No: 4/87 **Ref: 1a**

Aircraft type and registration:	Boeing 747-136 G-AWNB
No & Type of engines:	Four Pratt and Whitney JT9D-7JCN Turbofan engines
Year of Manufacture:	1970
Date and time (UTC):	15 November 1986 at 0620 hrs
Location:	Runway 28R, London Heathrow Airport
Type of flight:	Scheduled International Passenger
Persons on board:	Crew — 17 Passengers — 242
Injuries:	Crew — None Passengers — None
Nature of damage:	Uncontained failure of No.2 engine. LP Turbine module severely damaged — release of debris resulted in minor damage to left wing flap sections and lower fuselage.
Commander's Licence:	Airline Transport Pilot's Licence
Commander's Age:	50 years
Commander's Total Flying Experience:	12869 hours (of which 4645 were on type)
Information Source:	AIB Field Investigation.

The aircraft was on a scheduled passenger flight from New York, John F Kennedy International Airport, to London Heathrow with a total of 259 persons on board. The departure and oceanic crossing were normal. The flight crew reported, and the flight data recorder readout confirmed, that during the final stage of the cruise approximately 44 minutes prior to landing, the No.2 engine Turbine Gas Temperature (TGT) indication dropped from 616°C to 130°C. After checking that all other engine parameters appeared to be normal and recycling the TGT gauge electrical circuit breaker, a TGT indicator fault was suspected and the engine was allowed to continue running. A standard let down towards London Heathrow Airport was carried out followed by a normal Instrument Landing System approach and landing on runway 28R.

Shortly after touch down and after reverse power was applied there was a No.2 engine fire warning. The flight crew carried out the recommended emergency drill, the engine was shut down and the fire warning indication ceased. The aircraft was turned off the runway and, after the commander had received a damage report from the Airport Fire Service, was taxyed to the terminal area where the passengers disembarked through the normal channels.

Examination revealed that an uncontained failure of the engine had occurred in the area of the 3rd stage (low pressure) turbine, with debris puncturing the core cowling over most of its underside. Damage to the airframe was otherwise minimal, being confined to small dents and punctures of the left wing inboard flaps, flap fairing and wing/fuselage fairing. There was also evidence of debris ingestion into No.1 engine.

Large numbers of 3rd stage turbine stator vanes were recovered from runway 28R and initial examination indicated that this stator stage had rotated at high speed following failure of its anti-rotation pins. Rapid rotation of the stage had caused circumferential wear to occur on the turbine case, which separated through 360° and allowed the stator vanes to exit at high velocity. It should be noted that the TGT indication probes are inserted through the third stage turbine stator vanes and, therefore, rotation of the stage resulted in shearing of the probes.

Federal Aviation Authority Airworthiness Directive (AD) 86-09-01, issued following previous similar occurrences, required modification of the low pressure turbine stator anti-rotation pins before December 31st, 1989. The subject engine was un-modified.

The Chief Inspector of Accidents has ordered an Inspector's Investigation into this accident.