AAIB Bulletin No: **Ref: EW/G93/01/04** **Category: 4**

INCIDENT

Aircraft Type and Registration:	Boeing 757-236, G-BIKY	
No & Type of Engines:	2 Rolls-Royce RB211-535 C-37 turbofan engines	
Year of Manufacture:	1986	
Date & Time (UTC):	9 January 1993 at 0905 hours	
Location:	Munich	
Type of Flight:	Scheduled Passenger	
Persons on Board:	Crew - 7	Passengers - 123
Injuries:	Crew - None	Passengers - None
Nature of Damage:	Damage to No 1 engine thrust reverser	
Commander's Licence:	Air Transport Pilot's Licence	
Commander's Age:	46 years	
Commander's Flying Experience:	10,487 hours (of which 971 were on type) Last 90 days - 145 hours Last 28 days - 21 hours	
Information Source:	AAIB enquiries	

As G-BIKY was landing at Munich the crew of a company Boeing 767 observed something fall from the subject aircraft. The debris was recovered and found to be portions of the thrust reverser cascade fitted at the top outboard position on the number one engine. The vane assembly of the cascade segment had separated from the surrounding frame at the braze joints, and had struck the translating cowl, causing minor impact damage to the cowl outer skin. The frame was still attached to the reverser. Metallurgical examination indicated that the failure had originated in the frame angle at the top leading edge, and had progressed through the corner of the cascade segment. This fracture had then caused rapid failure of the 3 vanes attaching to the front frame member, leading to complete detachment of most of the vanes. There was evidence of contact with the inside surfaces of the translating cowl, probably in the last few reverser cycles before the incident took place. In view of the nature of the crack initiation and lack of any knowledge of previous cracking in this area, it is the view of the metallurgist that this could be a "one-off" event. The cascade parts have

been returned to the manufacturer for further investigation. A fleet check has found no other cases of this type of cascade damage.

The cascade assembly, part number 4BA82149/serial number 0066, was of aluminium alloy construction, fabricated from sheet parts which had been brazed together. It was refurbished in July 1991 and at that time had completed 15,358 hours. At the time of the incident it had completed a further 2,681 hours. There is no significant history of cracking of these vanes, or the corner brackets, although there have been problems in the past associated with the attachment bolts. In addition, cascades manufactured by rivetted fabrication have a history of cracking. The Boeing Company advises that it is aware of eight other events of a similar nature, one of these having resulted in separation of cascade segments which caused secondary damage to the translating cowl. It appears from these two cases that the energy involved in such cascade failures is relatively low.