

## Shorts SD3-60 Variant 100, G-BNMW

<b>AAIB Bulletin No:</b>	<b>Ref: EW/G2001/02/24</b>	<b>Category: 1.1</b>
<b>Aircraft Type and Registration:</b>	Shorts SD3-60 Variant 100, G-BNMW	
<b>No &amp; Type of Engines:</b>	2 Pratt & Whitney PT6A-67R turboprop engines	
<b>Year of Manufacture:</b>	1987	
<b>Date &amp; Time (UTC):</b>	26 February 2001 at 1026 hrs	
<b>Location:</b>	Departing from Glasgow Airport	
<b>Type of Flight:</b>	Public Transport	
<b>Persons on Board:</b>	Crew - 3	Passengers - 13
<b>Injuries:</b>	Crew - None	Passengers - None
<b>Nature of Damage:</b>	None	
<b>Commander's Licence:</b>	Airline Transport Pilots Licence	
<b>Commander's Age:</b>	45 years	
<b>Commander's Flying Experience:</b>	2,860 hours (of which 1,242 were on type)	
	Last 90 days - 173 hours	
	Last 28 days - 49 hours	
<b>Information Source:</b>	Aircraft Accident Report Form submitted by the pilot and investigation by the operators Quality Manager	

The aircraft was scheduled for a passenger flight from Glasgow Airport to Islay. On arrival at the aircraft, the commander noted significant deposits of snow on all the upper surfaces of the aircraft. He instructed that the passengers be boarded and then for the whole aircraft to be de-iced. The passengers were boarded and the de-icing was completed, using Type II de-icing fluid. At 0958 hrs the aircraft was pushed back from the stand and the engines were started, with both air conditioning bleed valves and the airframe anti-ice systems selected ON before taxi. There was a delay in the departure due to the weather and traffic and so, as the aircraft entered Runway 05 for departure, both the commander and the first officer checked the aircraft for any signs of snow contamination. Both pilots noted that the aircraft was clear of snow and that there was still de-icing fluid evident on the airframe. Both air conditioning bleed valves were selected OFF for the take-off.

The aircraft took off at 1024 hrs. On reaching approximately 900 feet the 'After take-off' checks were complete and both air conditioning valves were selected ON. The commander continued the

climb but was contacted, at about 2000 feet, by the cabin attendant who advised him that the rear of the cabin was filling up with dense dark grey smoke and that this smoke had a 'chemical' rather than burning smell. The commander informed the cabin attendant that they would be returning to Glasgow and that she should complete her emergency checks.

The commander declared a MAYDAY to Glasgow Approach at 1026 hrs, requesting an immediate return for a radar-vectoring ILS approach to Runway 05 and instructed the first officer to switch OFF both air conditioning valves. He also advised the passengers that the crew were aware of the smoke and would be returning to Glasgow Airport, with an evacuation on the runway, and that there would be heavy braking after landing. The cabin attendant checked the cabin for signs of heat sources; although the cabin was clearing slightly, dark grey or black smoke at foot level had been reported by the passenger in seat 8C. During the descent the crew checked each anti-ice system in turn for excessive electrical loads. Finding the electrical loads normal, the commander left all the anti-ice systems ON. The cabin attendant advised that most of the smoke had cleared and the commander instructed that the evacuation would be from the left rear door, after lowering the steps, but that, should the smoke increase or fire develop, all exits were to be used.

The crew followed ATC vectors, landing at 1035 hrs on Runway 05. The Airport Fire Service was in attendance and the commander ordered an evacuation after completing the engine shutdown checks. The evacuation was orderly and the commander confirmed to the Fire Service that no persons remained on board and that all aircraft systems had been isolated. The Fire Service completed a check of the aircraft, using thermal imaging equipment, but found no trace of fire or heat source. However, a large quantity of de-icing fluid was noted, dripping from the aircraft.

### **Technical investigation**

An investigation was conducted by the operator's Quality Manager. It became apparent that the smoke had been a product of substantial amounts of de-icing fluid, which had entered either the engine intakes and/or the cabin conditioning pack ducts, contaminating the air conditioning system. The heating of this air had then resulted in the smoke emanating from the cabin ducts.

The records showed that some 500 litres of fluid had been used to de-ice this particular aircraft, several times the quantity normally required. There had been no 'brushing off' of the snow deposits before the spray was applied and the Operator's procedures did not require that engine intake blanks should be fitted prior to the de-icing process. Following this incident, the operator has reviewed its Winter Operations Manual and de-icing procedures with the ground handling organisation.