Boeing 747-436, G-BNLM and Airbus A300-600, A6-EKF, 15 April 1996

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INCIDENT

Aircraft Type and Registration:i) Boeing 747-436, G-BNLM

ii) Airbus A300-600, A6-EKF

No & Type of Engines:i) 4 Rolls Royce RB211-524G turbofan engines

ii) 2 CF6 turbofan engines

Year of Manufacture: N/A

Date & Time (UTC): 15 April 1996 at 1841 hrs

Location: London Heathrow Airport

Type of Flights: Public Transport

Persons on Board: i) Crew - 16 Passengers - 289

ii) Crew - 14 Passengers - 224

Injuries: i) Crew - None Passengers - None

ii) Crew - None Passengers - None

Nature of Damage: None

Commanders' Licences: i) Airline Transport Pilot's Licence

ii) Airline Transport Pilot's Licence

Commanders' Ages: N/A

Commanders' Flying Experience: N/A

Information Source: AAIB Field Investigation

History of the Incident

An AIRPROX incident occurred when one aircraft was carrying outa missed approach procedure, and another, which had recently takenoff from the same airport, were in confliction.

Before the incident London Heathrow Airport was using Runway 27Right (27R) for departures and Runway 27 Left (27L) for arrivals. The surface wind was 180_/5 kt, 8 km visibility and QNH 1022 mb. At 1836 hrs, an Airbus A310 landing on Runway 27L was observedto have smoke coming from its main undercarriage, possibly dueto a burst tyre on landing. The Arrivals Controller asked itscrew to clear the runway to the right, to hold clear and to awaita landing gear inspection. While this was being carried out therunway was checked for possible debris. The following aircrafton the approach, an Airbus A300-600, had by this time reacheda distance of two miles from touchdown and its crew was instructedto carry out the missed approach procedure, climbing on the runwayheading to 1500 feet. The pilot of the next aircraft on the approachwas then asked to confirm that he could see the departures Runway(27R). He was then told to change his approach and land on thatrunway.

Departures Control

The Departures Controller, (responsible for Runway 27R), was verybusy with nine aircraft waiting for take-off. At the time theA300 carried out its missed approach, two aircraft were linedup on 27R, one at a runway intersection and one on the threshold. A B747-400, waiting at the holding point, had been cleared toline up and to be ready for take off once the second of thesehad commenced its take-off run. Immediately after clearing thesecond aircraft for take off, the Departures Controller amendedthis instruction to the B747-400 and told it to hold its positionsince he knew that Runway 27R was likely to be needed for landingaircraft and he did not want to B 747-400 to enter the runway. The controller then asked the B747-400 crew if their aircraftwas infringing the runway to which the answer was "negative....". The Departures Controller however, felt uncertain that the runwaywas not in fact infringed and so he decided to ask the B747400to enter the runway in preparation for take off. As it startedto do this, the controller cancelled the line-up clearance forthe next aircraft due for departure after it. He then clearedthe B747-400 for take off, adding 'THERE'S TRAFFIC SWITCHING ATTHREE MILES IF YOU CAN TAKE IT ON THE ROLL I'LL BE GRATEFUL'.

The B747-400 took-off at 1838:10 hrs. The Departures Controllerthen cleared the aircraft which had been transferred to him bythe Arrivals Controller having been switched across from Runway27L to land. After issuing taxi instructions to another aircraftand asking a previous departing aircraft to change to its DepartureControl frequency, he instructed the departing B747-400 to maintainthe runway heading.

Arrivals Control

At approximately the same time as this last instruction was given,the Arrivals Controller advised the A300 which was carrying outthe missed approach that it was now clear to climb to 3000 feet. Approximately two minutes had elapsed since the A300 had commencedits missed approach. During that time the controller had beenattempting to contact the Heathrow Director on his direct lineto advise that he intended to hand the A300 over to be positionedfor a second approach to land but he was unable to make contact,due to an apparent equipment unserviceability, and he had telephonedthe Director on a normal telephone line instead. In addition,the Arrivals Controller had initiated the ground emergency callto the airfield fire service concerning the A310 with a bursttyre and had given runway crossing clearances to a helicopterand a ground vehicle. He had also co-ordinated with the airfieldunit responsible for checking the condition of the runway andadvised a

further aircraft, which by this time was four milesfrom touchdown, that it was to continue its approach as he anticipatedthat the runway would be available in time for it to land.

When contact was established with the Director, the Approach Controllerwas told that the A300 was to be cleared onto a heading of 130_climbing to 3000 feet and should call the Director on 134·97MHz. Since he had already cleared the A300 to climb to 3000 feet,the Approach Controller instructed it to turn onto a heading of130_. He also attempted to tell it to change radio frequencybut he could not remember the correct frequency as his work-loadwas now exacerbated by the aircraft on short finals for his runway(27L) which was no longer able to side-step to runway 27R. Afterinitiating a missed approach for this aircraft and speaking tothe runway checking unit once again, he finally advised the A300crew to change frequency. The frequency he gave was incorrectbut the crew changed to the correct frequency nonetheless.

Meanwhile, twenty seconds before this frequency change, the DeparturesController cleared the B747-400 to commence a left turn and proceedto the Epsom NDB, and to change radio frequency to the LondonTerminal Control. Because of the way in which he had set-up hisAerodrome Traffic Monitor radar set, he was no longer able tosee the A300 radar return.

Traffic-alert and Collision Avoidance System

At 1841 hrs, both the B747-400 and the A300 checked-in on theirrespective frequencies. They were at this stage on convergingtracks 1·39 nm apart with the A300 at 3000 feet and the B747-400seven hundred feet below it with a clearance to climb to be ator above 3000 feet by the Epsom NDB, as required by the Dover4F Standard Instrument Departure (SID) (see Figure 1). As soonas radio contact was established, the A300 was instructed to climbto 4000 feet and to turn left onto a heading of 090_. The B747-400was instructed to stop its climb immediately, given traffic informationconcerning the conflicting aircraft, and issued with an instructionto turn onto a heading of 080_. At that moment the B747-400 crewreceived a Traffic-alert and Collision Avoidance System (TCAS)warning. This initially advised them of "Traffic",followed by a Resolution Advisory Warning to reduce the climbrate, followed by an instruction to descend. The crew conformedto the instructions given by the TCAS equipment and descendedto a height of approximately 1800 feet at which time the TCASwarning ceased. The A300 aircraft also received a TCAS warningwhich instructed the crew to "Monitor Vertical Speed",this instruction requires that the pilot ensures that the verticalclimb rate complies with that indicated by a green sector on theVertical Speed Indicator (VSI).

Apart from the traffic information passed to the B747-400 co-incidentwith the TCAS warnings, neither crew of the conflicting aircraftwere aware of the presence of the other. They were using differentradio frequencies at all times and were not informed of each othersposition by their respective controllers. When two aircraft aresimilarly equipped with TCAS, the instructions for the avoidanceof a collision are automatically co-ordinated between the twoaircraft. By adhering to the TCAS instructions, the crews ofboth aircraft prevented a possible collision.

ATC Separation Monitoring Function

Subsequent reference to the ATC Separation Monitoring Function(SMF) equipment which monitors aircraft separation but is notcontemporaneously displayed to controllers, recorded that at theirclosest proximity the two aircraft were between 600 and 700 feetapart vertically, and between 0·71 and 0·82 nmhorizontally.

Missed Approach Procedures for aerodrome controllers

The Heathrow Manual of Air Traffic Services Part 2 (MATS Part2), specifies procedures which must be adhered to in the eventof a missed approach occurring at London Heathrow Airport. Boththe Arrivals and Departures Controllers are required to co-ordinatewith each other to establish separation between the "go-around"traffic and any conflicting departing traffic. This co-ordinationwas not complied with in this incident.

The Arrivals Controller, in addition to activating the alarm signifyingthat a missed approach has occurred, is to pass details of theaircraft carrying out the missed approach to the appropriate HeathrowIntermediate Terminal Controller stating his preferred directionof turn for the aircraft. The Terminal Controller will then issuea frequency for the aircraft to use and any heading or altituderestrictions. On this occasion the Arrivals Controller was delayedin his attempt to contact the Terminal Controller by a combinationof perceived equipment malfunction and high workload.

The Departures Controller is required to suspend potentially conflictingdepartures until otherwise agreed with the appropriate Radar Director. In this incident, because he was not convinced that the B747-400was actually clear of Runway 27R, the Departures Controller wasconstrained to issue it with a take-off clearance. This was toensure that the runway would be available to the landing aircraftthat had been switched from Runway 27L at short notice. In addition,the turn towards Epsom NDB that was given to the B747-400 afterit had taken off was made without positively ensuring that itwould be clear of the A300 which had carried out a missed approach.

Due to the high workload of both controllers, their Supervisor,who was aware of the missed approach was unable to intervene toassist either controller without risking a major distraction ata critical juncture.