BULLETIN CORRECTION

INCIDENT

Aircraft Type and Registration:	Boeing 737-73V, G-EZKA
No & Type of Engines:	2 CFM56-7B20 turbofan engines
Year of Manufacture:	2003
Date & Time (UTC):	28 December 2005 at 1840 hrs
Location:	6 miles west of Newcastle, Northumbria
Type of Flight:	Public Transport (Passenger)
Persons on Board:	Crew - 5 Passengers - 128
Injuries:	Crew - None Passengers - None
Nature of Damage:	None
Commander's Licence:	Airline Transport Pilot's Licence
Commander's Age:	47 years
Commander's Flying Experience:	11,121 hours (of which 4,380 were on type) Last 90 days - 206 hours Last 28 days - 78 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot and subsequent enquires by the AAIB

AAIB Bulletin No 4/2006, page 49 refers

An incorrect figure (**Figure 1** - Location of APU air inlet on Boeing 737-700) was inadvertedly printed in the above report in the April bulletin. The complete report is reproduced below:

Synopsis

Prior to the flight the aircraft was de-iced due to snow accumulation. During a 'No Engine Bleed Air Takeoff', in which APU bleed air was in use, fumes and smoke entered the cockpit and cabin causing some passengers to suffer from eye and throat irritation. After isolating the APU bleed air and selecting engine bleed air the fumes dissipated. The aircraft returned to Newcastle and the passengers were offered medical attention. The fumes were as a result of de-icing fluid entering the APU air inlet during the initial climb out.

History of flight

The aircraft was being prepared for a scheduled flight from Newcastle to Budapest. During the walkaround checks the flight crew noticed large amounts of snow had accumulated on all the upper surfaces of the

airframe, wings and tailplane. Once all the passengers had boarded, the aircraft was de-iced to remove the accumulated snow and ice.

Performance limitations on the aircraft necessitated a takeoff to be made with all available engine power. This required the use of full engine thrust and the bleed air from both engines to be switched off. Bleed air from the APU was then used for air conditioning and pressurisation during the takeoff and initial climb.

The taxi and takeoff were without incident. However, on passing 300 ft, in the climb, the commander sensed a faint smell in the air, after which the first officer noticed thick black smoke appearing from behind the commander's left shoulder. The smoke quickly filled the cockpit, so the flight crew donned their oxygen masks. At the same time the cabin crew contacted the flight crew to inform them that the cabin air was also contaminated.

The suspicion was that the bleed air from the APU had become contaminated and had entered the air conditioning system. The first officer isolated the APU bleed air and changed over to engine bleed air; the fumes and smoke quickly dissipated.

A PAN was declared and a request made to ATC for an immediate return to Newcastle. During this time several passengers began to complain of eye and throat irritation. After landing, the passengers were deplaned and offered medical assistance in the terminal building.

Aircraft examination

A detailed examination of the aircraft by the maintenance organisation did not reveal any defect with the aircraft, bleed air or air conditioning system.

Previous events

A review of the CAA's Mandatory Occurrence Report database revealed at least three previous occurrences of contaminated bleed air during the takeoff on Boeing 737 aircraft. In all three cases the cause was reported as excess de-icing fluid finding its way into the APU air inlet (Figure 1) during takeoff and climb.

Manufacturer's information

The aircraft manufacturer provides information on adverse weather operations and exterior de-icing in a supplementary procedure to the flight crew operations manual. This states that during de-icing:

> *'APU and engine BLEED air switches ....OFF F/O*
>
> *The bleed air switches must be turned off to reduce the possibility of fumes entering the air conditioning system.*
>
> *CAUTION: With the APU operating, ingestion of de-icing fluid causes objectionable fumes and odors to enter the airplane. This may also cause erratic operation or damage to the APU.'*

The manufacturer also provides a supplementary procedure for 'No Engine Bleed Takeoff and Landing' but makes no mention of the possibility of de-icing fluid contamination of the APU air during climb out following a de-icing operation.

The aircraft maintenance manual, which provides the instructions on exterior de-icing, warns that fluid should not be directed at any of the engine or APU inlets and exhausts.

Discussion

The most likely cause of the fumes and smoke that entered the cockpit and cabin was excess de-icing fluid finding its way into the APU air inlet (Figure 1) during the climb out. The de-icing fluid would then enter the hot sections of the APU, causing it to produce smoke and fumes which would then pass through to the air conditioning and into the aircraft. Performance limitations for this takeoff required that all available engine power be used, necessitating that the engine bleed air be switched off and the APU bleed air used for air conditioning and pressurisation instead.

The operator has undertaken to remind those who de-ice the aircraft about the need to take care when de-icing in the vicinity of the APU inlet on Boeing 737 aircraft.

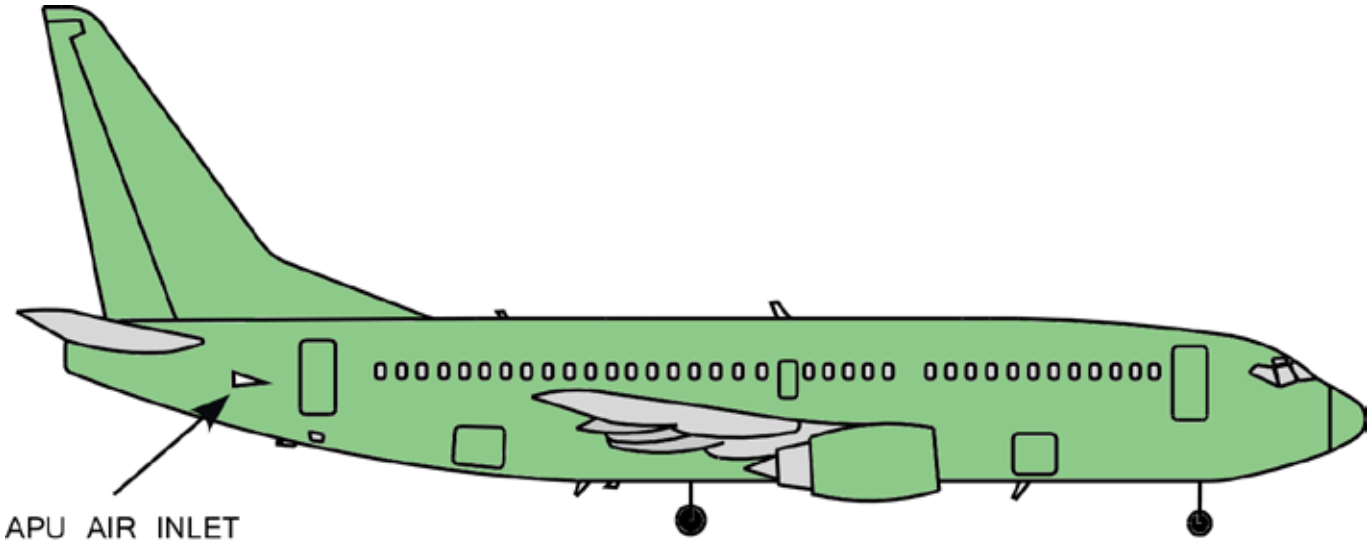

Figure 1
Location of APU air inlet on Boeing 737-700