

**No:** 3/91

**Ref:** EW/A341

**Category:** 1a

**Aircraft Type  
and Registration:**

Boeing 747-436, G-BNLC

**No & Type of Engines:** 4 Rolls-Royce RB211-524H2-19 turbofan engines

**Year of Manufacture:** 1989

**Date and Time (UTC):** 10 October 1990 at 1530 hrs

**Location:** Bangkok Airport, Thailand

**Type of Flight:** Public Transport

**Persons on Board:** Crew - 17 Passengers - 238

**Injuries:** Crew - None Passengers - 1 minor

**Nature of Damage:** Slight sooting of brake unit

**Commander's Licence:** Airline Transport Pilot's Licence (A)

**Commander's Age:** 47 years

**Commander's Total  
Flying Experience:** 12,400 hours (of which 500 were on type)

**Information Source:** AAIB Field Investigation

### **History of the Flight**

On completion of an 88 minute transit flight from Kuala Lumpur, the aircraft was landed at night on runway 21R at Bangkok (length 3700 metres) where the temperature was 29°C. The approach was made at a weight of 254 tonnes with the commander handling, a Vref of 150 kt, a medium autobrake selection (level three) and a tailwind component of 5 kt. After touchdown at 156 kt CAS, the first officer selected partial reverse thrust on all engines but had slight problems engaging reverse thrust on the outboard pair. The thrust reversers on the inboard engines deployed 11 seconds after touchdown; those on the outboard engines deployed 1.7 seconds later. Reverse thrust was modulated during the landing rollout and maintained for a total of 33 seconds. In appreciation of the modest additional stopping distance required by the delayed onset of reverse thrust, the commander decided to override the autobrakes and brake manually, leaving the runway at 16 kt groundspeed at the last exit point before the runway end. Whilst taxiing-in, the crew were alerted by the EICAS (Electronic Indicator and Crew Alerting System) to an abnormally hot brake on the number 8 wheel (left body gear, rear inboard wheel). The brake temperature had reached level five on a scale of zero to nine. The first officer read and actioned the appropriate drill which required him only to refer to the brake cooling chart in the operations manual and calculate the required cooling time, which was 70 minutes. The commander continued to taxi to the stand using only right side wheelbrakes and the engines were shut down on the

stand at 1530 hours. The passengers began disembarking normally from door 2L, using the jetty, whilst the flight deck crew actioned the checklist and post-flight paperwork.

Shortly after engine shutdown, the commander spoke to the ground engineer and requested chocks to be inserted and a cooling fan to be directed on to the hot brake unit. Chocks were inserted and the commander released the parking brake whilst the ground engineer went to get a cooling fan. The flightdeck crew continued with their checks and paperwork, but about 3 to 4 minutes later the supervising engineer contacted the commander by interphone and informed him of a brake fire which, in his opinion, was serious.

The commander elected to evacuate the aircraft and broadcast evacuation instructions on the public address system, which he then reinforced by sounding the evacuation alarm signal. In accordance with company procedures, the commander gave no instructions to the cabin crew regarding which exits to use for evacuation. Standard operating procedures for the cabin crew require that, during normal disembarkation, crew members are positioned in the vicinity of each of the 10 exit doors. In the event of evacuation, each crew member is required to ensure that there is no hazard outside their respective door before opening the door and evacuating passengers down the emergency escape slide.

At the time the evacuation alarm was sounded, most of the passengers from the upper deck and forward part of the aircraft had already disembarked through the jetty at door 2L. In view of the speed and relative safety by which the passengers still within the forward section could be evacuated through the jetty, it was decided not to activate the escape slides from any of the doors forward of the wing. These passengers were evacuated via the normal route, but at an accelerated rate.

In the centre and rear sections of the aircraft, where approximately 100 passengers remained, the cabin crew members posted by doors 3, 4 and 5 heard the evacuation instructions and assessed the environment outside their respective doors. Some passengers evacuated forward to door 2L and about 20 more were escorted aft to door 5L where steps had been positioned for cleaning staff to gain access from the apron.

The stewardess posted at door 4L observed that a catering truck was obstructing this exit and so she re-directed passengers near this door to door 4R which she could see was useable. The slide at door 4R deployed correctly and about 30 passengers evacuated down this slide; two passengers at the base of the slide assisted others to their feet and away from the aircraft. The stewardess posted at door 3R observed that the majority of passengers in her area of responsibility were closer to door 3L than to 3R and so she proceeded to door 3L to expedite evacuation. The view from the door window was in darkness but no hazards were seen and so the door was opened and the escape slide deployed automatically. Unlike the other slides which deploy essentially at right angles to the fuselage, the slides from doors 3L and R deploy in a chordwise direction aft over the wing and down to the ground, parallel to the fuselage. To indicate correct deployment, an inflatable pole-shaped inflation indicator is attached to the outboard edge of the slide between the wing trailing-edge and the end of the slide. The stewardess at door 3L looked for, and saw, the inflation indicator before supervising the evacuation of approximately 6 passengers. She then checked the cabin to ensure that no passengers were left aboard



before vacating the aircraft down slide 3L. Unknown to this stewardess, the end of the slide had fouled against the catering truck which, until hit by the slide, had been withdrawing from the area of door 4L at the request of the ground engineer. The bottom portion of the slide had folded into a 'V-shape' with the inverted apex of the 'V' about 6 feet above the ground. The 6 passengers and stewardess remained on the slide and were eventually assisted to the ground by the groundcrew, using a stepladder.

Five members of the cabin crew remained on board the aircraft until they were certain that all the passengers had been evacuated before they left using slide 4R. One man sustained a broken ankle and another suffered a friction burn to his arm during the evacuation. Because the evacuation was ordered after most of the passengers had disembarked into the terminal, the cabin crew were unable to ensure that every passenger was accounted for by means of a head-count.

The brake fire was put out by the ground crew, using BCF extinguishant. Although the fire had appeared to be serious, it had been confined to the inner part of the wheel and the brake unit. After inspecting the wheel and tyre, the ground engineer considered that they were serviceable for the onward flight to Heathrow but that the brake for that wheel should be blanked-off and rendered unuseable. An escape slide from another aircraft was fitted and the aircraft continued its service to London Heathrow.

Upon arrival at London, the No. 8 wheel and brake unit were inspected and although there was little sign of fire damage, there was evidence of hot fluid streaking on the inner face of the tyre and of fluid weeping from 2 of the 7 brake actuation cylinders (one being very wet). The brake pack was removed for detailed examination. It was found that the seals on the 2 leaking cylinders had failed and that one of them had given rise to a severe leak. An inspection of the remainder of the brake units on the aircraft resulted in 2 additional packs being rejected due to leaking actuation cylinders.

The Boeing 747-400 series is fitted with carbon brakes and, since its introduction to service, has suffered from minor hydraulic leaks from the brake units. The brake manufacturer has introduced, by Service Bulletin action, a modified seal to eliminate the problem and the operator was fitting these seals, on an attrition basis, to the cylinders of all brake packs sent to workshops for rectification. Following this incident, the operator has instituted a fleetwide special check for leakage from brake actuation cylinders and reduced the acceptable leakage indications for this and all subsequent routine inspections. These actions have increased the rate at which the modified seals are being fitted to the fleet. Information received from the brake manufacturer indicates that the surface temperatures attained on the friction surfaces of the carbon brake parts are higher than those attained on the equivalent parts of iron brakes, which could lead to an increased risk of spontaneous combustion of flammable fluids.

The braking control system was subjected to the full routine maintenance check and no evidence of malfunction was revealed. The Quick Access Data Recorder was also read-out and no evidence was found to suggest that this particular brake unit was malfunctioning during any of the last 5 landings and associated taxiing periods. Although the No. 8 brake had been the first, during this taxiing period, to attain the alert level of 5 on the temperature scale, other units had reached this temperature indication and, as the aircraft had reached its parking stand, No. 8 unit was not markedly hotter than the other left side brakes.