

Aviation Safety Investigation Report
199004040

Boeing 747-238B

27 December 1990

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NOTE: All air safety occurrences reported to the ATSB are categorised and recorded. For a detailed explanation on Category definitions please refer to the ATSB website at www.atsb.gov.au.

This incident was not the subject of an on-scene investigation.

Occurrence Number: 199004040 Location: 230 km N Cairns Qld Date: 27 December 1990 Highest Injury Level: Nil Injuries:	Occurrence Type: Incident Time:
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	Fatal	Serious	Minor	None
Crew	0	0	0	0
Ground	0	0	0	-
Passenger	0	0	0	0
Total	0	0	0	0

Aircraft Details: Boeing 747-238B
Registration: VH-EBQ
Serial Number: 22145
Operation Type: Regular Public Transport
Damage Level: Minor
Departure Point: Cairns Qld
Departure Time: 1202 hours
Destination: Narita JAPAN

Approved for Release: 18th December 1992

Circumstances:

VH-EBQ departed Cairns for Narita at 1202 local time. At 1221, a 'PAN' call (urgency message) was made and the pilot requested an Air Traffic Control (ATC) clearance to return to Cairns. The captain stated that as the aircraft was climbing through Flight Level (FL) 200, moderate airframe vibration was felt. Checks revealed no abnormal cockpit indications. The second officer carried out a visual inspection from the cabin, and noticed a damaged wing panel on the upper inboard trailing edge of the right-hand wing. A return to Cairns was initiated and a clearance to dump fuel was obtained. Cairns ATC advised the aircraft that they had diverted an Australian Airlines Boeing 737 (B737) to escort the aircraft during the return to Cairns. A fuel dump of approximately 25,000 kg was carried out, followed by a descent and circling approach to runway 33. The captain stated that with the flaps extended, there was a slight tendency for the aircraft to roll to the right. The aircraft was landed at 1259 without further incident. The escorting B737 landed approximately 5 min ahead of VH-EBQ. A readout of the digital flight data recorder was made to determine the data recorded on climb and during the subsequent landing at Cairns. Examination of this data showed that acceleration traces had minor inconsistencies or scatter as the aircraft was climbing through a recorded pressure altitude of FL 205 from 1214 07 to 1214 13. It is possible that the wing panel failure occurred at this time. No other anomalies were observed in the recorded data to indicate that the loss of a wing panel had occurred. Data recorded during the landing at Cairns was consistent with a crosswind landing and no evidence of airframe vibration or other anomalies was observed in the recorded data. The failure of the right-hand inboard trailing edge fibre reinforced plastic panel was accompanied by the loss of a 2.7 m by 18 cm section of the foreflap trailing edge, and some damage to the mid-flap. The operator had previously had some 20 incidents involving this panel on Boeing 747 aircraft. On 19 January 1991, the same panel failed on VH-EBP in flight between Sydney and Narita. The manufacturer indicated that there had been several incidents in the previous 18 months resulting from cracking,

delamination and separation of this panel. The possible related causes for failure of the panel were (a) Damage caused by personnel stepping on the panel. (b) Damage caused by tyre burst. (c) Manufacturing anomalies. (d) Misrigging. (The panel is an aerodynamic surface and is fixed in position with screw jacks to preload it with flaps retracted.) The panel is subject to a coin 'tap test' to check for delamination, and a push test on both upper and lower surfaces at each 'A' check (400 hrs). VH-EBQ was last inspected on 8 December 1990. When the trailing edge flaps are fully retracted and the fuel tanks are full, the trailing edge of the fixed panel is deflected upwards by as much as 4.5 cm by contact with the flaps. The operator has re-rigged the trailing edge panels so that the maximum deflection is 3.5 cm, thus reducing pre-load stress. In addition, 'NO STEP' signs have been painted on the panels to reduce possible damage during maintenance. The failed panel from VH-EBQ was not available for examination; however, the subsequent failed panel from VH-EBP was available, and a specialist examination was carried out. Specialist opinion was that both failures were of a similar type, whereby trailing edges had peeled off as a result of debonding and bending due to pre-load rather than aerodynamic forces. The manufacturer has incorporated design changes to overcome this type of failure. The operator has increased the frequency of periodic inspections of the panel, and it is considered that sufficient corrective action has been taken to overcome the problem. A comprehensive investigation of Air Traffic Services (ATS) aspects was carried out. The investigation concluded that the decisions and actions taken by the ATS personnel involved in the handling of the situation were prompt and effective. The provision of an escort aircraft was justified in view of the information received initially from VH-EBQ, and is consistent with the relevant operational practices and techniques documented in the Airways Operations Instructions (AOI). The captain of VH-EBQ initially felt some concern about the provision of an escort aircraft because of a lack of a clear understanding as to the function of the escort aircraft in relationship to his aircraft. Selection of the aircraft to perform the intercept/escort was in accordance with published AOI guidelines, and implementation of the escort action was efficient and effective. Consideration of weather conditions was not included as a factor in determining the provision of an escort aircraft in the current AOI.

Significant Factors:

The following factor was considered relevant to the development of the incident The right-hand inboard trailing edge composite wing panel failed, probably due to delamination followed by cracking and peeling. The failure was a known defect. Remedial action has been undertaken by the operator and the manufacturer to improve inspection and manufacturing techniques.

Recommendations:

Recommendations to the Civil Aviation Authority are being finalised by BASI and will be forwarded under separate cover.