

**SERIOUS INCIDENT**

<b>Aircraft Type and Registration:</b>	Boeing 737-8AS, EI-DWS	
<b>No &amp; Type of Engines:</b>	2 CFM56-7B26 turbofan engines	
<b>Year of Manufacture:</b>	2008 (Serial no: 33625)	
<b>Date &amp; Time (UTC):</b>	9 January 2016 at 1630 hrs	
<b>Location:</b>	During descent into Liverpool Airport	
<b>Type of Flight:</b>	Commercial Air Transport (Passenger)	
<b>Persons on Board:</b>	Crew - 6	Passengers - 173
<b>Injuries:</b>	Crew - None	Passengers - None
<b>Nature of Damage:</b>	None reported	
<b>Commander's Licence:</b>	Airline Transport Pilot's Licence	
<b>Commander's Age:</b>	41 years	
<b>Commander's Flying Experience:</b>	12,000 hours (of which 8,700 were on type) Last 90 days - 178 hours Last 28 days - 70 hours	
<b>Information Source:</b>	Aircraft Accident Report Form submitted by the pilot and inquiries made by the AAIB	

**Synopsis**

The aircraft was descending towards Liverpool Airport when the crew was presented with erroneous airspeed and altitude information on one of the two cockpit display systems. The crew took appropriate 'Airspeed and Altitude Unreliable' actions in accordance with the Quick Reference Handbook (QRH). In the later stages of the descent the airspeed and altitude returned to normal and the aircraft landed without further incident.

Subsequent diagnosis found the left (commander's) pitot probe to have a fault with its ice and rain protection heating element. Ordinarily this would not have affected the operation of the probe but the aircraft had encountered light to moderate icing conditions during its descent. Without the protection afforded by the pitot heater, it is likely that an ice restriction developed within the tube thus corrupting pitot pressure data fed into the aircraft system.

A similar event, to a Boeing 737-86N, EI-FHG, is included in this AAIB Bulletin.

**History of flight**

After an uneventful flight from Alicante the aircraft had commenced its descent into Liverpool. At FL110 the commander's indicated airspeed (IAS) and altitude (ALT) indications became erratic followed by an ALTN<sup>1</sup> caption on the electronic engine control

**Footnote**

<sup>1</sup> The ALTN caption indicates that the engine EEC is in alternate thrust setting mode in this case due to invalid flight condition data.

(EEC). The first officer's and the standby instruments were unaffected and appeared normal. The aircraft was in light to moderate icing conditions, in IMC, with a Total Air Temperature (TAT) of +8°C. At the time the first officer was the handling pilot and autopilot B was engaged. The erroneous indications had no effect on the aircraft flight path. The crew observed that shortly after the ALTN caution illuminated the autothrust made erratic thrust commands so they disengaged the autothrust and flew manual thrust for the remainder of the flight. The QRH checklist for 'Airspeed Unreliable' and EEC ALTN was actioned and it was confirmed that the first officer's and standby instruments were reliable data sources. The aircraft continued its descent and took up a hold at FL70 where two circuits were flown before radar vectors to the ILS Runway 09 (LPL) were resumed. Shortly after leaving the hold as the aircraft descended, the commander's airspeed and altitude indications returned to normal and there were no further erroneous readings during the approach and landing. There was no cockpit indication of a pitot system malfunction throughout the incident.

### **System description**

The Boeing 737 NG series are fitted with pitot probes mounted on the left and right of the fuselage just aft of the radome. The aircraft are also fitted with an auxiliary probe on the right side of the forward fuselage and two 'elevator pitot probes' on the fin. The probes incorporate heating elements which are part of the aircraft ice and rain protection systems. The probe assembly fitted to the left side of the aircraft is referred to as the commander's probe. The probe fitted on the right side is referred to as the first officer's probe. In addition there is a static plate fitted with separate orifices for the commander's and first officer's air data systems.

### **Analysis**

During the incident the commander noted that the symptoms appeared to indicate some form of blockage or restriction to his pitot probe thereby corrupting pitot information into the air data system. Icing was considered the plausible cause given the atmospheric conditions. Although the airspeed and altitude information was unreliable, there was not a complete loss of information which suggests only a partial blockage of the probe which alleviated as the aircraft continued its descent.

Subsequent fault diagnosis carried out by the operator found that the commander's (left side) pitot probe heater element had shorted to its casing. The item was replaced and the aircraft returned to service. The probe, Part No 0851HT, had accrued 17,864 hours and 10,385 cycles.

During this incident, as with previous similar events, there was no indication of pitot probe malfunction on the window/pitot heat panel. The aircraft manufacturer had issued Service Bulletin (SB) 737-30-1070 in April 2014 which introduced a minor modification to the pitot probe heater wiring. The modification ensures that in the event of a pitot heater malfunction, a master caution will appear in the cockpit. The SB compliance is at the Operator's discretion and in this case the Operator had scheduled it for this aircraft's next deep maintenance package.

**Conclusion**

The erroneous airspeed and altitude indication was likely to have been caused by partial and transient ice blockage of the commander's pitot probe whilst in light to moderate icing conditions. This was as a result of the failure of the pitot probe heating element. The partial icing conclusion is supported by the fact that the blockage alleviated itself in the descent when the IAS and ALT information returned to normal.