TRANSPORTATION SAFETY BOARD OF CANADA
BOARD CONCERN A06Q0188-D1-C1

DATE ISSUED: 21 February 2007

FORWARDED TO:

The Honourable Lawrence Cannon, P.C., M.P.
Minister of Transport

SUBJECT: Bombardier CRJ Flap Failures

Background

On 21 November 2006, Air Canada Jazz CL-600-2B19 Canadair Regional Jet (CRJ) Flight 8205 (registration C-GJZF, serial number 7545), with 49 passengers and 3 crew members on board, was being operated as a scheduled flight from Vancouver, British Columbia, to Prince George, British Columbia. At about 1514 Pacific standard time, the aircraft was cleared for a non-precision approach on Runway 33 at Prince George Airport. While established on final approach, and the aircraft configured for the landing with flaps set at 45 degrees, the flight crew conducted a missed approach. However, the flaps did not come up when selected, remaining at 45 degrees. The flight crew requested a diversion to their alternate airport, Grande Prairie, Alberta, and subsequently decided to go to Fort St. John, British Columbia, which was slightly closer. While en route, the flight crew attempted to recycle the flaps circuit breakers, but this did not clear the fault. At 1616, the aircraft landed without further problem at Fort St. John with about 500 pounds of fuel remaining. The Transportation Safety Board of Canada (TSB) investigation into this incident (A06Q0188) is ongoing.

Flap Drive System

On the CRJ, flaps are extended or retracted by a series of drive units and flexible shafts connected to actuators (see Appendix A). A flap electronic control unit (FECU) supplies the commands and monitors the performance of the components and flap position as the flaps are extended and retracted. Flap selection is made by moving the flap control lever in the cockpit to one of the flap position detents. When a flap problem is detected by the FECU, a signal is sent that causes a disconnect relay to operate, the associated power drive unit to stop, and both flap brakes to engage. The flaps remain set at whatever position they were in when the problem was detected.

Historical Data

A statistical review of the TSB database of reported flap events since 2005 indicates an ever increasing number of flap failures experienced by CRJ aircraft. There were 20 reported occurrences in 2005 and 28 in all of 2006. In the month of January 2007, the TSB received 24 reports of flap failure, suggesting that the frequency of CRJ flap failures is increasing. A flap failure occurrence is not in itself a reportable occurrence under the TSB regulations; therefore, the TSB database may not include all failures of this type.

Transport Canada (TC) and the United States Federal Aviation Authority (FAA) maintain a Service Difficulty Reporting (SDR) database.[1] A search of the SDR databases in Canada and the United States for the period 01 January 2006 to 01 January 2007 on flap problems revealed that 381 of 751 reported flap events occurred on CRJ series models aircraft. This represents 50 per cent of reported events. It was noted that SDR reports from the months of December, January, February and March represent 43 per cent of the 381 SDRs, with the remaining months of the year (8) comprising 57 per cent.

Previous Regulatory and Other Action

TC first issued an Airworthiness Directive[2] (AD) related to flap problems on the CRJ on 06 July 1998. This AD was issued because of a number of flap system failures that resulted in a twisted outboard flap panel and was issued to prevent an unannunciated failure of the flap system, which could result in a flap asymmetry and, consequently, reduced controllability of the aircraft.

The AD was divided into six parts and addressed areas such as operations, maintenance, modifications to the systems, and monitoring. The date for completing all actions associated with this AD was 31 December 2006.

The FAA also issued an AD for the same aircraft included in the TC directive, effective 21 July 2006, and included, among other requirements, the replacement of some flap actuators within 12 months of the date of the AD.

Bombardier Aerospace has initiated a comprehensive review of the flap system on the CRJ, and based on the results of the review, plans to formalize work instructions to correct the problem.

The TSB has not issued any previous safety action related to this issue.

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1 The purpose of the SDR system is to collect, analyze, record and disseminate data concerning defects, failures and malfunctions that have resulted in or may potentially result in a safety hazard to an aircraft or its occupants. It is intended to use the reported information in support of regulatory activities to improve the level of aviation safety.

2 "airworthiness directive"—means an instruction issued by the Minister or by a civil aviation authority responsible for an aeronautical product type design that mandates a maintenance or operation action to ensure that an aeronautical product conforms to its type design and is in a condition for safe operation (Section 101.01 of the *Canadian Aviation Regulations*).

Unsafe Condition and Underlying Factors

As has been shown above, even with the application of the AD, the number of reported occurrences of flap failure continues to increase. The problem with the flap system on the CRJ has been known for more than 10 years. Although there have been no accidents as a direct result of these problems, and the risk of an accident directly related to a flap failure remains low, there is a potential that a flap failure, combined with other circumstances, could lead to a serious incident or accident. The ongoing TSB investigation into the near fuel exhaustion occurrence in British Columbia shows that a flap failure at a critical time, combined with adverse weather and lack of suitable alternate airports, could lead to an accident. A flapless landing by a CRJ results in a significant increase in landing speed (upwards of 30 per cent). Combined with less-than-ideal runway conditions or other unexpected factors, the potential for an accident is increased. A flap failure could also serve to distract the crew and lead to a more serious mistake or oversight, with potential negative effects on the successful outcome of the flight.

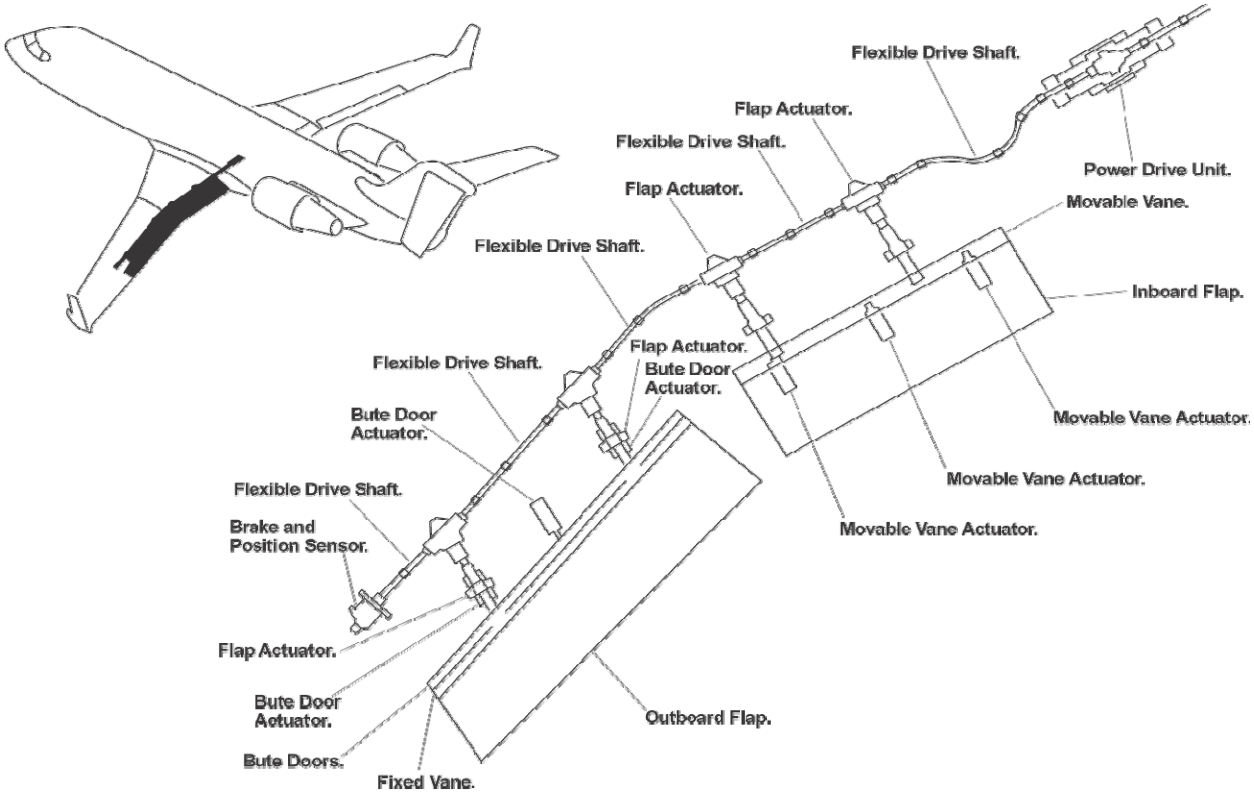
Board Concern

The Board is concerned that, despite best efforts by the industry and regulators alike to reduce the number of flap failures in the CRJ fleet, that number is increasing. As indicated by the above-noted occurrence under investigation by the TSB, it has been shown that a CRJ flap failure clearly has the potential to lead to a much more serious incident or an accident.

The Board requests that the Minister advise the Board of its action plan, both short and long term, to substantially decrease the number of flap failures on CRJ aircraft. The Board will continue to monitor this safety issue.

Wendy A. Tadros
Chair
on behalf of the Board

Appendix A – Flap Drive System



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