No: 4/92 **Ref: EW/G91/12/04** **Category: 1a**

Aircraft Type and Registration:	Boeing 747-236, G-BDXE	
No & Type of Engines:	4 Rolls-Royce RB211-524 D4 turbofan engines	
Year of Manufacture:	1978	
Date & Time (UTC):	14 December 1991 at about 1700 hrs	
Location:	Newcastle Airport	
Type of Flight:	Public Transport	
Persons on Board:	Crew - 18	Passengers - 373
Injuries:	Crew - None	Passengers - None
Nature of Damage:	Damage to leading edge flap section (No. 12) inboard of No. 2 engine	
Commander's Licence:	Airline Transport Pilot's Licence	
Commander's Age:	50 years	
Commander's Flying Experience:	14,585 hours	
Information Source:	Air safety report generated within the airline and examination by AAIB.	

After a normal and uneventful flight from Nairobi, the aircraft was diverted to Newcastle Airport due to fog at the intended destination, London Heathrow. The crew noted no handling or performance discrepancies at any stage during the flight.

As the aircraft was being vacated at Newcastle, the ground engineer brought to the captain's attention the condition of the No. 12 section of leading edge Krueger flap: this is the central section of the three sections of Krueger flap inboard of the No. 2 engine. The flap appeared twisted and it was possible to see into the wing forward of the front spar.

Further examination showed that one of the flap's two rotary actuators had become separated from its attachment lugs on the wing rib structure (Fig. 1). The rotary actuators connect the drive-shaft from the flap motor to the Krueger flap itself (Fig. 2) and each actuator comprises a simple gearbox and lever arm. The loss of one rotary actuator had allowed the flap's hinge arm to damage the wing leading edge while the flap was extended and had then prevented the flap from retracting properly.

The damage to the forward lugs and the lack of damage to the aft lugs (Fig. 1) showed that the initial event had been the separation of the rotary actuator from the aft lugs and that this had been followed by the overloading and failure of the forward lugs. Both of the corresponding lugs on the rotary actuator were intact, indicating that the separation at the aft lugs had occurred because of the migration of the stepped bolt out of the aft attachment. As there was no trace of the bolt, washer or lock-nut, it could not be determined exactly how the bolt had been free to migrate and whether or not the lock-nut and washer had been correctly installed.

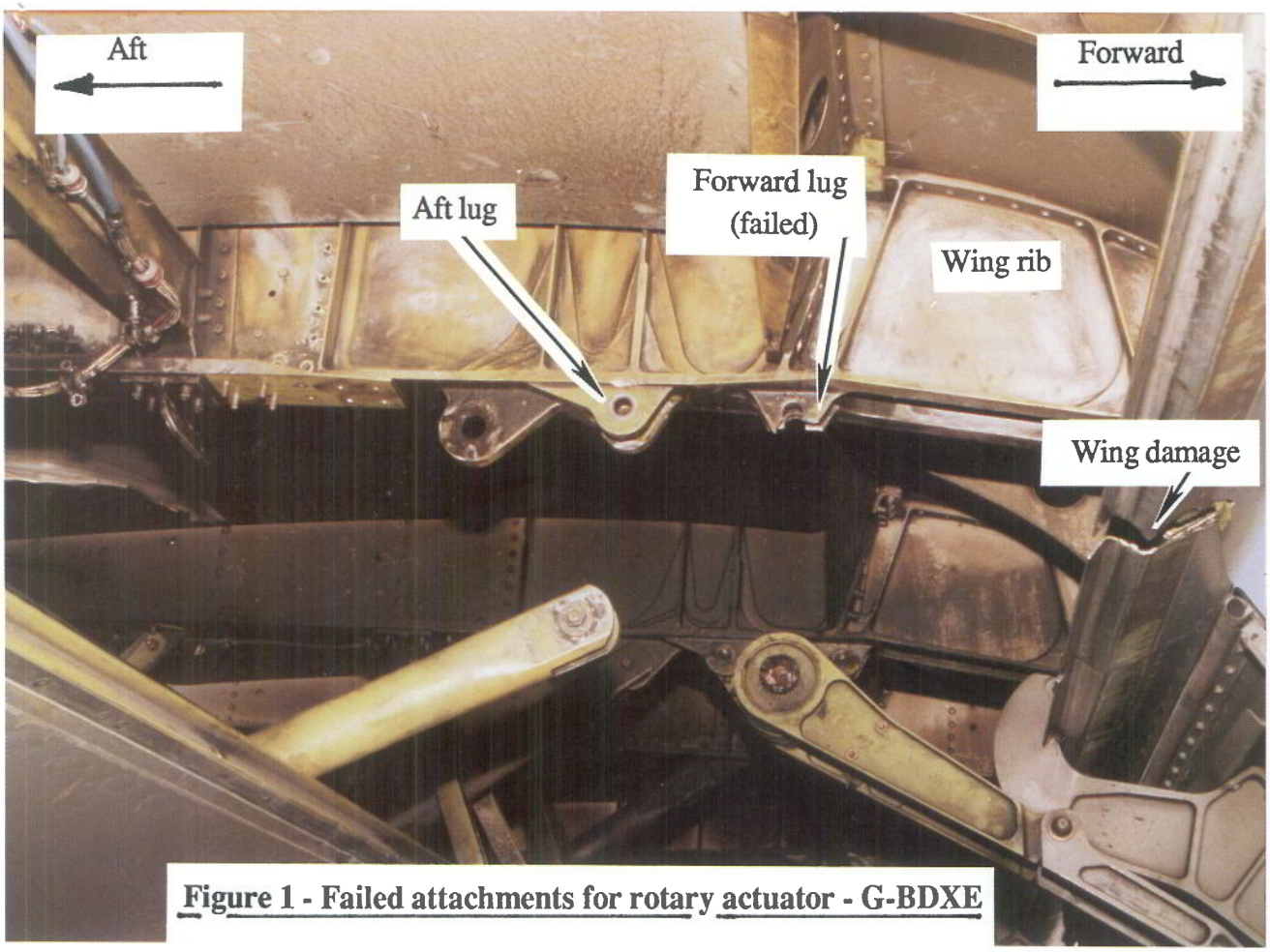

Figure 1 - Failed attachments for rotary actuator - G-BDXE

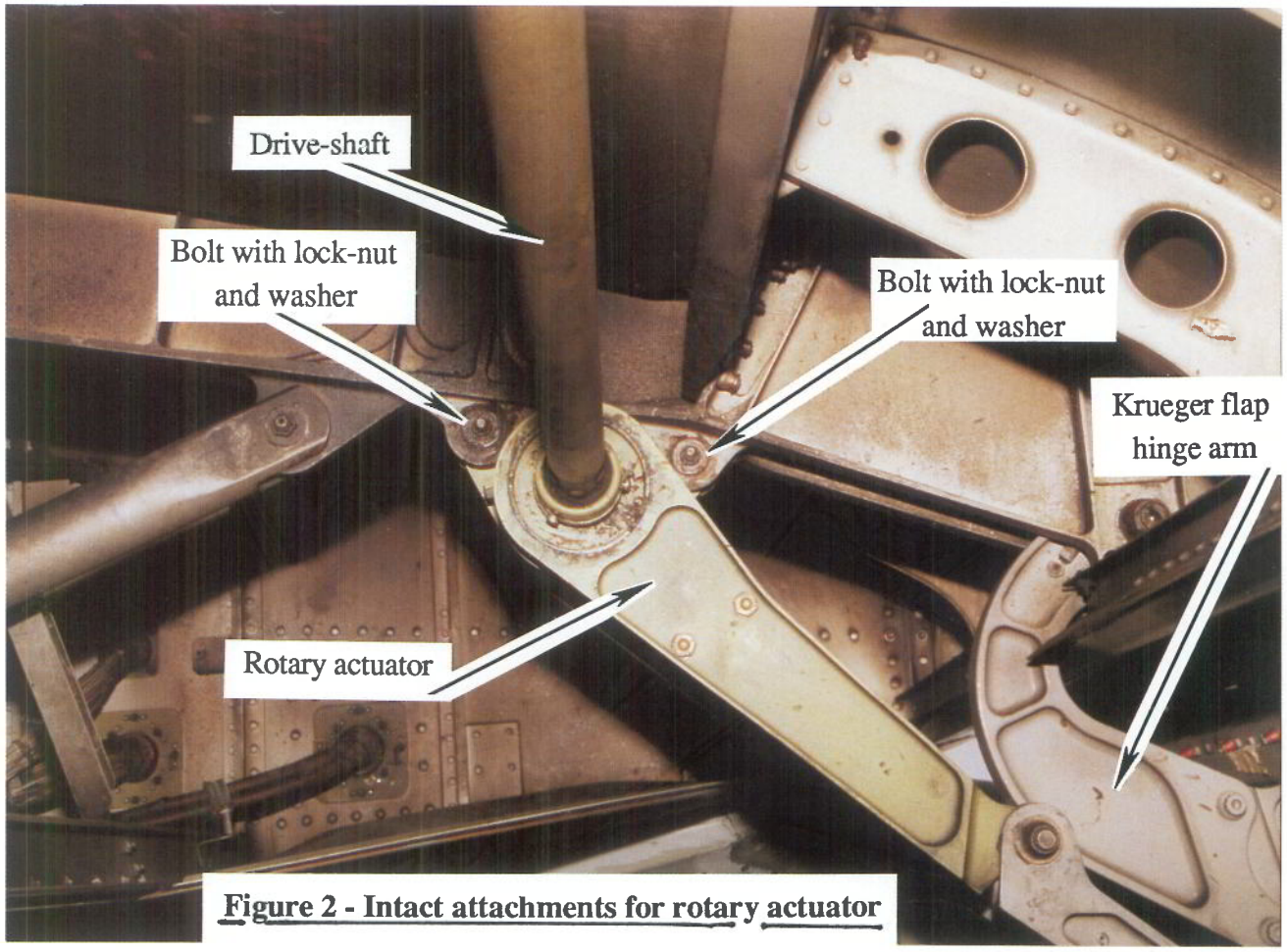

Figure 2 - Intact attachments for rotary actuator