

**Aviation Safety Investigation Report
198900812**

Boeing 747-238B

1 June 1989

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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.

Occurrence Number: 198900812 **Occurrence Type:** Accident
Location: 380km WNW of Alice Springs NT
Date: 1 June 1989 **Time:** 2011
Highest Injury Level: Serious
Injuries:

	Fatal	Serious	Minor	None
Crew	0	0	19	19
Ground	0	0	0	-
Passenger	0	7	58	240
Total	0	7	59	259

Aircraft Details: Boeing 747-238B
Registration: VH-EBP
Serial Number: 21658
Operation Type: Regular Public Transport
Damage Level: Minor
Departure Point: Sydney NSW
Departure Time: 1705
Destination: Singapore

Approved for Release: 5th January 1990

Circumstances:

The aircraft was cruising in clear and smooth conditions, some time after storms had been encountered, when it suddenly pitched upwards. Both the Captain and First Officer manually opposed the pitch up by applying considerable forward pressure to their control columns. The autopilot was disengaged by the Captain and the aircraft was descended to the assigned cruise flight level. During the above manoeuvres some passengers were injured by contact with the aircraft structure. A number of these passengers had been unrestrained in their seats, despite instructions that it was a company policy that seated passengers were to have their seat belts fastened. A doctor, who was aboard, assessed that some of the passengers' injuries were sufficiently serious to warrant hospital treatment. The Captain elected to divert to Darwin. Fifty passengers were treated in hospital including ten who were admitted. Analysis of the Digital Flight Data Recorder fitted to the aircraft indicated that during the flight excursion and subsequent recovery the aircraft climbed 1650 feet, the airspeed decreased by 45 knots and it was subjected to maximum and minimum vertical accelerations of +1.9 and -0.3 g. (The normal g force exerted on an object on the earth is +1 g.) The Captain stated that he initially thought that the aircraft had encountered a meteorological phenomenon known as a standing wave. The preflight meteorology briefing received by the flight crew indicated the possibility of clear air turbulence but did not mention standing waves. However, during the pitch up the Captain realised that there was an autopilot malfunction (there was no warning from the system that the autopilot had malfunctioned). He elected not to disconnect the autopilot immediately because he thought that the removal of a large but unknown nose up force from the control column would lead to excessive negative 'g'. The autopilot was disengaged after the aircraft returned to a more normal attitude. There was a requirement to reduce the nose up attitude fairly quickly if a 'g' induced stall was to be avoided. The Captain stated that his actions were a compromise between reducing the aircraft's nose up attitude to prevent a stall from developing and keeping negative 'g' to a minimum for passenger safety. The optimum outcome from the autopilot malfunction would have been obtained if

it had been initially recognized as such and an early disengagement of the autopilot accomplished. However, given that clear air turbulence had been forecast and moderate turbulence reports received from two other aircraft, it is not unreasonable that the Captain initially thought that the disturbance to the aircraft flight path was caused by meteorological conditions. Given that the disturbance was originally diagnosed as of meteorological origin, the Captain's actions were logical and the recovery technique from the resultant unusual attitude was correct. Maintenance investigation by the operator disclosed that the aircraft had suffered similar autopilot malfunctions over recent months. The flight crew was not aware of this history. The cause of the malfunction was traced to an intermittent defect in the Air Data Computer system.

Significant Factors:

The following factors were considered relevant to the development of the accident

1. There was an intermittent fault in the Air Data Computer system which resulted in the autopilot commanding a sudden pitch up of the aircraft.
2. The flight crew initially misidentified the cause of the pitch up which in turn resulted in a delay in disengaging the malfunctioning autopilot.
3. Some seated passengers were not wearing seat belts despite instructions to do so.

Reccomendations:

During the application of negative 'g', several unrestrained passengers collided with overhead lockers/panels and received neck injuries. Similar injuries could be expected during an encounter with turbulence. The first aid kits carried on the aircraft did not include neck braces. Passengers flying on any large aircraft could receive similar injuries. It is recommended that the Aviation Medicine Branch of the Civil Aviation Authority consider a requirement for all Regular Public Transport aircraft first aid kits to be equipped with an appropriate number of neck braces.