

**DHC-8-402,
G-FLBE**

**In flight from Newquay
Airport to London
Heathrow Airport**

14 November 2019

Serious Incident

Investigation Synopsis

Shortly after takeoff in a strong crosswind, the pilots noticed that both handwheels were offset to the right in order to maintain wings level flight. The aircraft diverted to Exeter Airport where it made an uneventful landing.

The handwheel offset was the result of a break in a left aileron cable that ran along the wing rear spar. In the course of this investigation it was discovered that the right aileron on G-FLBE, and other aircraft in the operator's fleet, would occasionally not respond to the movement of the handwheels. Non-reversible filters were also fitted to the operator's aircraft that meant that it was not always possible to reconstruct the actual positions of the control wheel, column or rudder pedals recorded by the Flight Data Recorder.

The aircraft manufacturer initiated safety actions to improve the maintenance of control cables and to determine the extent of the unresponsive ailerons across the fleet. Three Safety Recommendations are made in this report for the unresponsive aileron and filtering of the control position data.

Safety Recommendation 2020-024

Justification

The investigation discovered that aileron control surfaces on some DHC-8-400 aircraft were freezing in flight. This SR requires TC to investigate further.

Therefore, the following safety recommendation was made:

Safety Recommendation 2020-024

It is recommended that Transport Canada require De Havilland Canada to determine why the aileron control surfaces on the DHC-8-400 series of aircraft can become unresponsive to handwheel movements and ensure that the findings and any rectification action is promulgated to operators.

Date Safety Recommendation made: 08 October 2020

LATEST RESPONSE

Response received: 16 September 2022

The United Kingdom Air Accidents Investigation Branch (AAIB) has determined that the aileron became unresponsive due to aileron cable failure.

Transport Canada (TC) National Aircraft Certification (NAC) has been working with the manufacturer who has reviewed FDR data collected from operators pertaining to the aileron system on the DHC-8-400 aircraft.

Transport Canada agrees with the manufacturer's conclusion that the aileron control surfaces should not become unresponsive to handwheel movements if the system is properly maintained. This conclusion is based on the examination of 27 FDR files and an absence, as of April 2022, of any pilot reports of unresponsive aileron in De Havilland Canada reporting databases.

TC would also like to advise the AAIB that De Havilland Canada issued service letter SL-27-027 which provided information and recommendations reminding operators of the importance of proper maintenance practices of the aileron and spoiler wing circuit cables.

Transport Canada has completed and closed its investigation into this incident.

Safety Recommendation Status

Closed

AAIB Assessment

Partially Adequate

Action Status

No Planned Actions

Feedback rationale

It is not possible to establish if the 36 aircraft with unresponsive ailerons reported by the AAIB were due to inadequate maintenance as the operator ceased trading before this part of the investigation could be completed.

Regarding the comment that there have been no pilot reports of unresponsive ailerons. Control surface positions are not displayed in the cockpit and the spoilers will continue to respond if the ailerons do not move, which the manufacturer has advised is sufficient to control the aircraft. Moreover, the investigation examined the FDR data from 51 aircraft and established that 36 showed evidence of unresponsive ailerons, none of which were reported by the flight crews.

The AAIB recognises that De Havilland Canada have issued a Service Letter reminding operators of the required maintenance. (EU Regulation 996/2010 article 18 refers).

RESPONSE HISTORY

Response received: 16 September 2021

The purpose of this letter is to provide an update on Transport Canada's progress in addressing AAIB Safety Recommendation 2020-024.

Transport Canada has been in regular communication with the manufacturer who is working with operators of the affected aircraft to gather data regarding serviceability and maintenance of the aileron system.

Reduced flying, caused by the pandemic over the past year and a half, has limited the amount of data that is available. As restrictions start to ease and flying recommences we anticipate being able to proceed with an analysis of the data collected. Transport Canada expects to be able to provide a more substantive update on this recommendation by 31 March 2022.

AAIB Assessment – Partially Adequate Open

Response received: 17 December 2020

The United Kingdom Air Accidents Investigation Branch (AAIB) has determined that the aileron became unresponsive due to aileron cable failure.

Transport Canada (TC) National Aircraft Certification (NAC) accepts the recommendation and is working with the manufacturer to collect data necessary to determine what corrective action is appropriate to ensure the integrity of the aileron control system and the usability of Flight Data Recorder (FDR) for the ailerons.

Any corrective action that is determined to be mandatory will be promulgated to operators as part of NAC's Continuing Airworthiness program.

AAIB Assessment – Partially Adequate Open

Safety Recommendation 2020-025

Justification

Recording filtered parameters for primary flight controls makes it difficult to reproduce the flight from the stored data.

Therefore, the following safety recommendation was made:

Safety Recommendation 2020-025

It is recommended that the European Union Aviation Safety Agency require that the flight data recorder system fitted to DHC-8-400 series of aircraft registered in the United Kingdom record unfiltered data for the parameters representing primary flight control input positions and input forces, so that their original sensor signal values can be reliably established.

Date Safety Recommendation made: 08 October 2020

LATEST RESPONSE

Response received: 31 March 2023

The safety concern described in the safety recommendation is not considered to be an unsafe condition that would warrant Airworthiness Directive (AD) action under Regulation (EU) 748/2012, point 21.A.3B. However, the European Union Aviation Safety Agency (EASA) has published Safety Information Bulletin SIB No.: 2023-02 on 01/02/2023.

This SIB explains that starting from DHC-8-400 serial number 4472 onwards, for which the first individual Certificate of Airworthiness was issued on July 2014, all aeroplanes were delivered with an updated Flight Signal Conditioning Unit (FSCU) that does not filter control input position parameters and input force parameters.

The SIB also observes that alternatively, the existing FSCU can be replaced with the updated one, in accordance with the Aircraft Illustrated Part Catalogue which details the qualified interchangeability conditions and the Aircraft Maintenance Manual which provides instructions on how to carry out the replacement.

The SIB is published on the EASA website, at the following link: <https://ad.easa.europa.eu/ad/2023-02>.

By means of this SIB, for aeroplanes with a serial number below 4472 and not equipped with an updated FSCU, EASA recommends the implementation of SB 84-31-65 Rev B (or later revisions).

Safety Recommendation Status Closed

AAIB Assessment Not Adequate

Action Status Planned Action Completed

Feedback rationale

The Safety Recommendation was for EASA to require that the flight data recording system records unfiltered data for the parameters representing primary flight control input positions and input forces. This would be consistent with the requirements of the FAA. The issue of an SIB does not require, but only recommends that operators remove the filters by fitment of a flight signal conditioning unit part number 1152862-5. It is considered unlikely that operators will respond to the EASA recommendation with aircraft continuing to operate with filtering in place. This could have an impact on future safety investigations as the filtering is not reversible. Therefore, the response from EASA is considered to be Not Adequate. (EU Regulation 996/2010 article 18 refers).

RESPONSE HISTORY

Response received: 27 July 2021

The European Union Aviation Safety Agency is analysing this safety recommendation in cooperation with the Type Certificate Holder - De Havilland Aircraft of Canada.

An update will be provided once a decision has been reached on the orientation to be given to this topic.

AAIB Assessment – Partially Adequate Open

Safety Recommendation 2020-026

Justification

Filtering parameters by the Flight Data Recorder makes it difficult to reconstitute the flight.

Therefore, the following safety recommendation was made:

Safety Recommendation 2020-026

It is recommended that the International Civil Aviation Organisation provide guidance on the recording of filtered parameters by the flight data recorder system. The guidance should address as a minimum:

- 1) Definitions for filtered and unfiltered parameters.
- 2) Parameters on the FDR for which filtering is not permitted.
- 3) The need to be able to reconstruct the original sensor signal values from filtered data recorded during extremely dynamic conditions and that the information to achieve this is a permanent part of the aircraft specific FDR system documentation package.

Date Safety Recommendation made: 08 October 2020

LATEST RESPONSE

Response received: 08 January 2021

With respect to the above-mentioned safety recommendation, the proposal for providing guidance material on the recording of filtered and unfiltered parameters by the FDR system will be referred to the Flight Recorder Specific Working Group (FLIRECSWG) of the Flight Operations Panel (FLTOSP) for further study. The next FLIRECSWG meeting is scheduled for February 2021.

Safety Recommendation Status Open

AAIB Assessment Partially Adequate

Action Status Planned Action Ongoing Update Due 31 December 2021

Feedback rationale

The AAIB thanks ICAO for their response and looks forward to the update from FLIRECSWG on the response to this Safety Recommendation. (EU Regulation 996/2010 article 18 refers).

RESPONSE HISTORY

N/A