

## ACCIDENT

<b>Aircraft Type and Registration:</b>	DHC-8-402 Dash 8, G-ECOH
<b>No &amp; Type of Engines:</b>	2 Pratt & Whitney Canada PW150A turboprop engines
<b>Year of Manufacture:</b>	2008 (Serial no: 4221)
<b>Date &amp; Time (UTC):</b>	7 February 2014 at 0922 hrs
<b>Location:</b>	Overhead Isle of Man
<b>Type of Flight:</b>	Commercial Air Transport (Passenger)
<b>Persons on Board:</b>	Crew - 4                      Passengers - 71
<b>Injuries:</b>	Crew - 1 (Serious)      Passengers - 1 (Minor)
<b>Nature of Damage:</b>	None
<b>Commander's Licence:</b>	Airline Transport Pilot's Licence
<b>Commander's Age:</b>	60 years
<b>Commander's Flying Experience:</b>	12,200 hours (of which 3,900 were on type) Last 90 days - 171 hours Last 28 days - 56 hours
<b>Information Source:</b>	Aircraft Accident Report Form submitted by the pilot

## Synopsis

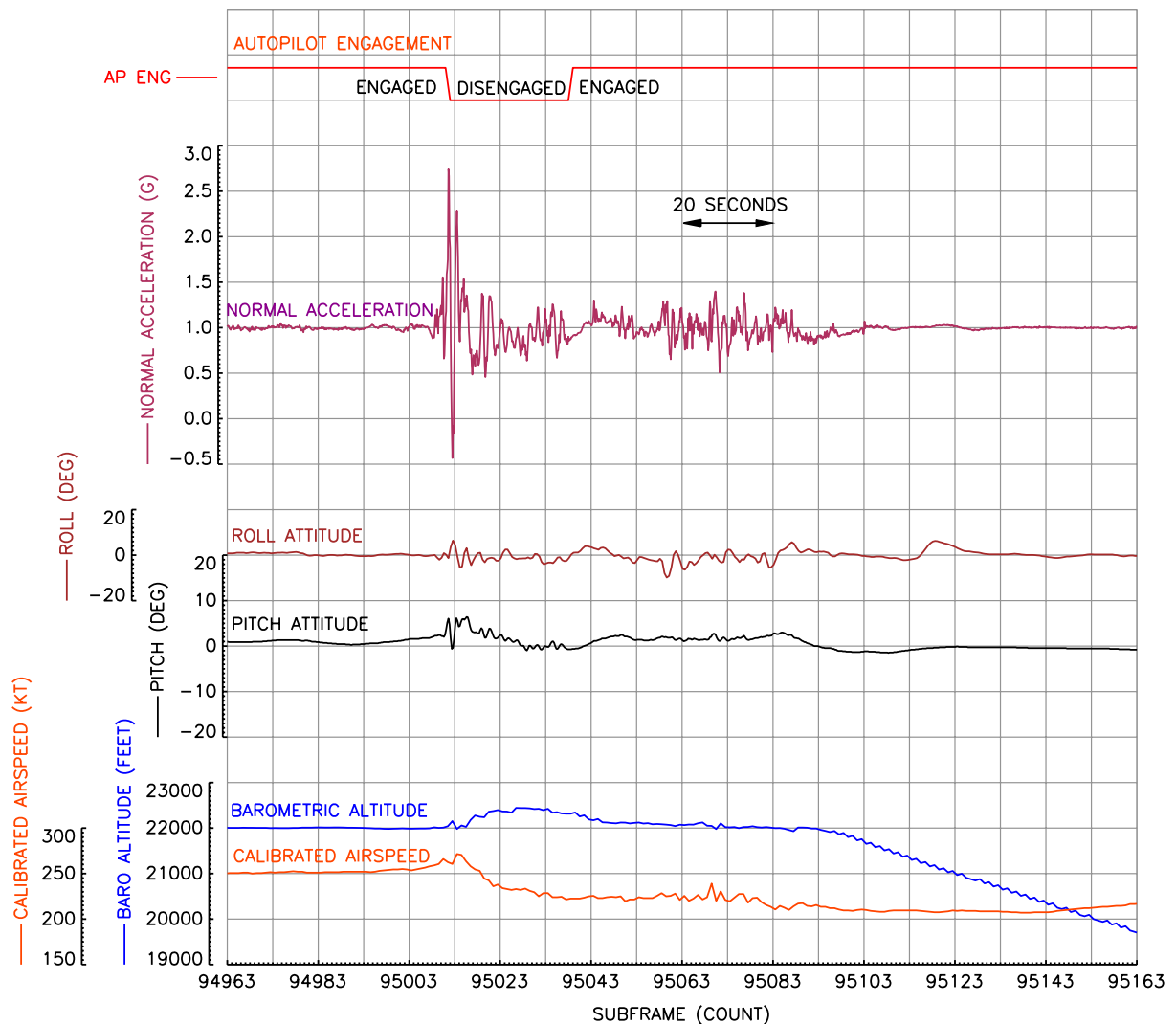
The aircraft experienced a sudden onset of severe turbulence when in cruise flight, in VMC, at FL220. A cabin crew member was seriously injured.

## History of the flight

The event occurred on a scheduled flight between Birmingham Airport and Belfast City Airport. The aircraft was in the vicinity of the Isle of Man in VMC and had been in cruise flight at FL 220 for 17 minutes when there was a sudden onset of severe turbulence. The flight conditions until then had been smooth and the seatbelt signs were OFF. The airspeed increased rapidly, the autopilot disconnected and the aircraft climbed, reaching a maximum level of FL225. The co-pilot, who was the pilot flying (PF), assumed manual control, closed the power levers and descended back to FL 220. After 25 seconds he re-engaged the autopilot. The severe turbulence moderated after a few seconds (see Figure 1) but remained at a moderate level and the flight crew initiated a descent.

In the passenger cabin, one of the cabin crew members was thrown off her feet and sustained serious injuries. She was given medical assistance by a doctor, who was travelling as a passenger, and transferred to hospital after landing at Belfast. One passenger suffered a minor injury.

The aircraft was inspected after the incident, in accordance with requirements in the Aircraft Maintenance Manual, and no damage was evident.



**Figure 1**

Recorded parameters derived from FDR data

### Recorded data

The FDR data indicated that the aircraft was in smooth flight conditions until the onset of the event at 0922 hrs. A maximum normal acceleration of +2.74g was recorded, followed by a minimum of -0.43g.

Recorded radar data for the area was available and examined for evidence of a possible wake turbulence encounter. No evidence was found of any other aircraft that could have had a significant effect on G-ECOH.

## Other information

In their on-board passenger announcements, the operator includes a recommendation that seatbelts are kept fastened, even when the seatbelt signs are OFF, as sudden turbulence is always a possibility.

## Meteorological information

The Met Office provided an aftercast, in which the available recorded data was reviewed, modelled and analysed to provide an assessment of the possibility of Clear Air Turbulence<sup>1</sup> (CAT) in the area. The data showed that during the morning a deep area of low pressure over the Atlantic had moved rapidly to the east, building a transient ridge of high pressure over the United Kingdom (UK). There were two strong jetstreams (both over 100 kt) either side of the UK, which would have given rise to a large windshift. A wind data model at 400 hPa (FL240) showed that a large windshear would have been close to the Isle of Man at 0900 hrs and there were indications of a temperature gradient in the same area. Either or both of these factors can give rise to CAT. Analyses of the other available data suggested that cumulonimbus (CB) activity was not likely to have caused the turbulence and that this was a CAT event arising as a result of a large windshear in the vicinity of the Isle of Man.

The *Fixed Time Prognostic Chart(s) ICAO Area EURO SIGWX* [Significant Weather] *FL100 to FL 450*, issued at 0600 hrs and 1200 hrs on 6 February 2014 and valid, respectively, at 0600 hrs and 1200 hrs on 7 February 2014, were available to the flight crew (see Figures 2 and 3). The charts present a confusing picture but showed the proximity of the two jetstreams. The area over the Isle of Man was not shown as a likely CAT area. However, it should be noted that these charts are produced 24 hours prior to their period of validity.

## Discussion

The aircraft probably encountered an area of CAT whilst in otherwise smooth air. CAT was not indicated on the forecast for the Isle of Man area, which was produced 24 hours in advance. The Met Office aftercast, using more up to date recorded meteorological data and data modelling, showed that some of the prevailing conditions, notably wind and temperature gradients, were conducive to the presence of CAT.

The operator's passenger announcements include advice regarding the fastening of seatbelts, in case of sudden turbulence.

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## Footnote

<sup>1</sup> Met Office definition within the Forecasters Reference Book is: '*Clear Air Turbulence (CAT) refers to any turbulence not associated with cloud. It is usually applied only to medium- and high-level disturbances.*'

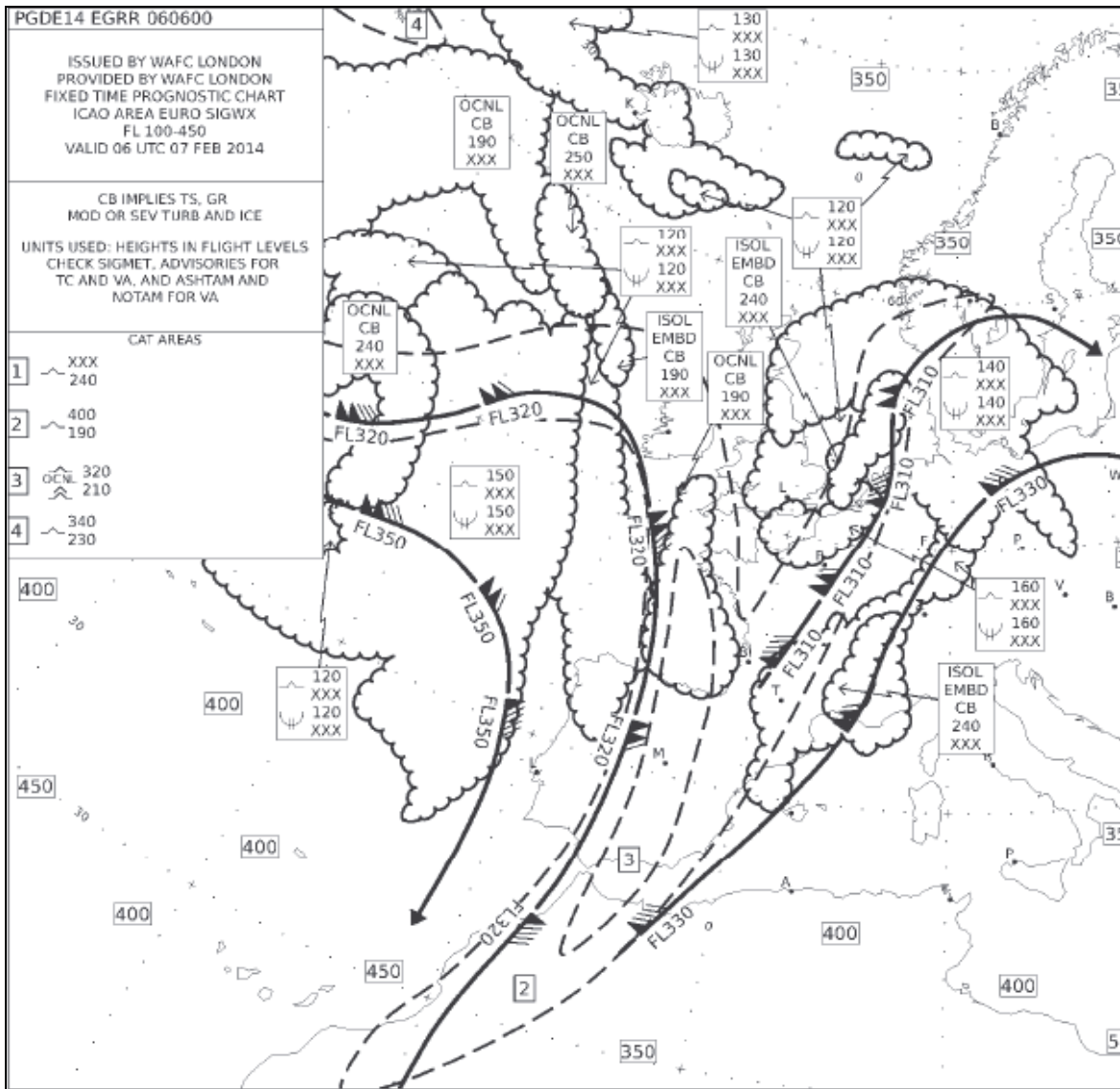


Figure 2

Significant weather chart valid 0600 hrs UTC 7 February 2014

