AAIB Bulletin No: 6/95	**Ref: EW/G95/03/17**	**Category: 1.1**

Aircraft Types and Registrations:	i) Boeing 747-236B, G-BDXA ii) Boeing 747-436, G-BNLA
No & Type of Engines:	i) 4 Rolls-Royce RB211-524D-19 turbofan engines ii) 4 Rolls-Royce RB211-524G turbofan engines
Year of Manufacture:	i) 1977 ii) 1989
Date & Time (UTC):	17 March 1995 at 1345 hrs
Location:	London Heathrow Airport
Type of Flight:	Towing on ground
Persons on Board:	1
Injuries:	None
Nature of Damage:	i) Severe - left wing leading edge structures ii) Substantial - unpressurised zone of rear fuselage
Commander's Licence:	N/A
Commander's Age:	N/A
Commander's Flying Experience:	N/A
Information Source:	Aircraft Accident Report Form submitted by the operator and telephone enquiries by the AAIB

The aircraft G-BDXA was being towed from a stand in the Heathrow Central Area to Terminal 4 by a team of the operator's ramp agents who were using standard company towing practices. This involved one man being positioned on the flight deck to act as aircraft brake man, a second as tug driver and a third as a ground radio operator in the tug. The aircraft was being supplied with electrical power from the tug, via an 'easy-break' connector, and this power was being used to generate hydraulic pressure in the No 4 system (which powers the wheelbrakes) by means of an electrically driven pump. There was also a voice communication link from the tug to the flight deck via another connector. The end of the towing bar which was connected to the nose landing gear had a load limiting frangible link. The weather was inclement, with high gusting winds and rain squalls.

They were approaching Terminal 4 and had just started to execute a sharp turn, having stopped to allow other traffic to clear, when a strong gust of wind caught the aircraft, causing it to 'rock about.' The tug crew felt their vehicle lurch and heard a loud bang, indicating to them that the towbar had broken. The tug was immediately driven clear of the aircraft in accordance with standard instructions.

When he saw the tug, the brake man in the flight deck realised that the tow link had parted and, although now out of any communication with the tug, applied the brakes and stopped the aircraft. However, after a very brief interval he became aware that the aircraft was on the move again. He attempted to re-apply the brakes but they appeared not to work and he observed that there was no indicated hydraulic pressure remaining in the braking system. Furthermore, he was unable to steer the aircraft because the steering is necessarily disabled (at the nose landing gear) in order for towing to be possible.

At the position where the towbar had separated, the taxiway had a detectable downslope and, with the wind from behind, the aircraft rolled uncontrollably into the rear of another aircraft (G-BNLA) which was parked on a stand. The tug driver had meanwhile attempted, in vain, to arrest the aircraft's progress by throwing chocks under the mainwheels, but it had gained sufficient momentum to merely roll over them.

Tests conducted by the operator after the event showed that the braking system functioned correctly with the No 4 system electrically driven hydraulic pump supplying pressure. It was also observed that if this hydraulic pump was disabled with full system pressure available to the brakes, corresponding to the separation of the easy break electrical connection from the tug, only a single application of the brakes was reliably obtained. This conformed with the advice given in the operator's towing procedures manual. An hydraulic leak was also found in the No 4 system at one of the landing gear door actuators. Inspection of the towbar link pin failure indicated that it had fractured as a direct result of excessive loading.

As a result of this potentially serious accident, the operator has initiated an urgent review of their towing procedures and the merits of using the aircraft's Auxiliary Power Unit (APU) to provide electrical, hydraulic and pneumatic power internally during towing is being addressed.