

Aircraft Type and Registration:	Airbus A320-231, G-JOEM	
No & Type of Engines:	2 IAE V2500-A1 turbofan engines	
Year of Manufacture:	1993	
Date & Time (UTC):	17 March 2004 at 1540 hrs	
Location:	Birmingham Airport, West Midlands	
Type of Flight:	Public Transport (Passenger)	
Persons on Board:	Crew - 6	Passengers - 168
Injuries:	Crew - None	Passengers - None
Nature of Damage:	Damage to forward left cabin door	
Commander's Licence:	Airline Transport Pilot's Licence	
Commander's Age:	36 years	
Commander's Flying Experience:	7,000 hours (of which 4,400 were on type) Last 90 days - 155 hours Last 28 days - 50 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot and further enquiries by the AAIB	

History of the accident

Passengers were boarding the aircraft through the forward left cabin door, via an airbridge (see Figure 1). When approximately two-thirds of the passengers had embarked, the cabin crew noticed that the bottom of the door, which opens outwards and forwards, was in contact with the floor of the airbridge. The crew contacted their handling agent and one of their staff attended the aircraft.

On arrival at the airbridge the ground agent noticed that the airbridge 'autolevel' alarm had activated. This indicated that there was an autolevel malfunction or that the 'travel timer' had tripped, or both. (Note: The autolevel circuit includes an adjustable timer that permits the airbridge's vertical travel motor to operate continuously for a maximum of six seconds.) She also saw that the autolevel 'safety shoe' (see Figure 2) was not in place on the airbridge floor beneath the aircraft door. The safety shoe is designed to create a 'signal' that triggers the airbridge to descend when the bottom of the aircraft door touches the shoe, thus preventing contact between the door and the airbridge.

The ground agent pressed the autolevel reset button, which was flashing on the airbridge control panel, and passenger boarding was stopped. She stated that the airbridge then moved up slightly and she immediately hit the emergency stop button, thus cutting power to the airbridge and freezing its position. The passengers who had already boarded were disembarked, to reduce the pressure on the bottom of the aircraft door; the airbridge controls were reset and the airbridge was moved away from the aircraft. The forward left door of the aircraft had sustained damage to its hinges and its bottom edge.

Examination of the autolevel sensor on the airbridge (see Figure 3) showed that the wheel had rotated to its full extent and jammed, indicating that the aircraft had descended relative to the floor of the airbridge. Once the wheel had been freed, the autolevel system was tested and found to operate correctly.

Previous activity

The airbridge had been driven into position and deployed when the aircraft had arrived on the stand earlier in the day. The operator of the airbridge, at that time, had noticed that there was no 'safety shoe' available to place beneath the aircraft door. However, in the absence of any report that the airbridge had been taken out of service, he continued to disembark the passengers. On completion, the airbridge remained in position against the aircraft for approximately three hours to await the next departure.

The dispatcher for the departing flight also noticed that the safety shoe was missing when he arrived at the aircraft. He reported the fact to the Building Maintenance Centre and continued to arrange for passenger boarding to commence. He stated that he had then returned to the handling agent's office, while the passengers were boarding, to obtain some paperwork and was away from the airbridge for about 20 minutes. It was during that period that the accident occurred.

The airport's Building Maintenance engineers had removed the safety shoe on 9 March 2004 when it was found to be damaged. However, the airbridge remained in service until the accident, eight days later. The airbridge was subsequently taken out of service pending the replacement of the safety shoe on 18 March 2004.

Operation of the Airbridge

The autolevelling system

The airbridge is equipped with an autolevelling system which automatically follows small changes in the height of the aircraft door sill. This 'autoleveller' includes a wheel and sensor unit mounted on

the end of a retractable arm located on the airbridge head floor. The wheel rests against the aircraft fuselage and rotates as the aircraft rises or falls with respect to the airbridge (see Figure 4). The autolevel circuit also contains an adjustable timer, which permits the vertical travel motor to operate continuously for a maximum of six seconds. At the end of this time all power to the system is removed, an audible alarm sounds and a warning light is energised at the control panel.

The autolevel mode is activated by the "AUTOLEVEL OUT" pushbutton on the control panel and deactivated by the "AUTOLEVEL IN" pushbutton. Pressing these buttons extends and retracts the autolevel arm, respectively.

The Safety Shoe

The safety shoe detects and automatically corrects for an insufficient gap between the aircraft door and the airbridge head floor, protecting the door from damage due to excessive lifting forces. When the airbridge has been correctly positioned against the aircraft, the operator places the safety shoe on the bridge head floor under the aircraft door. If the door comes into contact with the safety shoe, the bridge head is driven down and an alarm sounds. The alarm remains until manually reset. There is no provision in the manufacturer's instructions for operating the airbridge without the safety shoe in position, although it is possible to do so.

Manual Operation

The airbridge can be operated manually, without the autolevelling system, by retracting the autolevel sensor and activating the up and down commands on a joystick on the control panel. The manufacturer's instructions state that if an autolevel or safety shoe alarm is activated in the autolevel mode, then, having pressed the appropriate fault reset pushbutton, the "AUTOLEVEL IN" pushbutton is to be pressed and the airbridge is to be controlled manually.

Operator Training and Licensing

The airport authority issues instructions for the operation of this airbridge and administers the training given to operators. The training itself is delegated to the handling agent and, on completion, operators are issued with a licence by the airport authority, valid for three years.

Both airbridge operators had been trained and were currently qualified in accordance with the airport's procedures. Their training included a demonstration of the safety shoe and the actions to take in the event of an airbridge malfunction. Both their licences were valid, with the dispatcher's licence due to expire on 27 August 2004.

Discussion

The autolevel system sensor wheel had rotated to its fully 'down' position and jammed, suggesting a protracted movement of the aircraft in that direction. The autolevel alarm had activated and this indicated that there was a malfunction in the autolevel system or that there had been continuous 'levelling' of the airbridge for a maximum of six seconds. Following this alarm, the correct procedure would have been for an operator to operate the airbridge manually. Why the airbridge moved up slightly after the autolevel reset button had been pressed, as reported, is not clear. Nor was it apparent which of the two causes had triggered the alarm.

The absence of a safety shoe on the airbridge head floor removed the 'secondary' protection which would have prevented the airbridge from exerting excessive vertical loads on the aircraft door. Activation of that protection feature also initiates an alarm, which, when it occurs, requires cancellation by the operator and reversion to manual control. There is no provision in the manufacturer's instructions for operation of the airbridge without the safety shoe in place.

Following the accident, the airport authority took the airbridge out of service until the safety shoe had been replaced. They also issued a new Airport Operating Instruction which stated that;

No airbridge must be left unattended whilst in the "Auto-Level" condition when docked to an aircraft. A qualified operator must remain in attendance to respond to any audible alarm that may occur. During the period between completing disembarkation and boarding passengers for the next flights, if the airbridge is to be left unattended, the aircraft door should be closed, the jetty withdrawn clear of the aircraft side and shut down.

The handling agent has reduced the period between refresher training courses for airbridge operators from every three years to annually. He has also instructed dispatching staff that if a safety shoe is missing and should be present, as with this design, then the airbridge is unserviceable.



Figure 1

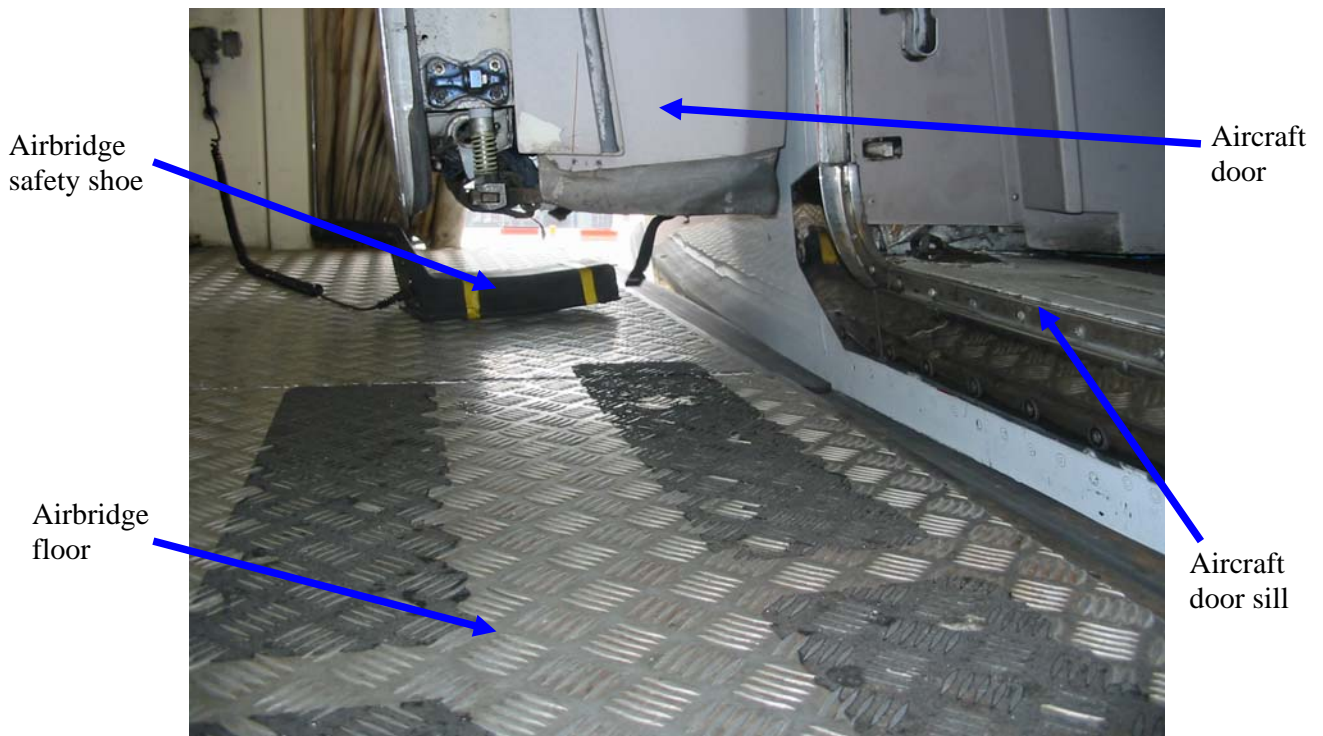


Figure 2

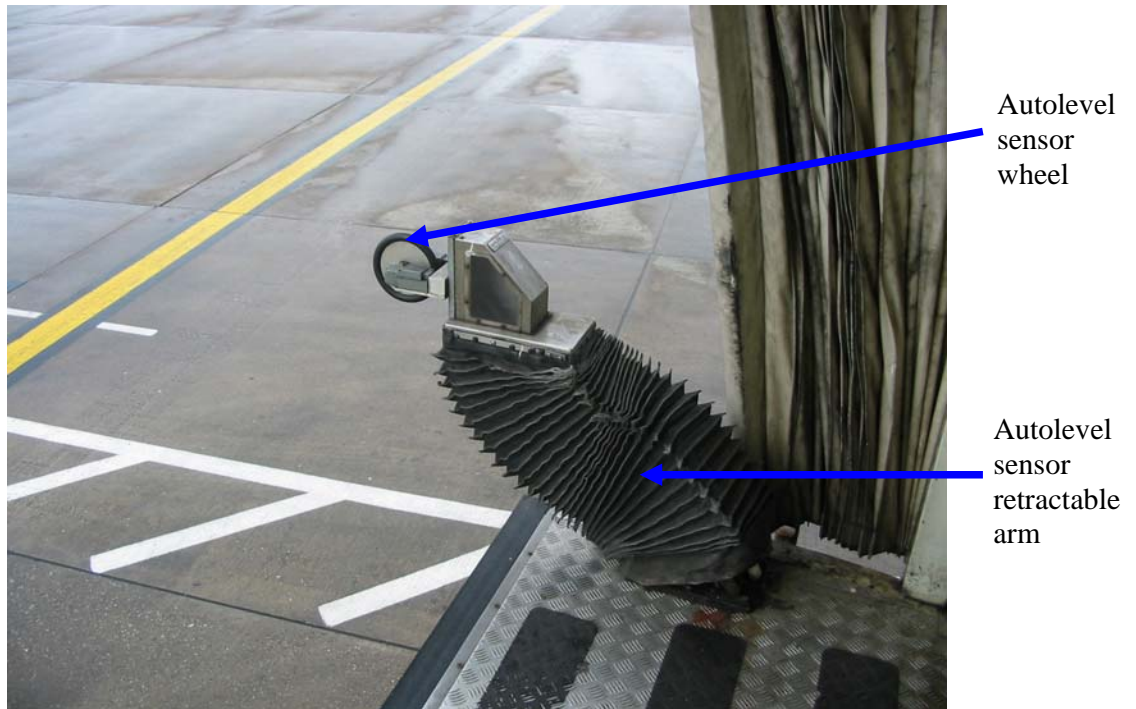


Figure 3

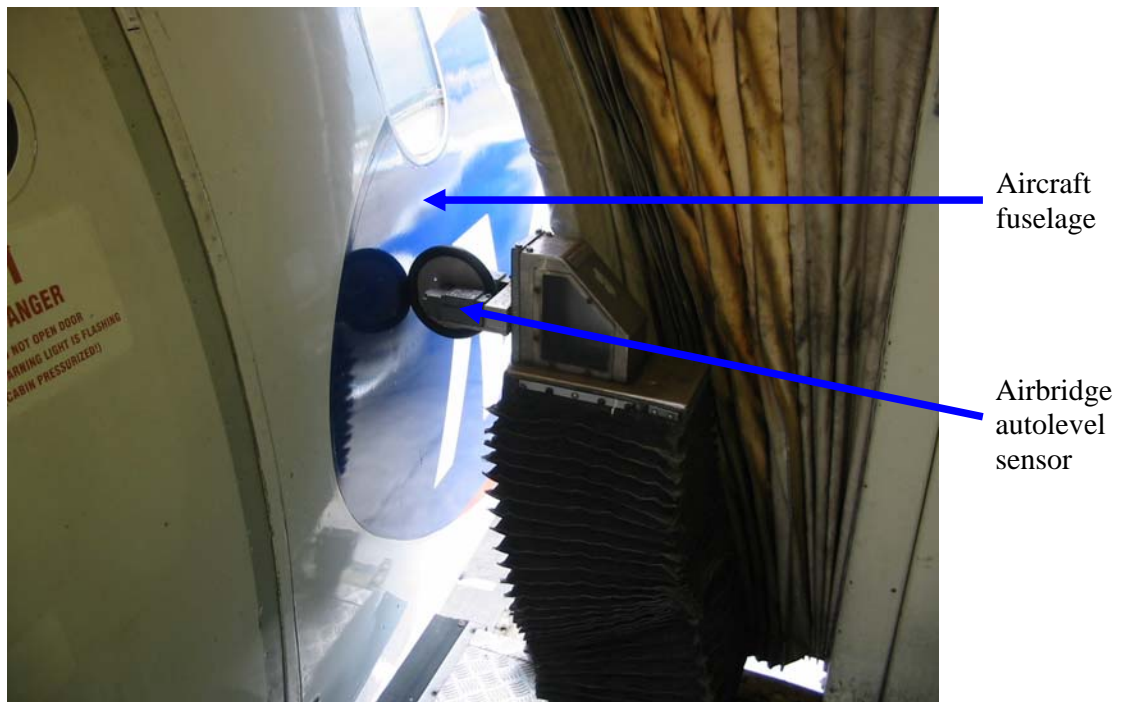


Figure 4