

No: 9/87

Ref: 1a

Aircraft type and registration: Boeing 747-243B N605PE

No & Type of engines: 4 Pratt & Whitney JT9-7A turbofans

Year of Manufacture: 1978

Date and time (GMT): 16 June 1987 at 1320 hrs

Location: Approximately 30 nm west of Gatwick Airport

Type of flight: Public Transport

Persons on board: Crew — 18 Passengers — 225

Injuries: Crew — None Passengers — None reported

Nature of damage: Minor airframe damage and damage to the electrical systems

Commander's Licence: Not known

Commander's Age: Not known

Commander's Total Flying Experience: 6500 hours (of which 2000 were on type)

Information Source: AIB Field Investigations

The aircraft left Gatwick at 1314 hrs on a SAM-1M Standard Instrument Departure (SID) for Newark in the United States.

On take-off the weather radar had indicated some small build-ups at 30 nm range but none showed 'red' centres on the Primus Colour radar. The commander reported that there was some light 'chop' from lift-off but no precipitation on entering cloud at about 4000 feet. After passing 7000 feet a lightning strike occurred, just aft of the flight deck. A few minutes later a second strike occurred, again apparently aft of the flight deck. The autopilot disengaged and it was noted that the flying controls had become stiff in pitch, although normal in roll. The commander estimated that a force of about 50 lbs was required to operate the elevator. About a minute later, level at 13000 feet, a third strike occurred, this time on the nose radome and the weather radar failed with an 'ANT' (antenna) message.

The commander reported that he was concerned about the strike to the radome area and particularly concerned about the stiffness in the elevator control circuit, so he elected to return to Gatwick. The autopilot was successfully re-engaged and on ATC instructions a right turn towards Midhurst was commenced. On completion of the turn the commander disengaged the autopilot to re-assess the elevator control forces and found that they had returned to normal.

A request that London Air Traffic Control Centre (LATCC) keep the aircraft clear of any build-ups could not be granted as their radar does not show weather returns. However, a British Airways aircraft nearby used its radar to confirm that there was a slight build-up, but nothing of any consequence, a few miles southwest of Midhurst.

The commander elected not to jettison fuel and returned to Gatwick for an over-weight landing. On passing to the south of Midhurst at about 11000 feet, the aircraft sustained a fourth and final strike somewhere on the tailplane. A full emergency had been declared and the aircraft landed safely although on the landing roll reverse thrust on the No 2 and No 3 engines could not be achieved and the autospoilers would not deploy.

After clearing the runway the commander tried to contact the Airfield Fire Service on the discrete frequency, but was unable to do so adequately, possibly due to shielding. This frequency is not recorded at Gatwick and the full extent of the difficulty could not subsequently be determined.

After a visual check of the undercarriage the aircraft returned to the terminal.

Subsequent inspection of the aircraft revealed several areas of damage. Along the forward fuselage, between the radome and the wing leading-edge, there were over 100 discrete burn marks, consistent with multiple attachments of 2 or 3 'swept-strokes', where the aircraft's forward speed carries it through an area of discharge. The attachments were generally to the heads of countersunk rivets, but in some places the skin had also been pitted. On top of the fuselage there was an area of approximately 4 square feet where the paint had been heavily discoloured, but eddy current inspection showed that the skin's annealed state was still within the specified limits.

The tip of the right-hand tailplane was also damaged, principally around the closure panel and the fibreglass tip-cap fairing. The aft section of the tip-cap was missing and the metallic diverter strip had been heavily bent and crimped, indicative of a high peak current.

The autospoiler and thrust-reverser failures were found to be due to the failure of 3 landing-gear proximity 'tilt' switches. Other electrical failures attributed to the lightning strikes were the failure of the HF radios, the weather radar and 2 bonding straps at hinge positions on the right-hand elevator. In the passenger cabin, part of the passenger address system was rendered inoperable.

The elevator feel phenomenon could not be fully reproduced. During the inspection a piece of wooden dowel approximately 1/2 inch long was found in a 'blind' rigging-pin hole at the base of the Captain's control column, although it appears extremely unlikely that this was related to the stiffness in pitch. The diameter of the dowel was the same as the rigging-pin hole, and there was no evidence as to how long it had been there.

The aircraft was fitted with both a Cockpit Voice Recorder (CVR) and a Flight Data Recorder (FDR). The elapsed time between the incident and the landing was too long for information on the incident to be retained on the CVR. The FDR was a Sandstrand "Universal Flight Data Recorder" (UFDR) P/N 980-4100-FWUS. No flight data was recorded on the UFDR and it has been returned to the manufacturer for investigation.