Boeing 777-200, N786UA

AAIB Bulletin No: 11/2000 Ref: EW/G1999/12/10 Category: 1.1

Aircraft Type and Registration:	Boeing 777-200, N786UA
No & Type of Engines:	2 General Electric GE-90-76B turbofan engines
Year of Manufacture:	N/K
Date & Time (UTC):	13 December 1999 at 0953 hrs
Location:	North west of London Heathrow Airport
Type of Flight:	Public Transport (Passenger)
Persons on Board:	Crew - 15 - Passengers - 175
Injuries:	Crew - 1 (serious) - Passengers - None
	Crew - 5 (minor)
Nature of Damage:	None
Commander's Licence:	Airline Transport Pilot's Licence (USA)
Commander's Age:	58 years
Commander's Flying Experience:	14,982 hours (of which 626 were on type)
	Last 90 days - 111 hours
	Last 28 days - 16 hours
Information Source:	Aircraft Accident Report Form submitted by the operator

The aircraft was inbound to London Heathrow on a scheduled passenger flight from Chicago (USA). During the descent, the aircraft entered an overcast cloud layer and, shortly afterwards, the overspeed warning alert sounded. The autopilot was disconnected and the speedbrakes were deployed manually to slow the aircraft. Approximately one minute later, the aircraft experienced severe turbulence that lasted less than 30 seconds. Shortly after this event, the purser contacted the flight deck crew to inform them that several flight attendants had been injured during the turbulence. One flight attendant sustained a fractured right fibula above the ankle when a passenger fell and collided with her.

Analysis of the DFDR data by the operator indicated that the aircraft had experienced three significant turbulence encounters while descending between FL270 and FL160. The aircraft experienced the greatest vertical accelerations during the second encounter, at FL250, with the maximum positive loading recorded of +1.75 'g'. At that moment, the airspeed increased from 313 kt to 334 kt in three seconds. Eight seconds later, the airspeed dropped to 301 kt with a reduction to

+0.51 'g'. The third encounter was at FL165 which consisted of three individual 'bumps' that ranged between +1.32 'g' and +0.77 'g'.

The 'Fasten Seat Belt' sign had been switched on for the passengers during the descent, but the cabin crew were still performing their duties and were not seated. Subsequent information from the cabin crew indicated that it was during the second encounter that the passenger had fallen and caused injury to the flight attendant.

The European Significant Weather Charts, covering FL100 to FL450, were provided to AAIB by the Meteorological Office. These indicated that, at the time of the event, moderate Clear Air Turbulence was forecast between FL370 and FL200, associated with the presence of a frontal system across the south of England. A north westerly Jetstream of around 150 kt was present with its core at FL310. Recordings from a radio sonde balloon ascent, about 60 nm west of London around the time of the turbulence events, indicated the presence of a vertical windshear of 10 kt per 1,000 feet, between FL220 and FL240. Moderate or severe Clear Air Turbulence typically extends for 2,000 to 3,000 feet vertically either side of a shear area.

The operator's statistics showed that between 1993 and 1999, some 946 turbulence related injuries had been documented. Currently, aircraft in service are not equipped with any accurate method to indicate the presence of turbulence relative to actual aircraft flight path, although such systems are under development.

Turbulence encounter reports are commonly made by flight crews on the ATC radio frequency in use at the time. These are then generally heard by, or re-transmitted to, other aircraft crews. Turbulence encounter reports were not received by the flight crew in this event until after the encounter had occurred.