

SERIOUS INCIDENT

Aircraft Type and Registration:	Boeing 737-86N, EI-FHG	
No & Type of Engines:	2 CFM56-7B26/3 turbofan engines	
Year of Manufacture:	2010 (Serial no: 37884)	
Date & Time (UTC):	8 January 2016 at 2210 hrs	
Location:	On approach to London Gatwick Airport	
Type of Flight:	Commercial Air Transport (Passenger)	
Persons on Board:	Crew - 6	Passengers - 78
Injuries:	Crew - None	Passengers - None
Nature of Damage:	None reported	
Commander's Licence:	Airline Transport Pilot's Licence	
Commander's Age:	50 years	
Commander's Flying Experience:	13,385 hours (of which 9,985 were on type) Last 90 days - 182 hours Last 28 days - 67 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot and inquiries made by the AAIB	

Synopsis

The aircraft was on approach to London Gatwick when the crew was presented with erroneous airspeed and altitude information on one of the two cockpit display systems. The crew took appropriate 'IAS Disagree, ALT Disagree and Airspeed Unreliable' actions in accordance with the Quick Reference Handbook (QRH). In the final stage of the approach the airspeed and altitude returned to normal and the aircraft landed without further incident.

Subsequent diagnosis found the right (first officer'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 icing conditions during its descent. Without the protection afforded by the pitot heater, it is likely that an ice restriction developed within the tube, corrupting pitot pressure data fed into the aircraft system.

A similar event, to a Boeing 737-8AS, EI-DWS, is included in this AAIB Bulletin.

History of flight

During descent and approach to Gatwick (LGW) in light icing conditions the crew observed that the right-side airspeed indications dropped from 250 kt to 115 kt and the altitude differed from the left-side indication by 200 ft. This was immediately followed by an 'IAS and ALT disagree' master caution. The crew initiated 'IAS Disagree, ALT Disagree and Airspeed Unreliable' checklist actions and confirmed the left to be correct and the right

to be at fault. The commander elected not to disconnect the autopilot as he was content with the aircraft attitude and system parameters. The crew continued their descent from FL130 into a normal approach. At FL70 the crew noted that the autothrust was not getting 'N₁ limiting' values and was using degraded N₁ thrust limits from the Flight Management Computer. After selecting FLAP 1 the stick shaker activated, with attitude and N₁ within limits. The GPS ground speed and airspeed corroborated so no recovery action was taken. However, during the final stage of the approach, the first officer's airspeed indicator rose to 220 kt and altitude rose to 300 ft in agreement with the indications on the left-side displays. At this point the 'IAS and ALT disagree' caution disappeared. The crew continued to land the aircraft without further incident except that the Electronic Engine Control (EEC) ALTN¹ caution illuminated after landing but required no action. There was no cockpit indication of 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

About the time of the incident the commander noted they had entered light icing conditions observing the effect on the windscreen. When the 'IAS and ALT disagree' caution illuminated he concluded the cause to be a frozen pitot probe or static port. The aircraft responses to the various actions taken by the crew confirmed that a blockage within the first officer's pitot probe was the probable cause. 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.

The operator carried out fault diagnosis on the pitot-static system and found the first officer's pitot heater resistance to be out of limits. The probe, Part No 0851HT, had accrued 20,232 hours and 11,526 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 Service Bulletin compliance is at the Operator's discretion and in this case the modification is under consideration.

Footnote

¹ The ALTN caption indicates that the engine EEC is in alternate thrust setting mode, in this case due to invalid light condition data.

Conclusion

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