

AAIB Bulletin No: 10/94 **Ref:** EW/C94/7/6 **Category:** 1.1

Aircraft Type and Registration: Boeing 747-238, N160UA

No & Type of Engines: 2 Pratt & Whitney JT9-7J turbofan engines

Year of Manufacture: 1976

Date & Time (UTC): 28 July 1994 at about 0700 hrs

Location: Bovingdon holding pattern, London Heathrow Airport

Type of Flight: Public Transport

Persons on Board: Crew - 18 Passengers - 267

Injuries: Crew - None Passengers - None

Nature of Damage: Vertical stabiliser top cap fairing missing, ILS localiser aerials destroyed

Commander's Licence: Airline Transport Pilot's Licence

Commander's Age: 57 years

Commander's Flying Experience: 16,000 hours (of which 800 were on type)
Last 90 days - 225 hours
Last 28 days - 70 hours
Last 24 hrs - 10 hours

Information Source: AAIB Field Investigation

The aircraft took off from San Francisco at 2100 hrs and, at 0645 hrs, entered the Bovingdon holding pattern, where the commander, who was the handling pilot, noted that there was some rain and turbulence over the beacon. The seat belt sign was on and the passengers were seated when, at FL100 over the beacon, there was a loud 'boom' and the aircraft shuddered. The commander instructed the flight engineer to inform the passengers that there had been a lightning strike but that there was no cause for anxiety. As nothing appeared to be wrong with the aircraft handling characteristics, the crew did not report the accident to ATC and the flight progressed normally until, on final approach, although both ILS glideslope displays functioned properly, neither of the aircraft's localiser receivers appeared to receive any signal. However, the crew was in visual contact with the runway and able to carry out a non-instrument approach and landing.

When the crew disembarked, the commander noted that the top cap of the vertical stabiliser was missing.

Examination of the aircraft showed that the majority of the GRP fin cap had been lost and the VOR/Localiser aerial located within it had been totally destroyed, together with the fusible connection links to the aircraft aerial system. The fin trailing edge box immediately above the rudder had also been damaged. There was no other externally visible damage to the aircraft.

Electrical checks of the affected aerial system initially showed a conductive path between the aerial and screen elements in the aircraft. However, after disconnecting the aerial section connectors, the conductive path no longer existed. A self test of the two VOR/Localiser receivers indicated that they were still serviceable, however, before returning the aircraft to service both receivers were changed and the aerial connections cleaned.

The aircraft took off from Stanbury (G) at 2100 hrs and, in 0645 hrs, entered the Birmingham holding pattern, where the commander, who was the leading pilot, noted that there was some rain and turbulence over the location. The wind fell sign was on and the passengers were seated when, at Ft. 100 ft above the horizon, there was a loud boom and the aircraft shuddered. The commander instructed the flight engineer to inform the passengers that there had been a lightning strike but that there was no danger for landing. As it seems appeared to be wrong with the aircraft handling characteristics, the crew did not return the aircraft to VTC and the flight proceeded normally until, on final approach, although the ILS, the VOR/Localiser and the aircraft's localiser receivers appeared to be working normally. However, the crew was in visual contact with the runway and able to carry out a normal approach and landing.

After the crew reported to the commander that the top cup of the vertical stabiliser was



Photo 1 Damage to top of fin as seen from the ground

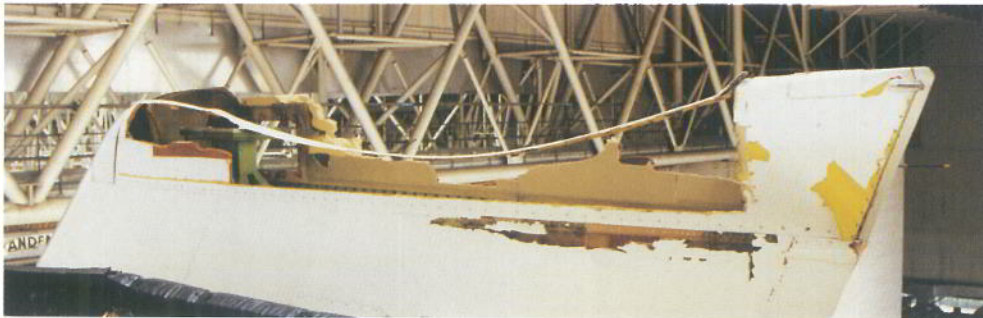


Photo 2 Closer view of damage to top of fin
(note damage to trailing edge section below the fin cap)



Photo 3 Damage to antenna assembly.
(Small debris retrieved from inside fin top structure)