
Nicotine-induced pressurization failure, McDonnell Douglas MD-82, HB-INW,

Micro-summary: Nicotine deposits help contribute to pressurization controller failure.

Event Date: 1997-12-18 at 1930 UTC

Investigative Body: Air Accident Investigation Unit (AAIU), Ireland

Investigative Body's Web Site: <http://www.aaiu.ie/>

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AAIU Report No. 1998/ 011
AAIU File No. 19970060
Published: 26/11/1998

Aircraft Type and Registration: MD-82, HB-INW

No. and Type of Engines: 2 JT8D - 217

Aircraft Serial Number: 49569

Year of Manufacture: 1987

Date and Time (UTC): i) 18th. December 1997, 1930 hrs
ii) 19th. December 1997, 1425 hrs

Location: i) London FIR
ii) Shannon FIR

Type of Flight: i) Ferry Flight
ii) Test Flight

Persons on Board: 5 (3 flight crew; 2 engineers)

Injuries: None

Nature of Damage: None

Commanders Licence: Airline Transport Pilots Licence

Commanders Age: 42 years

Commanders Flying Experience: 7613 hours

Information Source: ATC Watch Manager, Shannon Airport.
Reports submitted to the AAIU by the
Commander and the Engineering
facility.

Synopsis

On the evening of Thursday 18th. December 1997, at approximately 1830 hours, HB-INW, an MD-82, departed Shannon Airport for a ferry flight to Zurich, after a heavy maintenance visit to an engineering facility at Shannon.

The pilot stated that on reaching FL 370 there was a loss of cabin pressure control, as they approached the STRUMBLE VOR. The crew attempted to regain control by placing the pressurisation system in manual mode.

This was unsuccessful and, as the cabin altitude was climbing rapidly, an emergency descent was commenced in accordance with the Operating Company's Flight Crew Emergency Checklist. In the descent, at FL 220, cabin pressurisation was stabilised and the cabin control system responded to normal control inputs.

After consultation with the onboard engineering specialists and, after system function checks, the aircraft re-commenced a stepped climb and the system was again checked when stabilised at FL 160 and FL 240.

At FL 310, however, control of the pressurisation system was again lost. As the cabin altitude was climbing rapidly an emergency descent was again conducted in accordance with the Operating Company's Flight Crew Emergency Checklist. In consideration of these events and the aircraft fuel situation the commander decided to return to Shannon for a technical investigation and rectification. They landed at 2005 hours.

Following a de-brief of the aircrew by the engineering facility staff, two troubleshooting teams were formed, one team to investigate the cabin-pressurisation system and the other to investigate named components in the air conditioning system. This investigation continued through the night of the 18/19th. December. The air conditioning system was function checked and when the aircraft was pressurised on the ground, all systems operated normally with no binding or restriction felt at the cabin air outflow valve, (considered to be the cause of the original problem by the pilots). The aircraft was then readied for a test flight in the Shannon area on the 19th. December, to verify the systems serviceability.

After take-off the system was successfully checked, with no binding, during the stepped climb up to FL 310. On stabilising at this level and after switching the cabin pressure control system to manual, the outflow valve stuck completely. It was not possible to close the valve and, as cabin altitude climbed rapidly, the crew initiated an emergency descent in accordance with the Operating Company's Flight Crew Emergency Descent Checklist. At FL 250 the valve was found to be free again. The aircraft landed in Shannon at 1455 hours. Further detailed technical investigations continued.

Troubleshooting

The engineering facility contacted the aircraft manufacturer, McDonnell Douglas, who stated that a similar problem had occurred with other operators and, in those cases, the defect was caused by a combination of worn valve bearings and a nicotine deposit build up on the valve.

In following up the manufacturers suggestion the cabin air outflow valve was disassembled, the bearings were replaced and the valve was cleaned, reassembled and reinstalled, per the Operating Company's Maintenance Manual. Further tests, however, showed that the valve was still stiff to operate.

On the morning of 20th. December authorisation was received from SWR engineering to ferry the aircraft unpressurised to Zurich (due to spare parts availability at Zurich to aid troubleshooting). Two employees of the Shannon engineering facility also travelled on this flight.

That evening a replacement valve was flown in from Austria, and fitted to the aircraft as per the McDonnell Douglas Maintenance Manual - the engineering Company's staff had earlier discovered a slight anomaly between the operators Maintenance Manual and the McDonnell Douglas Maintenance Manual in the matter of certain critical clearances between the sides of the cabin outflow nozzle valve and the nozzle body. The correct instructions are to be found in the McDonnell Douglas Maintenance Manual, Chapter 21.32.05, page 506, figure 503. This anomaly was pointed out by the engineering facility to the aircraft operator in Switzerland.

On the 21st. December, following a successful test flight up to FL 370, the aircraft landed in Zurich at 1230 hours approximately, where, following a post flight debriefing, the aircraft was subsequently released for commercial operations.