Aviation Safety Investigation Report 200205893

Boeing Co 737-476

15 December 2002

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 CEO 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 CEO 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.

Occurrence Number: 200205893 **Occurrence Type:** Serious Incident
Location: Canberra, Aerodrome
Date: 15 December 2002 **Time:** 1023 ESuT
Highest Injury Level: Nil
Injuries:

	Fatal	Serious	Minor	None
Crew	0	0	0	7
Ground	0	0	0	-
Passenger	0	0	0	103
Total	**0**	**0**	**0**	**110**

Aircraft Details: Boeing Co 737-476
Registration: VH-TJF
Serial Number: 24431
Operation Type: Air Transport High Capacity Scheduled Domestic Passenger
Damage Level: Nil
Departure Point: Canberra ACT
Departure Time: 1020
Destination: Melbourne Vic.

Approved for Release: 16 September 2004

FACTUAL INFORMATION

At about 1020 Eastern Summer Time on 15 December 2002, a Boeing 737-400 (737) aircraft, registered VH-TJF, departed runway 35 at Canberra Airport for Melbourne. As the aircraft was rotated, the handling pilot felt that the pitch control was unusually stiff. The crew informed air traffic control of the problem and climbed the aircraft to a safe altitude in order to conduct a controllability check. The crew declared an urgency emergency phase as a precaution. The aircraft subsequently landed at Canberra Airport, at about 1115, with airport emergency services in attendance.

The operator's maintenance personnel could not reproduce the problem on the ground. After investigation and replacement of the system B flight control module an assessment flight was conducted the following day to Melbourne Airport. That flight determined that the defect was still present and the aircraft was relocated to the operator's maintenance facility in Melbourne for further investigation.

After an extensive investigation by the operator, the elevator binding was reproduced and found to be due to an incorrectly located elevator control cable. The control cable was hooked over the lip of a J shaped floor support beam, beneath the aft galley. The angular deflection of the cable over the floor support beam was such that the cable would only bind intermittently. The cable was repositioned and re-rigged in accordance with the manufacturer's aircraft maintenance manual. An assessment flight was conducted and it confirmed that the defect was no longer evident.

A scheduled maintenance inspection on the 737 was completed on 13 December 2002. A review of the aircraft's technical log indicated that on three of the eleven sectors flown since that inspection, reports of heavy and binding flight controls were noted.

During the scheduled maintenance inspection completed on 13 December 2002, several flight control cables had been disconnected to carry out a modification that required the removal of the flight control columns. One of those cables was found, during the operator's subsequent investigation, to be hooked over the aft galley floor support beam. The scheduled maintenance inspection did not require the floor panels to be removed and therefore did not allow a complete inspection of the cables after the modification was completed. Although there was no reported work carried out on the control cable system in that area, several maintenance work cards detailed maintenance near that area.

The operator conducted tests to determine how the cable might have become hooked over the J section floor support beam. With normal operating tension on the cable, a force of approximately 30 kg was required to place the cable over the beam. With only slight tension on the cable and the cable clamped, it could be readily placed over the beam. The test also determined that with the aft galley installed, as was the case, access to the location where the cable was hooked over the floor support beam was very limited.

The manufacturer's aircraft maintenance manual contained instructions for maintaining a light tension on control cables that were disconnected but not removed. The instructions detailed the installation of cable clamps on the affected cables, to ensure that the cables do not unwind on their cable drums or become displaced from their pulley guides. If the cables were between rig pin locations, then rig pins were to be installed through the applicable cable drum or quadrant.

The aircraft manufacturer indicated that during certification of the 737, tests were performed to determine if an untensioned cable during emergency operations of the flight controls would interfere or hang up on adjacent structure. The manufacturer determined that the J section of the floor support beam did not present a risk.

The operator conducted an inspection of other 737 aircraft and found that two other configurations existed. One installation was the same as the incident aircraft but the cable was located within a plastic tube. The other installation had the floor support beam facing in the opposite direction (J section tail of the beam facing away from the cable). The manufacturer determined that the configuration of the incident aircraft was in accordance with the design drawing for the aircraft and that the floor support beam location was limited to the operator's fleet.

ANALYSIS

It is unlikely that the cable, when under normal operating tension, could have been incorrectly positioned, due to the force required. Although it could not be determined when the cable was placed over the J section floor support beam it is likely that it occurred during the scheduled maintenance inspection when tension on the control cable system was released.

SAFETY ACTION

Local safety action

As a result of this occurrence, the operator:

- issued a maintenance memo noting the importance of observing standard work practices when working with and/or within the area of cables

- instituted a training package on standard work practices when changing/releasing [tension on] cables

- inspected and compared configuration drawings for seven other 737s in the fleet.