

**INCIDENT**

<b>Aircraft Type and Registration:</b>	BAe 146 200, EI-CZO
<b>No &amp; Type of Engines:</b>	4 Lycoming ALF502R-5 turbofan engines
<b>Year of Manufacture:</b>	1984
<b>Date &amp; Time (UTC):</b>	20 February 2007 at 0833 hrs
<b>Location:</b>	London City Airport
<b>Type of Flight:</b>	Commercial Air Transport (Passenger)
<b>Persons on Board:</b>	Crew - 5                      Passengers - 55
<b>Injuries:</b>	Crew -None                      Passengers - None
<b>Nature of Damage:</b>	Main landing gear tyres burst, wheels damaged
<b>Commander's Licence:</b>	Airline Transport Pilot's Licence
<b>Commander's Age:</b>	33 years
<b>Commander's Flying Experience:</b>	4,750 hours (of which 470 were on type) Last 90 days - 95 hours Last 28 days - 32 hours
<b>Information Source:</b>	AAIB Field Investigation

**Synopsis**

During a landing on Runway 10 at London City Airport, the aircraft came to rest in the paved undershoot area of Runway 28, having burst all four main landing gear tyres. It was established that the lift spoilers had not deployed after touchdown. The lack of normal deceleration resulted in the flight crew selecting the braking hydraulic system to Yellow from Green, and then to the Emergency Yellow system; this system provides no anti-skid protection for the wheels.

In light of several similar overrun events involving the BAe/RJ 146 since its introduction into service, the Chief Inspector of Air Accidents had ordered an Inspectors Investigation to be carried out into this incident.

**History of the flight***Background*

Following a flight from Paris Orly Airport to London City Airport (LCY), the aircraft commenced an ILS approach to Runway 10, which has a 5.5° glide slope. The weather conditions were benign; the ATIS at the time stated that the surface wind was from 170° at 5 kt, variable between 140° and 220°, visibility was 10 km or more, there were one or two octas of cloud at 600 ft aal, five to seven octas at 1,300 ft aal, the temperature was 10°C, the dewpoint 8°C, and the mean sea level pressure was 1006 mb. The runway surface was damp.

The landing weight of the aircraft was approximately 32.0 tonnes, at which weight a  $V_{REF}$  of 110 kt is

appropriate<sup>1</sup>. The landing data card prepared prior to the approach showed a  $V_{REF}$  of 119 kt.

### *The approach and landing*

Analysis of the data from the FDR shows that the latter part of the approach was flown at approximately 124 kt. The aircraft touched down immediately before the end of the touchdown zone, some 330 metres beyond Runway 10 threshold, at  $119 \pm 2$  kt, and in a level pitch attitude. The data also shows that the lift spoilers did not deploy and suggests that the aircraft was probably close to ‘wheel-barrowing’ during the early part of the landing roll, mainly as a consequence of the lack of spoilers. The pitch attitude was slightly more nose-down than recorded in previous landings at LCY, with the main landing gear wheels in contact with the ground. It is likely that the main landing gear was compressed only just enough to ‘make’ the weight on wheels switches, with the aircraft mainly supported by aerodynamic lift from the wings.

The commander, who was the pilot flying (PF), selected the engines to ground idle and, later, recalled that he also selected the airbrake/lift spoiler lever to LIFT SPOILERS. However, he also recalled pressing the brake pedals to their full extent but perceiving that there was “not a hint of deceleration”. He then called “brakes, brakes”, interrupting the co-pilot’s monitoring of the correct thrust setting, spoiler deployment and brake pressure.

Perceiving that the Green hydraulic system brakes had failed, the commander selected the Yellow hydraulic

brake system, but did not notice any change in the deceleration; instead, he felt that “the aircraft was only coasting down the runway”. He then selected the Emergency Yellow brake system, which provides no anti-skid protection for the wheels. The aircraft seemed to decelerate slowly and came to rest in the undershoot area of Runway 28, 161 metres short of the dock edge at the eastern end of the airport<sup>2</sup>. Toward the end of the skid, all four main landing gear tyres burst although, at the time, the flight crew were unaware that this had occurred.

Skid marks were evident for each of the four main wheel tyres over a distance of 473 metres leading up to the position in which the aircraft came to rest. The aerodrome fire and rescue service arrived promptly, there was no fire, and the passengers disembarked normally.

### **Engineering examination**

An exhaustive investigation of the aircraft revealed no malfunction in any relevant system, and the aircraft was returned to service after the wheels and tyres had been replaced.

However, a friction test of the airbrake/lift spoiler lever revealed that movement of this lever through the detent at the rear of its airbrake travel to lift-spoiler, required a force of 14 lb, whereas zero force was required to move the lever from lift-spoiler back to the airbrake quadrant. Both these forces were within the aircraft’s maintenance manual limits.

In March 1988 the aircraft manufacturer issued service bulletin (SB) 27-73-00889 to amend the operating

---

#### **Footnote**

<sup>1</sup> According to the appropriate landing technique, in the conditions pertaining at the time, the approach speed at this weight should be 115 kt ( $V_{REF}$  plus 5 kt) and, during the final approach, the speed should reduce to 110 kts over the runway threshold ( $V_{REF}$ ), with touchdown occurring at 103 kt ( $V_{REF}$  minus 7 kt).

---

#### **Footnote**

<sup>2</sup> The length of the pavement surface on Runway 10 is 1,508 m, and the declared Landing Distance Available (LDA) is 1,319 m;

force characteristics of the lift-spoiler selector lever. The lever's characteristics were amended such that a force of 12 lb would be required to move the lever from lift-spoiler to airbrake. The SB is not mandatory and, initially, was applicable to 114 aircraft, 105 of which, including EI-CZO, are still in service. EI-CZO had not been modified.

#### **Safety action**

Previous AAIB investigations have found that pilots commonly mis-diagnose spoiler failure on landing as brake failure. The safety factors incorporated into

landing performance calculations mean that, in the event of spoiler failure, an aircraft which touches down within the correct margins of speed, at the touchdown position, will stop before the end of the LDA, provided that appropriate braking effort is made by the flight crew.

In light of several similar overrun events involving BAe146 aircraft since its entry into service, the Chief Inspector of Air Accidents has ordered an Inspectors Investigation to be carried out into this incident.