FINAL REPORT

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In accordance with the provisions of SI 205 of 1997, the Chief Inspector of Accidents, on 21/2/05, appointed Mr. John Hughes as the Investigator-in-Charge to carry out a Field Investigation into this incident and prepare a Synoptic Report.

Aircraft Type and Registration:	BAe 146-200, EI-CWA
Aircraft Serial Number:	E2058
Year of Manufacture:	1986
Date and Time (UTC):	21 February 2005 @ 15.30 hrs
Location:	Dublin Airport
Type of Flight:	Ferry Flight
Persons on Board:	Crew - 2 Passengers - Nil
Injuries:	Crew - Nil Passengers - Nil
Nature of Damage:	Broken LH undercarriage door hinge
Commander's Licence:	Airline Transport Pilot's Licence
Commander's Details:	Male, aged 42 years
Commander's Flying Experience:	10,200 hours, of which 5,700 were on type
Information Source:	ATS Dublin (Report No. DA 031/05)

SYNOPSIS

The aircraft was on a positioning flight to Paris CDG following maintenance for a suspected Main Landing Gear indication problem at Dublin. On retraction of the gear following the take-off, a red "gear unlocked" and "gear in transit" warning light, was observed by the crew. The "abnormal" checklist detail was then carried out and the gear activated in an effort to clear the problem. The crew requested a quick return (QRF) to Dublin. On the approach the warning indications cleared and the aircraft landed on RWY 28. No airport services were required. An inspection of the aircraft revealed that a Left Hand (LH) undercarriage door hinge had broken.

FINAL REPORT

1. FACTUAL INFORMATION

1.1 History of the Flight

The aircraft was scheduled for a ferry flight after an undercarriage gear repair and the Captain and his First Officer (FO) had been briefed by Engineering. After take-off the gear was retracted. A red "Gear Unlocked" and at the same time an undercarriage "In-transit" light stayed on showing that the gear was not up-locked. During climb the abnormal checklist was completed and maintenance contacted who requested that a gear swing should be carried out. This was completed but with no improvement. The crew requested a quick return (QRF) to Dublin. During approach the warning disappeared, which suggested an indication problem. The undercarriage gear was cycled again and no fault indication occurred. At no time were there any vibration or unusual noise levels noticed and a normal landing was carried out. The aircraft taxied normally to the stand.

No emergency call was made in this instance, but the Airport Fire Services (AFS) had been alerted by the Airport Authorities. At the stand, it became apparent that one of the LH gear door hinges had failed.

1.2 Aircraft Information

The main gear doors are mechanically linked to the landing gear and close only when the undercarriage gear is retracted, to enclose the gear and fairing within the fuselage. The door is also attached to the main gear bay through two upper door hinges. A side stay is installed between the main landing gear and the airframe to provide a mechanically locked support when the gear is in the extended position.

Proximity switches mounted on the side stay give a remote indication that the unit is in the locked or unlocked condition. The door up-lock electrical circuit is integrated into the main undercarriage indicating system through a printed circuit board (PCB) in order to confirm to the crew that both the undercarriage and the door are in the up-locked position.

1.3 Maintenance History

On a flight the previous day, the LH main gear unsafe indication appeared after the gear had been selected up. The crew carried out the emergency check list drill and concluded that the indication was due to a fault in the indicating circuitry. Maintenance trouble-shooting failed to find a fault. The gear was cycled without any erroneous indications.

1.4 Manufacturers Action

On 22 December 2004, the aircraft manufacturer issued an "All Operator Message" indicating that there had been three reported instances of main landing gear door hinge failures. This had been attributed to corrosion, which had gone undetected due to corrosion emanating from the surface between the bracket and the bearing housing. Only extensive corrosion of this type would have been visible due to the inspection regime then in place.

The action they proposed was to replace hinges, where corrosion was found, with a modified hinge. Where no corrosion was found, a specific protection treatment was required. The message referred to a previous Service Bulletin (ISB 52-113) issued in February 2001, with a "Recommended" compliance.

The manufacturers now recommended that the SB be carried out with focus being placed on older aircraft first. They intended to raise the SB classification in consultation with the UK CAA.

1.4 Fleet Status

At the time of this incident, the SB had been complied with, in the case of 10 out of the Operator's fleet of 16 aircraft. The remainder, including EI-CWA had been scheduled for this maintenance. All of the 10 aircraft had been modified prior to the issue of the "All Operator Message".

2. ANALYSIS

The corrosion evidenced in the attached photographs at **APPENDIX A** was very severe but might not have been readily visible in situ. There was obviously a problem with the door during the previous flight. Maintenance could not find the fault probably due to the fact that in the hangar there were no aerodynamic forces acting on the door pulling it in a lateral direction. The hinge may have been fractured at that stage.

On the incident flight, the aerodynamic forces on the door were sufficient to finally break the door hinge. The door was then only supported through the rear hinge. When the door closed the aerodynamic forces prevented the door roller from engaging in the door up-lock.

3. CONCLUSIONS

(a) Findings

1. The LH undercarriage door failed to engage in the door up-lock.

(b) Cause

1. The failure of the door forward hinge was due to corrosion. Failure of the hinge, in turn, prevented the up-lock from engaging due to lateral aerodynamic forces on the door.

4. SAFETY RECOMMENDATIONS

This report does not sustain any Safety Recommendations.

Note: *SB (52-113) was mandated on 6 July 2005 under EASA AD G-2005-0017. It has since been incorporated on all the Operator's aircraft except for G-MIMA and G-OZRH, which are on Annex 6 arrangements.*

APPENDIX A

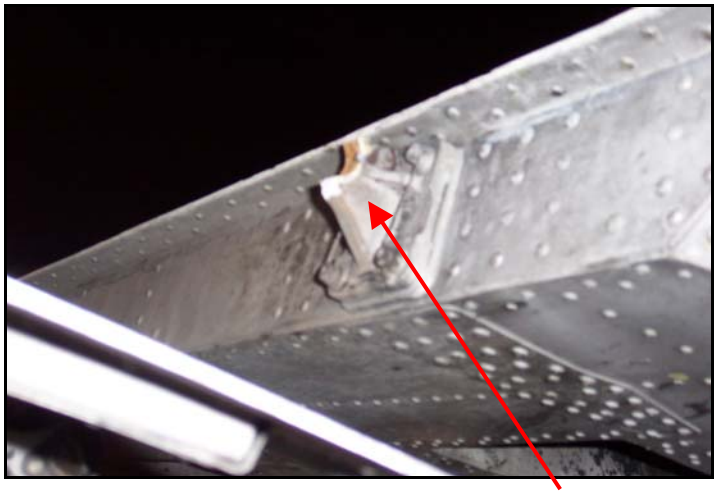

Photo No. 1: The broken half-hinge attached to the undercarriage door.

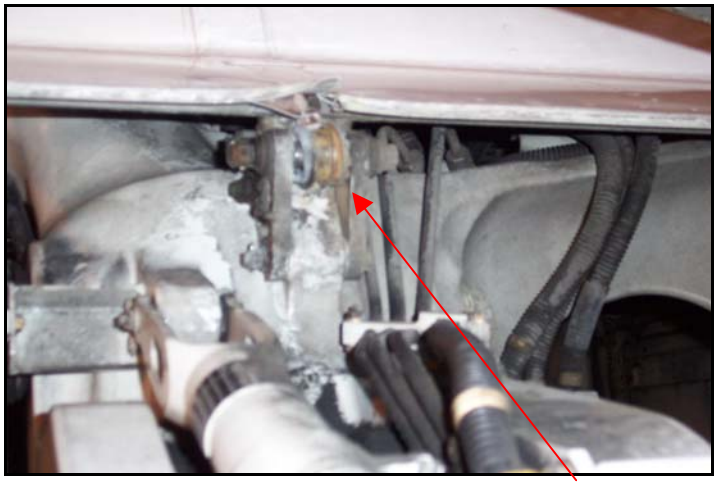

Photo No. 2: The corresponding half fixed to the undercarriage strut showing the corrosion on the bearing housing.

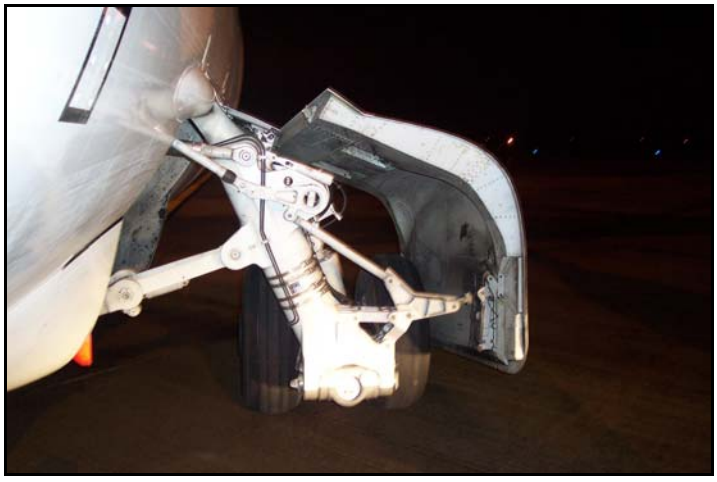

Photo No. 3: General view of the LH undercarriage and door.

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