
Hard landing, BAe 146-200, G-JEAJ

Micro-summary: This BAe 146-200 landed hard, bounced and then rolled out. Damage to the underbelly was discovered.

Event Date: 2000-06-08 at 1710 UTC

Investigative Body: Aircraft Accident Investigation Board (AAIB), United Kingdom

Investigative Body's Web Site: <http://www.aaib.dft.gov/uk/>

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BAe 146-200, G-JEAJ

AAIB Bulletin No: 10/2000 **Ref: EW/C2000/6/2** **Category: 1.1**

Aircraft Type and Registration: BAe 146-200, G-JEAJ
No & Type of Engines: 4 Lycoming ALF 502-R5 turbofan engines
Year of Manufacture: 1988
Date & Time (UTC): 8 June 2000 at 1710 hrs
Location: London City Airport
Type of Flight: Public Transport
Persons on Board: Crew - 5 - Passengers - 78
Injuries: Crew - None - Passengers - None
Nature of Damage: Skin damage to aft underside of fuselage
Commander's Licence: Airline Transport Pilot's Licence
Commander's Age: 27 years
Commander's Flying Experience: 3,217 hours (of which 2,011 were on type)
Last 90 days - 174 hours
Last 28 days - 85 hours
Information Source: AAIB Field Investigation

History of the flight

The aircraft was being flown from Edinburgh to London City Airport and the aircraft received radar vectors for a landing on Runway 10. In accordance with company operating procedures, which require all landings at London City to be carried out by the commander, he was the handling pilot. The weather given was surface wind 140°/08 kt, variable between 100° and 180°; CAVOK, temperature +22°C, dew point +9°C, QNH 1013 mb.

An autopilot coupled approach, which was stabilized in the correct landing configuration at 119 kt (Vref+ 5 kt) with speed brakes 'open' was flown. The autopilot was disconnected at 1,700 feet radio altimeter height and the commander used the visual cue of the runway Visual Approach Slope Indicators for the final approach. He cross checked these with the ILS presentation and was monitored by the first officer. The approach checks were completed and the aircraft flared at about 100 feet. At that point the aircraft developed an abnormally high sink rate which could not be reduced and the aircraft landed heavily in the area of the runway indicating numbers short of the normal touchdown point.

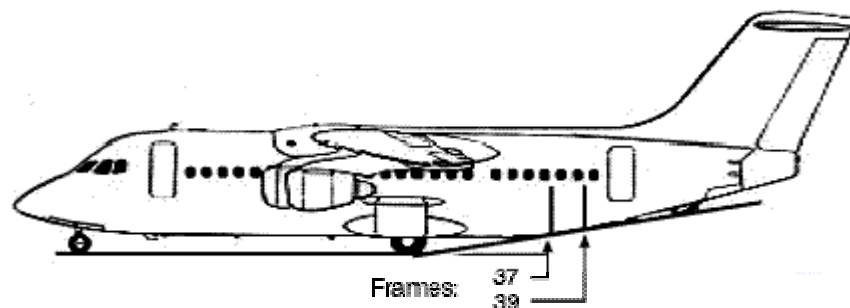
The aircraft bounced and the first officer called for a go around, but the commander could see that the aircraft would land prior to the limit of the touchdown zone and informed the first officer of his intention to continue the landing. The aircraft landed heavily a second time and the lift spoilers were selected. Only the green hydraulic system spoilers deployed and the first officer informed the commander and called for maximum braking which was applied initially and subsequently reduced when a normal roll out was assured. The aircraft was brought to a stop within the landing distance available.

Neither ATC or the crew was aware of the aircraft having suffered any damage and it was taxied from the runway to its allocated parking stand. In view of the heavy landing the commander and an engineer carried out an inspection of the tail area and located the damaged underbelly section.

Examination of aircraft

An inspection of the runway did not reveal any scrape marks that could be identified as being caused by G-JEAJ. However, the inspection was not conducted until 24 hours after the event, during which period there had been some rainfall.

It was apparent that light scrape 1.57 metres long and approximately 0.27 metres wide had occurred on the underside of the rear fuselage. The damaged area extended from just ahead of Frame 37 to the forward face of Frame 39. Frame 37 was close to the aft edge of the baggage door on the left side of the fuselage, with the rear pressure bulkhead being joined to the fuselage skin at Frame 45. Additionally, there had been a light strike on the tail bumper, which is attached to the air conditioning equipment bay door aft of the rear pressure bulkhead. The area of damage is indicated on the sketch below.



Apart from the loss of paint, the skin had suffered light abrasion but had not been penetrated. Some dimpling had occurred in the areas between the stringers and frames in the centre of the panel. After removing the floor panels in the baggage area the dimpled areas of skin could be inspected. No cracking had occurred and the frames and stringers were undamaged. The subsequent inspection at the operator's maintenance base revealed no additional damage, and the aircraft was returned to service following replacement of the skin panel.

Conclusion

The commander concluded that, whilst he may have retarded the throttles slightly early in the flare, the sink rate had developed probably due to a downdraft from adjacent buildings or the variable wind direction. Whilst he recollected applying some power, it was insufficient to arrest the sink rate

and the aircraft touched down early in a nose high landing attitude leading to the fuselage scraping the ground.