and information on the position of other aircraft in the immediate vicinity.

At 1220:41, FAB866 started to communicate directly with CRQ502 on the MF to determine its intentions. CRQ502 had commenced a turn to the east, away from FAB866, and was descending through 2500 feet asl. At 1220:58 CRQ502 advised that it was remaining at 2000 feet asl and heading northeast. By this time, FAB866 had flown through the flight path of CRQ502 and the two aircraft were separated vertically by 1600 feet and increasing. Neither crew saw the other aircraft visually given that they were in cloud.

FAB866 was still heading toward the airport at 3400 feet asl and continued to broadcast its intentions on the MF. FAB866 also requested information on any traffic in the area that might conflict with their flight. VP FSS interjected at this point and provided additional traffic information on the King Air, which was on final approach for Runway 31 (13 nm from threshold) and AIE820, which was 15 nm southeast at 2000 feet asl.

At 1222, FAB866 informed that it intended to commence another RNAV 25 approach via the MEHON fix, descending from 4000 to 3000 feet asl, and that its flight path would be a downwind track for Runway 25. At the time, both CRQ502 and AIE820 were already proceeding away from the airport and not in conflict with FAB866. PSC102 continued inbound and landed on Runway 31 before FAB866 landed on Runway 25. There were no further conflicts and the three aircraft landed at CYVP without further incident.

Weather

At the time of the occurrence, the Kuujuaq forecast was as follows: wind 250° True (T) at 12 knots gusting to 22 knots, visibility greater than 6 statute miles (sm), few clouds at 1200 feet above ground level (agl), broken cloud at 4000 feet agl; temporarily between 0600 and 1200 visibility 5 sm, light snow showers, and broken cloud at 1200 feet agl. At 1200, the Kuujuaq actual weather was reported as follows: wind 220°T at 12 knots gusting to 17 knots, visibility 15 sm, scattered cloud at 3000 feet agl, overcast ceiling measured at 7000 feet agl, temperature 1°C, dew point -4°C, altimeter 30.32 inches of mercury, remarks stratocumulus cloud 4,¹³ altocumulus cloud 6. At 1223, a special observation reported the weather as follows: wind 250°T at 12 knots gusting to 19 knots, visibility 8 sm in light snow, few clouds at 3400 feet agl, overcast ceiling estimated at 6000 feet agl, temperature 0°C, dew point -2°C, stratocumulus cloud 3, stratocumulus cloud 7.

Flight Service Operations

There were two flight service specialists on duty at the CYVP flight service station at the time of the occurrence. One specialist was responsible for communicating with the aircraft and providing airport advisory, weather, traffic information, and vehicle control services. The second specialist was taking weather observations. There is no automatic terminal information service (ATIS) available at Kuujuaq airport. All weather and landing information is provided by the VP FSS on the MF.

¹³

Opacity of cloud measured in eighths of the sky obscured.

VP FSS provides information on aircraft movements to and from CYVP for the benefit of all aircraft operating within the MF zone. In the province of Quebec, all air traffic services are provided in either or both official languages and it is the pilots who determine in which official language they wish to communicate. The NAV CANADA *Flight Services Manual of Operations* (FS MANOPS) provides guidance and procedures for specialists to follow when operating in a bilingual environment.¹⁴ Communication between the CYVP FSS and AIE820 and PSC102 was in French. AIE820 later changed to English. All communication with FAB866 and CRQ502 was in English. A review of the recorded communication between the inbound aircraft and VP FSS revealed a number of instances where traffic or position information had to be repeated in the other official language to ensure that all aircrew had the required information. There were also instances in which the language of use for a particular flight was changed from one to the other and back, both by VP FSS and the aircrew. This added to the communication workload and also reduced the amount of time available on the MF for aircrew to coordinate their intentions among themselves.

Flight service specialists provide traffic information about other aircraft in a number of ways. The specialist may state an aircraft's position or bearing from a known fix or airport, or type of aircraft, or the specialist may state an aircraft's heading, altitude, and estimated time of arrival at the location.¹⁵ Specialists may use the NARDS to assist in monitoring aircraft movements and to provide traffic information and traffic updates. When the aircraft's radar target has been identified, the specialist may provide traffic information by stating the position of other traffic in terms of the 12-hour clock, distance, the direction in which the traffic is proceeding, aircraft type if known, and the relative speed and altitude information.¹⁶ The NARDS may not be used to assign or suggest headings or altitudes, or to provide emergency assistance.¹⁷ The specialists may assist pilots in coordinating aircraft movement to facilitate the safe, orderly, and expeditious flow of traffic, provided it is clear that they do not control aircraft movement.¹⁸ In the case of a potential conflict or another aircraft in close proximity, the specialist may alert an aircraft immediately as to where to look for the other traffic.¹⁹ In this instance, the NARDS range was set to 20 nm centred on CYVP Airport.

For the 11 minutes (660 seconds) between 1214, when the last of the four aircraft established contact on the MF, and 1225, when the conflict had ended, 91 per cent of the time (601 seconds) was taken up with verbal communications between the VP FSS and the four IFR aircraft inbound to CYVP. The remaining seconds were split up in primarily 1 to 3 second gaps during which no transmissions were made (see Appendix C - Communications Workload). VP FSS could see the radar targets for all four aircraft inbound to the airport. Due to the altitude and

¹⁴ FS MANOPS section 770

¹⁵ FS MANOPS sub-paragraph 414.4

¹⁶ FS MANOPS sub-paragraph 454.2

¹⁷ FS MANOPS sub-paragraphs 451.2, 451.3 and 451.4

¹⁸ FS MANOPS sub-paragraph 414.10

¹⁹ FS MANOPS sub-paragraph 414.11

flight paths of AIE820 and PSC102, the VP FSS was concerned about a potential conflict. Between 1217:05 and 1219:17, VP FSS passed traffic information to these two aircraft and requested updates on their intentions. During this time, the VP FSS had not noticed that CRQ502 and FAB866 were on converging courses to the northeast of the airport.

Traffic Level

CYVP is a hub airport in Quebec's northern area. Commercial carriers provide local flights to smaller communities as well as scheduled flights to and from southern Quebec. There were 13 129 local and itinerant aircraft movements in 2008. In the past five years, traffic increased an average of six per cent per year (see Appendix D – Kuujuaq Airport Movements and Trend by Quarter). Many of the commercial aircraft flying into CYVP are medium to large passenger aircraft capable of carrying 50 or more passengers.

The traffic situation at CYVP at the time of the incident was moderate and complex. The VP FSS was required to pass and continually update traffic information to four inbound IFR aircraft, all estimating the airport within a few minutes of each other. The traffic often comes in spurts, normally comprising two busy periods in the day – before noon and in the late afternoon. The mix of visual flight rules (VFR) and IFR traffic, multiple runways, and approaches in use at one time, and the use of different languages can, at times, make CYVP a complex traffic area.

Airborne Collision Avoidance System

The ACAS provides two levels of alert of conflicting traffic. A TA indicates to the crew that there is a potential conflict within a specified time (usually 40 seconds). If the system then determines that the potential conflict has progressed to the point where action is required to resolve the situation safely, a resolution advisory (RA) is annunciated to the crew. Action by the crew is dictated by company procedures, but the crew is normally required to follow the RA instruction unless positive visual contact has been made with the intruding aircraft. Current CARs specify which types of aircraft, flying in specified airspace, must be equipped with a functioning ACAS.²⁰

FAB866 and CRQ502 were equipped with ACAS. The ACAS on CRQ502 was not functioning during the flight from Kangirsuk to CYVP.²¹ As a result, the CRQ502 crew was unaware of their proximity to FAB866 while it was on final approach to Runway 25. It could not be determined why the ACAS did not function; however, there had been reports of previous intermittent ACAS operation on this aircraft. The ACAS on FAB866 operated correctly;

²⁰ The new ACAS regulations are effective for newly manufactured aeroplanes weighing more than 5700 kg, operating under Subparts 702, 703, 704 and 705 of the CARs (with a few exceptions) on the date the regulations were promulgated, 01 July 2007. All aeroplanes (weighing more than 5700 kg, operating under Subparts 702, 703, 704 and 705 of the CARs; again with a few exceptions) will have to be in compliance by 01 July 2009.

²¹ The CARs, when fully in effect for all commercial aircraft, will provide conditions under which it is permissible to operate these aircraft without a serviceable ACAS unit.

however, the range is limited to 12 nm. For a short time when FAB866 was turning onto final approach, no ACAS display was available, likely because the aircraft attitude blocked the signal. FAB866 received a TA from its ACAS, but had already initiated a missed approach before the TA was received.

Airspace

Canadian domestic airspace has seven classifications. The classification of an airspace structure determines the operating rules, the level of air traffic service (ATS) provided within the structure and, in some instances, communications and equipment requirements.²² The airspace in the vicinity of CYVP below FL 180 is class G uncontrolled airspace. This means that IFR and VFR flights are not subject to control and aircrew must rely on communicated traffic information, received either directly from other aircraft transmitting on the en route frequency or relayed by a FSS or flight information centre (en route) to maintain safe spacing.

The airspace within 5 nm of CYVP up to 3200 feet asl is designated as a MF area. There is a MF published (122.2 MHz) at CYVP. In accordance with CAR 602, aircraft operating to or from CYVP are required to make specific reports to the FSS on the MF; for example, arriving IFR aircraft are required to indicate their intentions prior to entering the MF area and make specific position reports.

The FSS at CYVP provides airport advisory, weather, traffic and vehicle control services. With multiple aircraft inbound during instrument meteorological conditions (IMC), the complexity can increase substantially. The TSB has investigated two other occurrences (A04Q0049 and A07Q0213) that took place in the vicinity of an airport located within class G uncontrolled airspace. In both cases, the aircraft crews, flying under IFR, were unable to develop an accurate traffic picture, thereby increasing the risk of a collision occurring.

Published Instrument Approaches at CYVP

At the time of the incident, there were nine instrument approaches published for the CYVP Airport. Four of these approaches required aircraft to be capable of conducting a RNAV approach. The two approaches used by FAB866 and CRQ502 were, respectively, the RNAV 25 and RNAV 31. Two of the entry points (EPMIB and ETLAB) for the two approaches were 2.85 nm apart. There are no restrictions on the route the crew takes to get to the initial fix for the chosen approach. Altitudes indicated on the approach charts are minimum safe altitudes established for each segment of the approach. Pilots may fly the approach at whichever altitude is suitable for their aircraft and situation. This close proximity of the approaches and lack of standardized arrival routes can present a hazard for aircraft conducting approaches to the two runways simultaneously via the published fixes. It is not readily possible for aircrew to determine that the two fixes are in close proximity or that their projected flight paths to one of the entry fixes may intersect with another approach.

Analysis

The airspace above CYVP is uncontrolled below FL 180. This means that there is no air traffic control service or separation provided. Flight crews must rely on communicated traffic information either directly from other aircraft or relayed by the VP FSS to ensure aircraft separation.

Traffic information was provided extensively, and the aircraft maintained altitudes and flight paths in accordance with published procedures. There were, however, a number of safety factors that contributed to a risk of collision between FAB866 and CRQ502.

During the construction activity on Runway 25, a NOTAM had been issued closing the runway to all aircraft. However, an exception was arranged to allow First Air to use Runway 25. This exception was not known to other operators. This resulted in a number of queries to VP FSS why one aircraft was allowed to land and others were not. This added to the frequency congestion.

Once the aircraft were in uncontrolled airspace, the aircrew have the responsibility of avoiding a collision by arranging or coordinating safe spacing from other aircraft based on direct communication with other aircraft or traffic information provided by the VP FSS. Flying IFR in uncontrolled airspace allows aircraft to fly in IMC but does not provide aircraft to aircraft separation as is the case in controlled airspace.

For the 11 minutes before the conflict between FAB866 and CRQ502 had been resolved, 91 per cent of available air time was taken up with verbal communications between the VP FSS and the four IFR aircraft inbound to CYVP. There was little opportunity remaining for the crews to resolve conflicts and come to an agreement on an orderly arrival sequence. On several occasions, it was also apparent that crews did not hear or did not understand the traffic information provided by other aircraft even though they were listening on the common frequency. This required the VP FSS to repeat the traffic information – often in the other official language. Because the weather was IMC, it was unlikely crews would see other aircraft visually while inbound to the airport and on approach to the runway, and, in fact, neither crew acquired the other aircraft visually.

Aircraft crew and the VP FSS have the responsibility to provide relevant traffic information. Traffic information provided in the format of relaying position reports as distances from a fix along with altitude information and airport estimate can be time consuming, and requires the receiving crew to mentally – or with the use of a chart – plot the other aircraft's position in order to formulate a traffic picture and to determine if a conflict exists. This is especially critical when aircraft are approaching the airport from different directions and conducting approaches to different runways. Neither the crew of CRQ502 nor FAB866 were aware of the point at which their flight paths would conflict. A risk of collision resulted when CRQ502 and FAB866 flew towards each other at the same altitude in IMC, without visual contact.

The VP FSS's workload was high while relaying traffic information and providing airport advisory services; the specialist did not have time to radar identify all the individual aircraft. Therefore, the VP FSS passed non-radar-based traffic information to FAB866 and CRQ 502, and only changed to radar-based traffic information when the aircraft were 3 nm apart, at the same altitude, on conflicting flight paths. As a result, FAB866 and CRQ502 could not quickly form an accurate mental image of the traffic picture and take appropriate early action to avoid a conflict. There was no separation plan developed by the crews while they were communicating on the en route frequency 126.7 MHz because their situational awareness of the traffic flows was not accurately developed, based on the available traffic information.

In environments such as uncontrolled airspace where no IFR separation is provided, ACAS has proven to be a useful tool to avoid mid-air collisions. The requirement for commercial aircraft manufactured before July 2007 to be equipped with a functioning ACAS did not come into effect until July 2009. CRQ502 was equipped with ACAS, but it was not working on this flight due to an intermittent fault. As a result, the crew was not aware of the potential conflict with FAB866. Based on limited ACAS information and traffic information from VP FSS, FAB866 abandoned the approach and commenced a missed approach in order to ensure safe spacing and to re-evaluate the traffic situation.

In order for CRQ502 to fly the RNAV 31 approach starting at the EPMIB entry point, the aircraft had to fly across the approach area for the RNAV 25 approach. Although minimum altitudes are published on the approach charts, pilots may use their discretion on what altitude to maintain. Without standard arrival routes or specific requirements to fly at published altitudes, there is a risk of collision if aircrew do not take into consideration the approaches to other runways when they are transitioning to their chosen approaches. Because individual approaches are published on separate pages, it is difficult for pilots to visualize how other approach paths may affect their own approach. The proximity of entry fixes for RNAV 25 (ETLAB)²³ and RNAV 31 (EPMIB) could also lead to a risk of collision when aircraft are manoeuvring at these fixes simultaneously.

With increasing traffic levels at CYVP, more instances of multiple aircraft inbound to multiple runways and IMC weather, complexity increases considerably, and the risk of a mid-air collision is also increased. In this case, the collision risk was reduced because FAB866 carried a functioning ACAS that provided a warning to the crew of the proximity of another aircraft.

²³ All fixes associated with the RVAV (GNSS) RWY 25 approach were changed, both in name and location, in November 2008. The ETLAB fix was changed to IMUVA and its location changed by approximately 0.31 nm.

Findings as to Causes and Contributing Factors

1. Neither the crew of Air Creebec 502 (CRQ502) nor First Air 866 (FAB866) were aware of the point at which their flight paths would conflict. A risk of collision resulted when CRQ502 and FAB866 flew toward each other at the same altitude in instrument meteorological conditions (IMC), without visual contact.
2. Although traffic information was extensively exchanged among all four aircraft arriving at the Kuujuaq Airport, Quebec, it was ineffective in preventing a risk of collision developing between FAB866 and CRQ502.
3. Due in part to frequency congestion and in part to the lack of adequate awareness of each other's location, the crews of FAB866 and CRQ502 were unable to develop an effective separation plan.
4. CRQ502 was equipped with airborne collision avoidance system (ACAS), but it was not working on this flight due to an intermittent fault. As a result, the crew was not aware of the extent of the risk of collision with FAB866.
5. The limited closure of Runway 25 increased the opportunity for conflict on approach to the two runways and also contributed to frequency congestion.

Findings as to Risk

1. Aircraft flying under instrument flight rules (IFR) rules in uncontrolled airspace are not provided with any form of air traffic control service. This increases the risk of collision when multiple aircraft are inbound to the airport, especially when flying in IMC and multiple runways are in use.
2. The RNAV approach plates for Runway 25 and Runway 31 at Kuujuaq Airport, published on separate pages, do not indicate any information about the close proximity of the two entry fixes, EPMIB and ETLAB. There are no standard arrival routes or procedures for aircraft to join the published instrument approaches to any of the runways at Kuujuaq Airport. As a result, it may not become obvious to pilots flying one or the other approach that there is a potential for a risk of collision while manoeuvring to their selected approach.

Safety Action

Action Taken

Transport Canada

Transport Canada has produced an article for Aviation Safety Letter 1-2010, which was published in January 2010, regarding this occurrence.

Airport Authority

The day after this incident, the NOTAM (Notice to Airmen) was revised to read “CYVP RWY 07/25 CLSD 1100/1600 AND 1715/2200 DLY 0810231100 TIL 0811082200”.²⁴ The revised closure times opened a window from 1600 UTC (1200 Eastern Daylight Time (EDT)) until 1715 UTC (1315 EDT) for operations on Runway 07/25 by all arriving and departing aircraft.

Safety Concern

Structure of Airspace

The airspace in the vicinity of Kuujuaq Airport (CYVP) below FL 180 is class G uncontrolled airspace. This means that instrument flight rules (IFR) and visual flight rules (VFR) flights arriving and departing CYVP are not provided with control services. To maintain safe spacing, aircrew must rely on traffic information received directly from other aircraft, from a flight information centre on the enroute frequency, or from the Flight Service Station (FSS) on the mandatory frequency (MF).

The FSS at CYVP (VP FSS) provides airport advisory, weather, traffic information, and vehicle control services. With multiple aircraft inbound during instrument meteorological conditions (IMC), the complexity can increase substantially. VP FSS is equipped with the NAV CANADA auxiliary radar display system (NARDS), but cannot use this tool to provide separation instructions to aircraft.

Aircrews and the VP FSS have the responsibility to provide relevant traffic information. Relaying position reports as distances from a fix along with altitude information and airport estimate can be time consuming and requires the receiving crew to mentally, or with the use of a chart, plot the other aircraft's position in order to formulate a traffic picture and to determine if a conflict exists. This is especially critical when aircraft are approaching the airport from different directions and conducting approaches to different runways in IMC. Also, the VP FSS must ensure that information is passed in the other official language, depending on which language is used by the aircrew, contributing to frequency congestion.

²⁴

Times in NOTAM are Coordinated Universal Time (UTC).

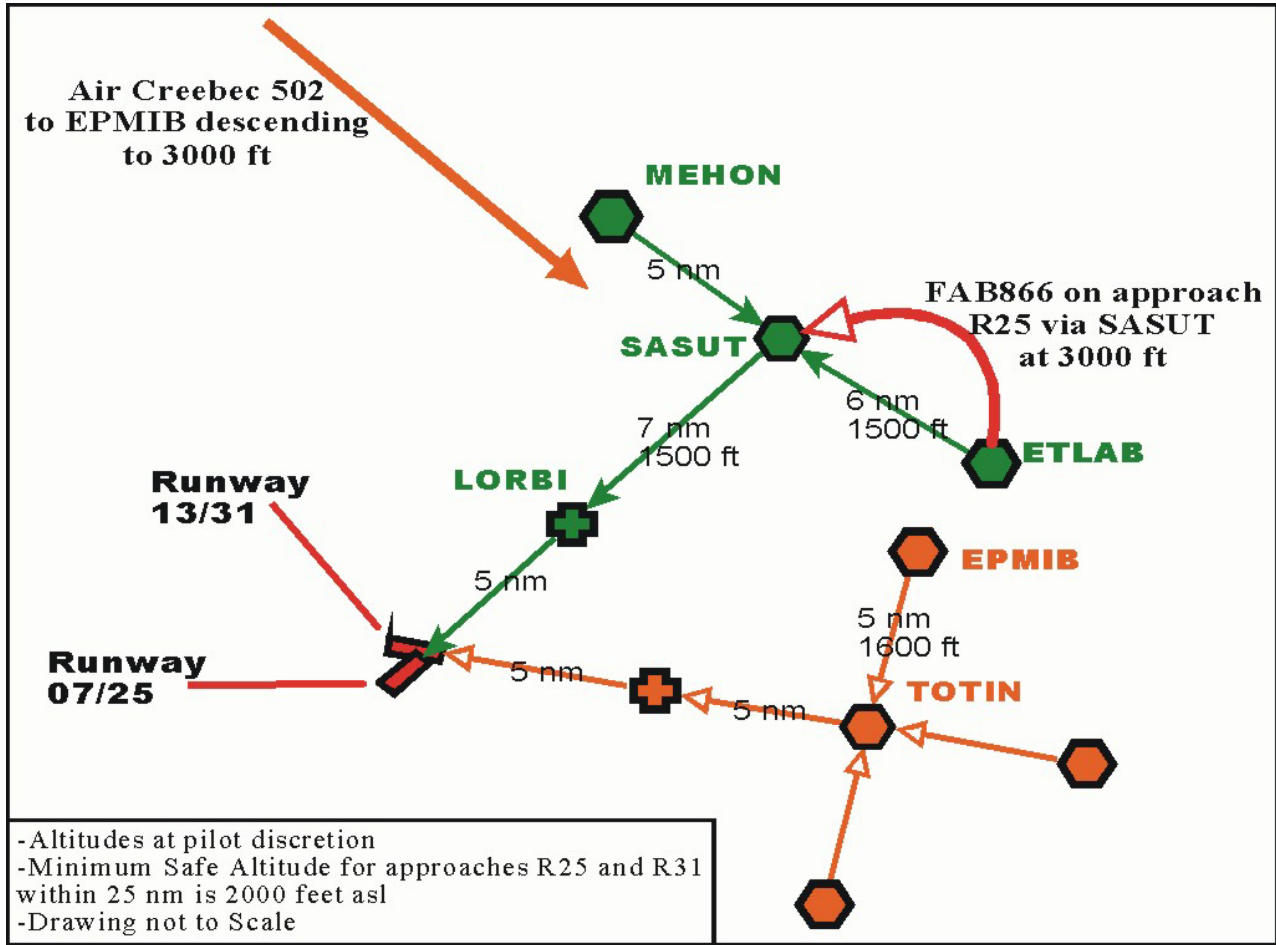
Although traffic information was extensively exchanged among all four aircraft arriving at CYVP, it was ineffective in preventing a risk of collision developing between FAB866 and CRQ502. With four inbound aircraft and the FSS trying to communicate traffic and airport information, the resulting frequency congestion hampered efficient and timely communications. As a result, neither the crew of CRQ502 nor FAB866 were aware that their own flight paths would conflict on the final approach path for Runway 25. A risk of collision resulted as the CRQ502 and FAB866 flight paths crossed at the same altitude in IMC, without visual contact.

IFR flights arriving and departing CYVP are not provided with control services because the airspace in the vicinity of CYVP below FL 180 is class G uncontrolled airspace. With increasing traffic levels at CYVP, more instances of multiple aircraft inbound to multiple runways flying in uncontrolled airspace under IFR in IMC weather, the complexity of the traffic situation increases considerably. As a consequence, so does the risk of mid-air collision. The Board is concerned that NAV CANADA and Transport Canada may not have an accurate picture of the level of risk at CYVP and, moreover, whether positive separation of IFR aircraft is required to reduce the risk to aircraft, passengers, crews, and the environment. One means of addressing this concern would be for NAV CANADA to conduct an aeronautical study to properly assess whether positive separation of IFR aircraft is warranted. The Board will continue to monitor this safety issue.

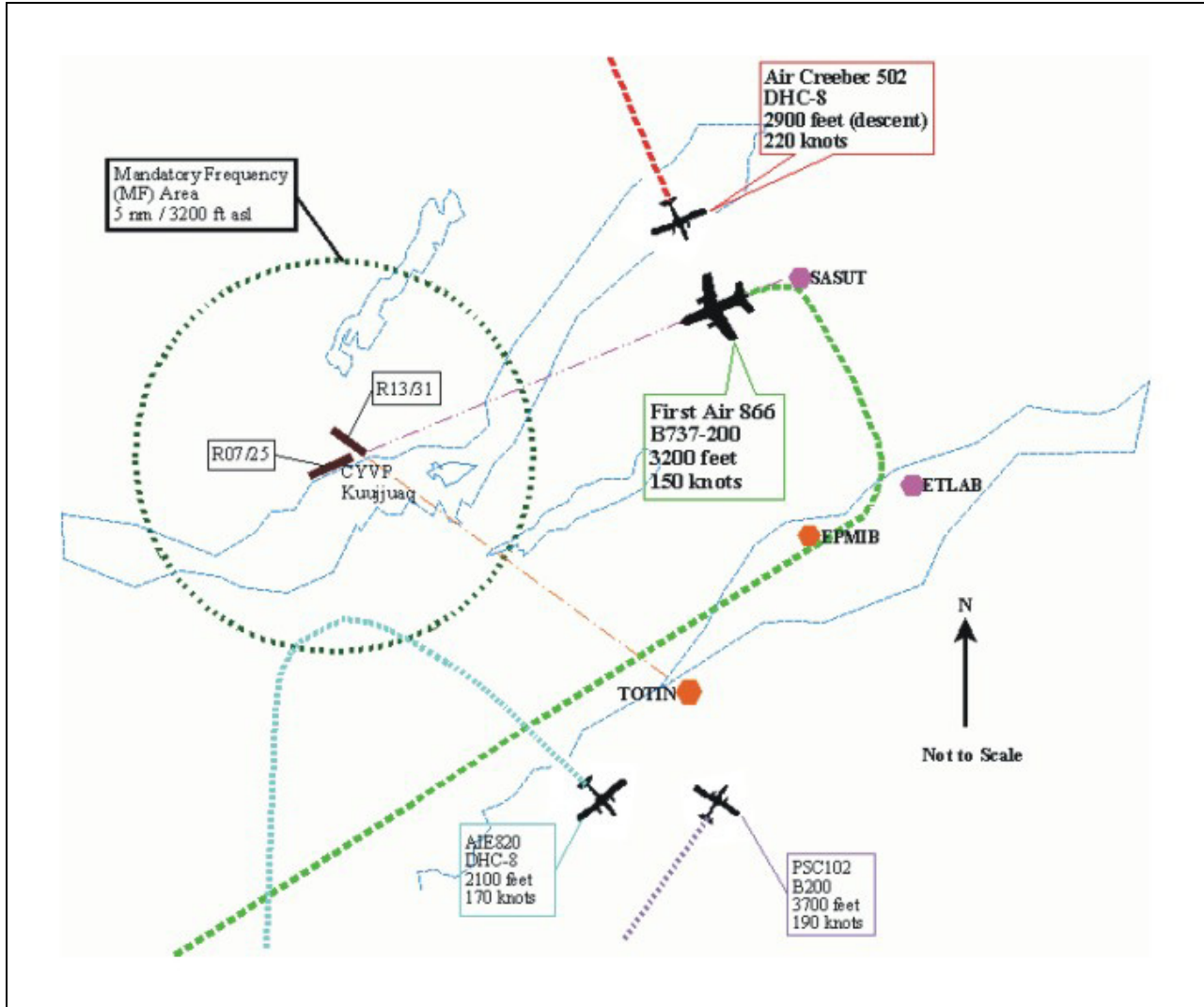
This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board authorized the release of this report on 21 April 2010.

Visit the Transportation Safety Board's Web site (www.bst-tsb.gc.ca) for information about the Transportation Safety Board and its products and services. There you will also find links to other safety organizations and related sites.

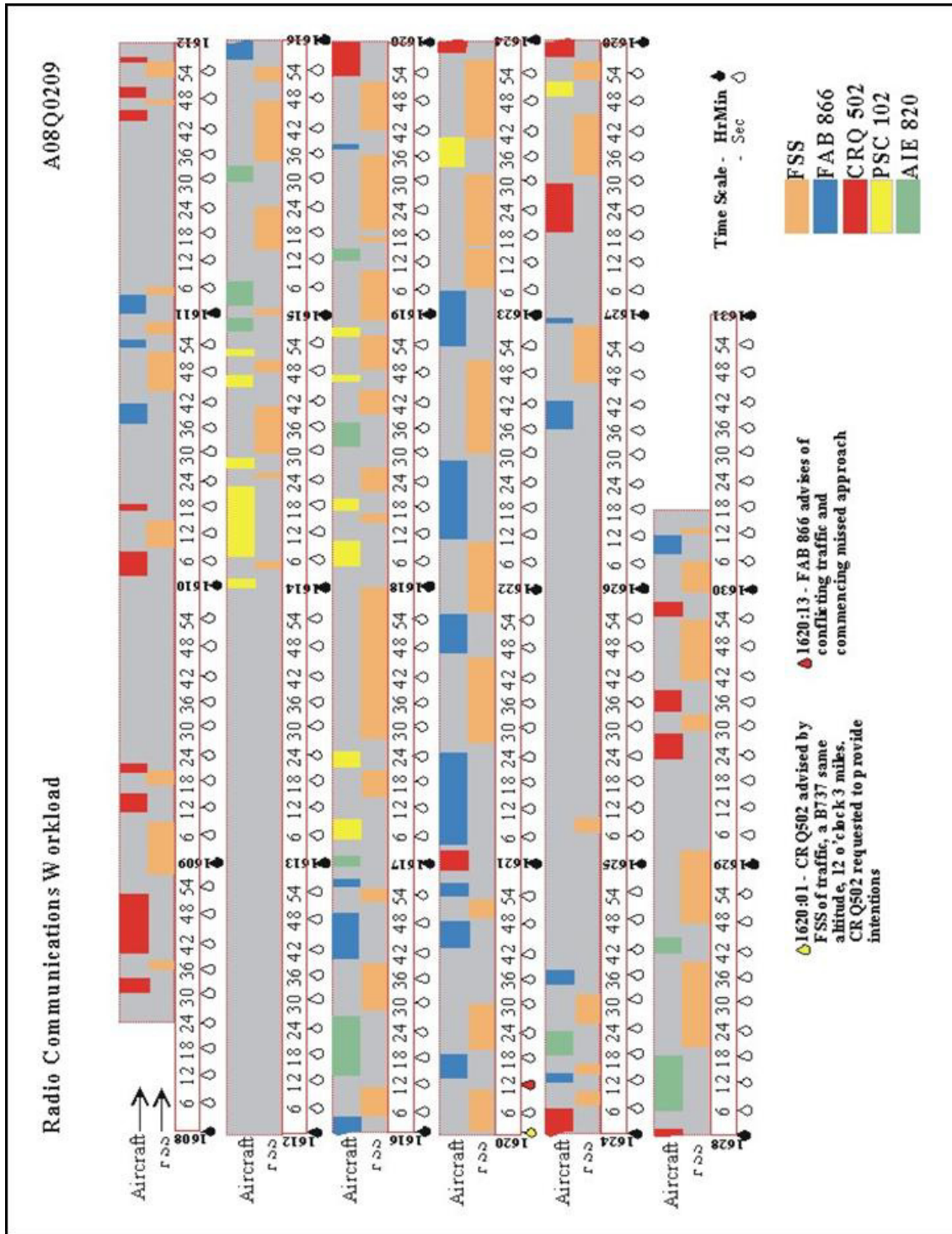
Appendix A – Proximity RNAV Approach Fixes Runways 25 and 31 at Kuujjuaq Airport (CYVP)



Appendix B – Aircraft Flight Paths – Vicinity of Kuujuaq Airport (CYVP)



Appendix C – Communications Workload



Note: times indicated are UTC (EDT plus four hours)

Appendix D – Kuujjuaq Airport (CYVP) Movements and Trend by Quarter

