Boeing 737-3Y0, G-IGOG, 25 May 2000 at 2020 hrs

AAIB Bulletin No: 8/2000 Ref: EW/G2000/05/17 Category: 1.1

Aircraft Type and Registration:	Boeing 737-3Y0, G-IGOG
No & Type of Engines:	2 CFM CFM56-3B1 turbofan engines
Year of Manufacture:	1988
Date & Time (UTC):	25 May 2000 at 2020 hrs
Location:	Overhead Brussels
Type of Flight:	Public Transport
Persons on Board:	Crew - 5 - Passengers - 71
Injuries:	Crew - None - Passengers - None
Nature of Damage:	No damage
Commander's Licence:	Airline Transport Pilot's Licence
Commander's Age:	34 years
Commander's Flying Experience:	5,965 hours (of which 419 were on type) Last 90 days - 233 hours Last 28 days - 65 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot

The aircraft was on a scheduled flight from Venice to London Stansted. It was established in the cruise at FL 350 and no turbulence was experienced. In the vicinity of Brussels the commander noticed his ears popping and checked the cabin altitude rate of climb which indicated cabin pressure climbing at nearly 2,000 feet/min. Before the First Officer could select the standby system, the pressurisation reverted automatically into standby with no effect. The First Officer selected manual operation to close the main outflow valve but the cabin altitude was still climbing.

The flight crew donned oxygen masks and initiated an emergency descent. The commander deployed the passenger oxygen masks by manual selection. Maastricht ATC assisted by assigning a radar vector, which ensured the aircraft remained clear of other traffic during its descent. The flight crew experienced some difficulty when communicating with each because the intercom volume button had not been pressed down. The First Officer selected transponder code 7700 during the descent, which was stopped at FL 100.

In the passenger cabin four cabin crew were conducting the in-flight service when the oxygen masks deployed. They immediately seated themselves, secured their seat belts and each put on an oxygen mask. The senior cabin crew member (SCCM) noticed that some passengers were changing their masks one for another, which he guessed was due to the passengers not sensing the flow of oxygen through the mask and assuming they were not working correctly. He made an announcement over the public address system reassuring the passengers and instructing them to keep the mask that they were using as they were in fact working. Whilst there was some concern amongst the passengers the situation remained controlled with passengers responding well to the reassurances and instructions given by the cabin crew. They secured the cabin and galleys and the SCCM received regular information from the flight deck, which he conveyed to the other cabin crew who in turn briefed the passengers. Since an emergency diversion was not required, and sufficient fuel was available, the flight continued to Stansted.

The operator, assisted by the manufacturer, conducted an engineering investigation into the cause of the depressurisation. A fault in the feedback loop between the pressure controller and the outflow valve was identified. The outflow valve was changed and, following ground and air testing, the aircraft was returned to service.

On 27 May 2000 the aircraft was flown from Stansted to Alicante without incident but on the return sector to Stansted, at the top of the descent, engine power was reduced and the cabin altitude began to climb at 4,000 feet/min. A PAN call was transmitted and the aircraft descended. The pressurisation reverted automatically to the standby mode, which controlled the pressurisation sufficiently to prevent the oxygen masks deploying. Given that there were no ill effects from this event, the flight was continued to Stansted at FL 100.

A further engineering investigation traced the cause to two separate system failures. One was an intermittent fault in the Number One Transfer Relay in the electrical system, which resulted in the cabin pressurisation controller adopting a 'Hold' mode (Boeing In-Service Activity Report No 98-16 refers). In this case the cabin outflow valve 'froze' in the cruise position and did not auto-fail to standby mode. A strip report for the relay confirmed some evidence of arcing/shorting.

In the second case an intermittent pneumatic defect, a sluggish High Pressure Shut-off Valve (HPSOV) on Number 1 engine, resulted in reduced air supply to the cabin when the thrust levers were retarded.

Either system failure occurring, as a sole event would not have resulted in cabin depressurisation, but when acting together there was insufficient air to maintain cabin altitude.