Decompression at altitude, Boeing 757-236, G-BIKL

Micro-summary: **This Boeing 757-236 experienced a decompression at altitude.**

Event Date: **1999-05-22 at 1245 UTC**

Investigative Body: **Aircraft Accident Investigation Branch (AAIB), United Kingdom**

Investigative Body's Web Site: **http://www.aaib.dft.gov/uk/**

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1. Accident reports can be and sometimes are revised. Be sure to consult the investigative agency for the latest version before basing anything significant on content (e.g., thesis, research, etc).

2. Readers are advised that each report is a glimpse of events at specific points in time. While broad themes permeate the causal events leading up to crashes, and we can learn from those, the specific regulatory and technological environments can and do change. ***Your company's flight operations manual is the final authority as to the safe operation of your aircraft!***

3. Reports may or may not represent reality. Many many non-scientific factors go into an investigation, including the magnitude of the event, the experience of the investigator, the political climate, relationship with the regulatory authority, technological and recovery capabilities, etc. It is recommended that the reader review all reports analytically. Even a "bad" report can be a very useful launching point for learning.

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Boeing 757-236, G-BIKL

AAIB Bulletin No: 11/99 Ref: EW/A99/5/1 Category: 1.1

Aircraft Type and Registration:	Boeing 757-236, G-BIKL
No & Type of Engines:	2 RB211-535C-37 turbofan engines
Year of Manufacture:	1983
Date & Time (UTC):	22 May 1999 at 1245 hrs
Location:	During cruise between Stockholm and London
Type of Flight:	Public Transport
Persons on Board:	Crew - 8 - Passengers - 117
Injuries:	Crew - Nil - Passengers - Nil
Nature of Damage:	None
Commander's Licence:	Airline Transport Pilot's Licence
Commander's Age:	52 years
Commander's Flying Experience:	10,300 hours (of which 4,325 hours were on type)
	Last 90 days - 159 hours
	Last 28 days - 41 hours
Information Source:	AAIB Field Investigation

History of flight

A new crew had taken over the aircraft for the flight from Stockholm to London Heathrow. The only unserviceability was that the right air conditioning pack had been inoperative for the last two sectors that day. In accordance with the Dispatch Deviation Manual (DDM), G-BIKL had been cleared to continue the series of flights but not to exceed three flight days before completion of repairs; the crew were required to confirm that high flow was operating normally on the remaining pack and were to limit altitude to FL 350 or below.

Following a normal take off and climb, the commander, as handling pilot, established the aircraft in the cruise at FL310. Then, between 'AMRAN' and 'DANDI' reporting points, the 'L ENG BLEED OFF' message illuminated on the Engine Instrument Crew Alert System (EICAS) and the associated light went off. The commander checked the pressurisation and noted that the cabin altitude was climbing at approximately 2,000 feet/min. He instructed the first officer to ask Copenhagen ATC for an immediate descent and the aircraft was immediately cleared to FL250. As they descended, the controller asked if they would require a further descent and the crew declared a

'PAN', requesting descent to FL100 and a diversion to Hamburg. During the descent, the commander gave the handling duties to the first officer and he then reviewed the non-normal checklist for 'Engine Bleed Off' in the Quick Reference Handbook. The final action in the checklist is for the 'Isolation Switch' to be selected 'On'. When this was selected, the pressurisation began to recover to normal. The crew recalled that this occurred at approximately FL140 and that the maximum displayed cabin altitude was 9,000 feet. By now, the aircraft was under the control of Bremen ATC and the crew cancelled the 'PAN' call but stated that they would continue with the diversion into Hamburg.

The commander briefed the cabin staff and the passengers and continued with the diversion into Hamburg, asking for priority when ATC advised that aircraft were being held prior to approach. An uneventful approach and landing was made at Hamburg.

Recorded information

The Cockpit Voice Recorder was not removed from the aircraft for replay as its 30 minute recording duration was insufficient to retain information from the incident.

The Flight Data Recorder (FDR) was removed and replayed. Time histories of the recovered data showed that the event occurred 49 minutes after the aircraft reached cruise altitude. At the time, the aircraft was level at FL 310 and at 290 kt IAS; the left environment control system (ECS) pack was operating in 'hi-flow' and the right ECS pack was 'off'. The status of engine bleed is not recorded on the FDR so the event was identified by two VHF transmissions followed, 15 seconds later, by a descent. This descent continued at 6,000 feet/min to FL100. Approximately one minute into the descent, the left ECS pack was no longer in 'hi-flow' and one minute later the pack showed 'off'. Two minutes after reaching FL 100, the isolation valve opened and the left pack switched 'on'; shortly afterwards, the left pack entered 'hi-flow'. Thirty nine minutes after beginning the descent, the aircraft landed.

During the incident, no warnings were recorded by the FDR. One discrete parameter, which is recorded, indicates when the cabin altitude exceeds 10,000 feet; this was not activated.

Engineering information

A review of the technical log showed a series of reports of 'left bleed off' in cruise, with no fault found on the subsequent checks. After one report, on 18 May, the aircraft self test equipment gave a firm indication of a fault in the left engine speed card, and this was changed. On the incident flight, as the aircraft was operating with the right hand pack unserviceable, the failure of the left engine bleed system resulted in the loss of air supply to the remaining pack, and gradual depressurisation of the aircraft. Subsequent checks carried out on the left hand system did not reveal any defects, however, the pressure regulating and shut-off valve, and the reverse flow check controller were replaced as a precaution, and the aircraft has since returned to service with no recurrences reported to date.

A similar air conditioning system failure occurred G-BIKG, operated by the same company, on 10 June 1999. An emergency descent was carried out following a cabin altitude warning in the cruise, on the aircraft in which the right hand air conditioning pack had been rendered inoperative under a Allowable Deferred Defect. (See AAIB Bulletin 9/99 page 43)

The operator had in place two systems to detect repeat defects; copies of the last 10 technical logs were available on the aircraft for the flight deck and maintenance crews, and the computerised maintenance data system checked for three recurrences in the last 100 sectors. Neither system would have detected the long thin trail of defects on G-BIKL.

As a result of the investigation of these two incidents, the operator has drafted changes to the company's DDM reminding captains and ground engineers of the need to review the defect history when applying DDM requirements. However, access to the defect history beyond that detailed in the last 10 technical logs carried on the aircraft may still remain a problem.