

No: 8/86

Ref: 1a

Aircraft type and registration: Boeing 737-200 N-64 AF

No & Type of engines: 2 Pratt & Whitney JT8D-15 turbine engines

Year of Manufacture: 1978

Date and time (UTC): 2 April 1986 at 1502 hrs

Location: London Heathrow Airport

Type of flight: Non-scheduled International Passenger

Persons on board: Crew — 5 Passengers — 79

Injuries: Crew — None Passengers — 11 (minor)

Nature of damage: Substantial fire damage within the left side main landing gear wheel well

Commander's Licence: Air Transport Rating (United States of America)

Commander's Age: 52 years

Commander's Total Flying Experience: 19,500 hours (of which about 1000 were on type)

Information Source: AIB Field Investigation.

The Boeing 737-200 aircraft was commencing a non-scheduled international passenger flight from London Heathrow to Frankfurt with a crew of 5 and 79 passengers on board. After a normal start up and taxi sequence the aircraft arrived at the holding point at Heathrow runway 28R, next in line for take-off clearance, when the wheel well fire warning system activated. At the same time the aircraft immediately behind transmitted the warning that smoke and flames were coming out of the wheel well area of the aircraft in front. The commander requested the Heathrow Air Controller Departures (Tower) to alert the fire services and at the same time ordered the emergency evacuation of the aircraft. The reaction of the fire services was prompt, and within 2 minutes of the alert call nine appliances were deployed around the aircraft. The Senior Fire Officer at the scene considered that the fire was sufficiently serious to up-grade the emergency to 'Aircraft Accident', and consequently local authority off-airport emergency services were also alerted. In the event the fire was quickly extinguished, and outside assistance was not required.

The emergency evacuation of the aircraft was completed without serious incident, and the last passengers were leaving the aircraft as the fire vehicles arrived at the scene. All four door exits were used and all escape chutes operated normally. The emergency over-wing exits were not used. Eleven passengers sustained slight injuries, consisting mainly of minor bruising and grazing. Despite clear instructions from the cabin crew that no hand baggage or personal belongings were to be carried down the escape chutes, one passenger suffered a cut hand when the bottle he was carrying broke as he reached the ground. The total evacuation time was less than 90 seconds.

Subsequent examination of the aircraft showed that the fire had originated in the 'B' system No 2

Hydraulic pump and had caused considerable fire damage in the main wheel well. This damage included hot fracture of the case drain hydraulic line of the No 2 'B' system pump; hot fracture of an adjacent pipe in the 'A' hydraulic system; considerable wiring damage including complete melting of insulation of looms at a number of positions above, and adjacent to, the failed pump; and localised melting of insulation on cables remote from the pump. In addition there was evidence of heating of all 3 hydraulic reservoirs; melting and burning of sheathing of flexible hydraulic lines; heat damage to flying control cables, pulleys, and turnbuckles; plus general damage to secondary structure.

Both the 'B' system hydraulic pumps on the Boeing 737-200 aircraft are alternating current (AC) electric units. The electrical portions of these pumps are immersed in the system hydraulic fluid which provides the cooling medium. Initial examination of the No 2 pump revealed a small hole in the underside of the motor case. Strip examination showed that a major electrical short-circuit had occurred between phases close to the point at which the supply cables enter the electrical stator. The hole in the case was adjacent to this point, and was clearly the result of local burning through from within the unit, and a direct result of the short-circuit. A substantial quantity of an unidentified black substance was found in areas adjacent to both ends of the electric stator. Chemical analysis of this material indicated that it was identical in all significant respects to a sample of the insulating liners fitted around either end of the stators in some pumps of this type. The condition of the remainder of the pump was consistent with a unit of low time since overhaul, having suffered no failure of mechanical components but having been subjected to burning of the working fluid.

In 1976 the Federal Aviation Agency (FAA) issued an Airworthiness Directive (AD) relating to Boeing 727 and 737 aircraft, "to prevent a hydraulic system 'B' pump motor internal wiring fault from burning a hole in the case and possibly igniting the escaping hydraulic fluid which could then ignite fuel leakage". The AD required immediate inspections for fuel leakage in areas adjacent to the AC hydraulic pumps, followed, after limited delay, by modification of the pumps to incorporate insulating liners within their motor units. The AD further stated that incorporation of ground (earth) fault protection systems in the pump electrical power circuits constituted "terminating action". Examination of this aircraft showed that the ground fault protection circuits were not incorporated in the 'B' system electrical supplies, however, there was evidence that the modification to incorporate insulating liners had been carried out on the failed pump.