Aviation Safety Investigation Report 199602278

Boeing Co
B737

14 July 1996

Readers are advised that the Australian Transport Safety Bureau investigates for the sole purpose of enhancing transport safety. Consequently, Bureau reports are confined to matters of safety significance and may be misleading if used for any other purposes.

Investigations commenced on or before 30 June 2003, including the publication of reports as a result of those investigations, are authorised by the Executive Director of the Bureau in accordance with Part 2A of the Air Navigation Act 1920.

Investigations commenced after 1 July 2003, including the publication of reports as a result of those investigations, are authorised by the Executive Director of the Bureau in accordance with the Transport Safety Investigation Act 2003 (TSI Act). Reports released under the TSI Act are not admissible as evidence in any civil or criminal proceedings.

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.

Aviation Safety Investigation Report

199602278

The Bureau did not conduct an on scene investigation of this occurrence. The information presented below was obtained from information supplied to the Bureau.

Occurrence Number:	199602278	**Occurrence Type:**	Incident
Location:	100km S Darwin, Aerodrome		
State:	NT	**Inv Category:**	4
Date:	Sunday 14 July 1996		
Time:	0725 hours	**Time Zone**	CST
Highest Injury Level:	None		

Aircraft Manufacturer:	Boeing Co		
Aircraft Model:	737-376		
Aircraft Registration:	VH-TAI	**Serial Number:**	23483
Type of Operation:	Air Transport Domestic High Capacity Passenger Scheduled		
Damage to Aircraft:			
Departure Point:	Darwin NT		
Departure Time:			
Destination:	Adelaide SA		

Approved for Release: Monday, September 2, 1996

The thrust reverser fault light on the pilot' overhead panel illuminated when the aircraft was approaching top of climb out of Darwin. The crew completed the required check list items and elected to return to land at Darwin. Maintenance locked out the thrust reverser and the aircraft flew to Adelaide where the engine accessory unit (EAU) was replaced.

Thrust reverse control system.

The thrust reverser control consists of a thrust reverser isolation valve and a directional control valve for each reverser. Each isolation valve is opened by switches. These switches sense motion of the control stand quadrant to command reverse thrust,and low altitude or compression of the right main gear for normal operation. Also if a reverser sleeve is sensed to be not fully stowed, the isolation valve is opened and the directional control valve is commanded to the stow position.

Illumination of the reverser light in flight indicates that the reverser isolation valve is open and the directional control valve is in the stow position or vice versa. The light will also illuminate if the stow enabling relays for each sleeve disagree for more than two seconds. The reverser light illuminates during normal stow and trips the master caution after approximately 12 seconds.

An open thrust reverser isolation valve will not, by itself, permit the reverser to be deployed in flight: the directional control valve requires ground logic and movement of the reverse thrust lever to move to the deploy position.

Similarly, a directional control valve in the deploy position will not, by itself, permit the reverser to be deployed in flight; the isolation valve also requires ground logic and movement of the reverse thrust lever to open.

System serviceability.

The thrust reverse indication system has had a history of intermittent illumination of the overhead panel thrust reverser fault light. The manufacturer has addressed many of the causes through design changes such as the introduction of a spring loaded proximity sensor, improved thrust reverser control switches located in the isle stand as well as introduction of a six-light engine accessory unit which facilitates trouble shooting.

However, many operators still report problems with troubleshooting the system. These problems have led to a high rate of removal of the EAU, testing of which was unable to confirm any unserviceability within the units. In 1993 the manufacturer introduced a sixteen light EAU capable of monitoring the individual state of each of the thrust reverser indication proximity sensors.

Continuing erroneous fault light illumination was traced to a certain batch of relays fitted to the EAUs. These were failing because of chemical/thermal corrosion of the coil wire, or insufficient clearance between the case and the armature, or cold welding of the relay contacts.

Operators engineering action.

The operator is removing the suspect relays on a campaign basis and is having the improved EAU fitted to current delivery aircraft. However the improved EAU will not be retrofitted to the existing fleet.

A modification that introduces an independent method of locking the stowed thrust reverser is being progressively introduced. So far the operator has modified 9 out of its fleet of 30 aircraft.

Manufacturers advice.

The manufacturer advised that the overhead panel reverser fault light has only one purpose: to inform the crew that the reverser may deploy if another fault develops. No immediate action by the flight crew is required. The manufacturer recommends that the flight should continue to its destination.

The manufacturer is currently assessing whether, with the independent method of locking the stowed thrust reverser installed, it is possible to suppress the reverser light in flight.