



National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: May 8, 2001

In reply refer to: A-01-16 through -22

Honorable Jane F. Garvey
Administrator
Federal Aviation Administration
Washington, D.C. 20591

On November 20, 2000, about 1222 eastern standard time, a flight attendant/purser was killed during an emergency evacuation of American Airlines flight 1291, an Airbus Industrie A300B4-605R, N14056, at Miami International Airport (MIA), Miami, Florida. The airplane was pressurized until the flight attendant/purser opened the left front door (1L); he was then forcibly ejected from the airplane. Visual meteorological conditions prevailed, and an instrument flight plan was filed. The flight was operating as a 14 *Code of Federal Regulations* Part 121 scheduled international passenger flight. There were 133 persons on board. During the emergency evacuation, in addition to the 1 flight attendant/purser who was killed, 3 passengers sustained serious injuries; 18 passengers and 1 flight service director¹ sustained minor injuries; and the 2 pilots, 6 flight attendants, 1 off-duty flight attendant, 1 flight service director, and the remaining 100 passengers reported no injuries. The airplane sustained minor damage.

The flight departed MIA for Port Au Prince International Airport, Haiti, and had been airborne for about 8 minutes when the flight crew encountered a problem with the automatic pressurization system. The captain stated to National Transportation Safety Board investigators that the automatic cabin pressurization controllers would not control cabin pressure when the airplane was climbing through 16,000 feet and that the electronic centralized airplane monitor

¹ Flight service directors are language translators who receive emergency procedures training for land and over-water evacuations for the aircraft to which they are assigned.

(ECAM) display² showed the forward outflow valve³ opened fully.⁴ The cabin altitude was climbing at a rate of 2,000 feet per minute, and the cabin altitude indicator showed 7,000 feet. The captain decided to operate the pressurization system in the manual mode (and closed the outflow valves) and, about 11 minutes after departure, indicated to air traffic control (ATC) that the flight would return to MIA. At that point, the pilots began performing the American Airlines A300⁵ Cabin Pressurization Manual Control Checklist,⁶ which is contained in the American Airlines A300 operating manual.

The captain stated to Safety Board investigators that during the return to MIA, the flight attendant call chimes sounded erratically and the lavatory smoke detectors sounded continually. Passengers and cabin crewmembers complained about pressure in their ears. About 3 minutes before landing, the captain declared an emergency to ATC and requested that aircraft rescue and firefighting (ARFF) personnel stand by for the landing. After the airplane landed at MIA, ARFF personnel checked the exterior of the airplane and reported no signs of fire. The cockpit voice recorder indicates that a flight attendant reported smelling smoke to the flight crew. The captain indicated to Board investigators that he observed the illumination of a cargo loop light⁷ on the cockpit overhead panel. The captain then ordered an emergency evacuation of the airplane, and the American Airlines A300 Ground Evacuation Checklist⁸ was performed. The flight attendants heard the sounding of the evacuation signaling system and attempted to open the emergency exits to begin the emergency evacuation but were having difficulty doing so. A flight attendant reported to the flight crew that the doors would not open. While the flight attendant/purser was struggling to open the 1L door of the airplane, the door suddenly burst open, and he was forcibly ejected onto the ramp and was killed. Preliminary findings from the investigation revealed that excess air pressure inside the cabin caused the door to burst open.

Although this accident investigation is ongoing,⁹ the Safety Board identified several safety issues that require the Federal Aviation Administration's (FAA) attention.

² The ECAM display is a cathode ray tube screen located in the cockpit. The system is automatic and displays messages and system diagrams to pilots. It provides operational assistance for both normal and abnormal airplane system situations.

³ The two outflow valves open and close during flight and on the ground to maintain control of cabin pressurization.

⁴ Postaccident examination of the accident airplane by the Safety Board's Systems Group revealed that insulation blankets partially blocked the forward outflow valve and almost fully blocked the aft outflow valve.

⁵ All A300 airplanes that American Airlines operates are A300-600 airplanes.

⁶ The American Airlines A300 Cabin Pressurization Manual Control Checklist is similar to that of Airbus. The entire checklist cannot be performed at one time; rather, pilots must initiate the checklist and then complete it later in flight. According to the accident captain, he did not perform all of the items in the Cabin Pressurization Manual Control Checklist because of his other priorities at the time, including addressing the smoke indications and landing the airplane.

⁷ Illumination of a cargo loop light may indicate a fire in the cargo compartment. No evidence of fire was found in the Safety Board's postaccident examination of the airplane.

⁸ The American Airlines A300 Ground Evacuation Checklist, which is contained in the American Airlines A300 operating manual, is similar to the Airbus A300-600 On Ground/Emergency Evacuation Checklist.

⁹ The description for this accident, MIA01FA029, can be found on the Safety Board's Web site at <<http://www.nts.gov>>.

Pressurization System

Airplane pressurization systems can be operated in automatic and manual modes. The manual mode of operation, which is considered by both the Airbus A300-600 and American Airlines A300 operating manuals¹⁰ to be an abnormal procedure, is used on the A300-600 airplane when the automatic mode becomes inoperative and allows the flight crew to manually operate the electric motors that control the outflow valves. The Airbus A300-600 and American Airlines A300 Cabin Pressurization Manual Control Checklists, which are contained in the companies' respective operating manuals, both address the manual mode of the pressurization system. With the pressurization system in the automatic mode, the airplane is pressurized upon landing, but the outflow valves automatically open slowly (and depressurize the airplane) within 45 seconds of landing, assisting in passenger comfort. However, with the pressurization system in the manual mode, the airplane does not automatically depressurize after landing because the automatic operation of the electric motors that open and close the outflow valves is inhibited. Therefore, when operating the airplane's pressurization system in the manual mode, the flight crew must fully open the outflow valves as indicated in the Cabin Pressurization Manual Control Checklist by selecting the Cabin Vertical Speed Control switch to the UP position before landing to ensure that the airplane is depressurized.

As indicated earlier, the accident captain began performing the items in the Cabin Pressurization Manual Control Checklist but did not complete the checklist, including the item that instructs pilots to select the Cabin Vertical Speed Control switch to the UP position to open the outflow valves and depressurize the airplane before landing. The captain indicated that he did not complete the checklist because of his other priorities at the time. During postaccident interviews with Safety Board investigators, the pilots of the accident airplane stated that they were not aware that the airplane would not automatically depressurize after landing because this issue was not mentioned in the operating manuals or during training.

The investigation confirmed that the pressurization system description section in the Airbus Industrie A300-600 operating manual does not state that the airplane will not automatically depressurize after landing if the pressurization system is being operated in the manual mode. The investigation also confirmed that the American Airlines A300 operating manual does not contain this information. Further, because the American Airlines training program for the A300-600 airplane only covers the information in the American Airlines A300 operating manual, the training program also fails to address this issue.

The Safety Board is concerned that because of the lack of information in the Airbus Industrie A300-600 operating manual and the American Airlines A300 operating manual and training program about this issue, flight crews of Airbus Industrie A300-600 airplanes might be unaware that the airplane does not automatically depressurize upon landing when the pressurization system is in the manual mode. Although proper completion of the Cabin Pressurization Manual Control Checklist should result in the airplane being depressurized upon

¹⁰ The manufacturer's operating manual provides flight crewmembers with information on the technical, procedural, and performance characteristics of the aircraft. This manual is suitable for training and may be used as a crew manual or to aid operators in developing operating manuals and procedures.

landing, the Board's experience has shown that pilots sometimes do not properly complete checklists, as occurred in this case. This investigation found that pilots may not be aware that one of the repercussions of failing to complete the checklist is the airplane remaining pressurized upon landing. The Board notes that regardless of a flight crew's reasons for failing to complete the checklist, if the pilots had known that the airplane was still pressurized, they would likely have depressurized the airplane before permitting the door to be opened.¹¹ Therefore, the Safety Board believes that the FAA should require that the Airbus Industrie A300-600 operating manual clearly state that automatic depressurization of the airplane upon landing will not occur when the pressurization system is being operated in the manual mode. Further, the Safety Board believes that the FAA should review all Airbus Industrie A300-600 operators' operating manuals and training programs and require revisions, if necessary, to ensure that they clearly indicate that automatic depressurization of the airplane upon landing will not occur when the pressurization system is being operated in the manual mode.

Checklists for Emergency Ground Evacuation

The Airbus Industrie A300-600 On Ground/Emergency Evacuation Checklist and the American Airlines A300 Ground Evacuation Checklist, which are contained in the companies' respective operating manuals, direct the flight crew to select the Ram Air switch to the ON position during a ground evacuation. This switch allows fresh outside air to flow into the airplane when it is airborne and depressurizes the airplane by opening both outflow valves when the airplane is in flight or on the ground and the pressurization system is being operated in the automatic mode. When the pressurization system is being operated in the automatic mode, the Ram Air switch is used as a backup method of ensuring that the outflow valves are open and is also used to open the outflow valves if the evacuation occurs less than 45 seconds after landing. However, the Ram Air switch does not control the outflow valves if the pressurization system is being operated in the manual mode. Therefore, when the flight crew of the accident airplane selected the Ram Air switch to the ON position while performing the checklist for ground evacuation,¹² the outflow valves did not open and depressurize the airplane because the pressurization system was being operated in the manual mode.

The pilots of the accident airplane stated to Safety Board investigators that they were unaware that the Ram Air switch did not control the outflow valves when the pressurization system was being operated in the manual mode and that this information was not included in their ground or simulator training or documented in the operating manuals. The investigation confirmed that the Airbus Industrie A300-600 operating manual does not state that the Ram Air switch will not control the outflow valves if the pressurization system is being operated in the manual mode. The investigation also confirmed that the American Airlines A300 operating

¹¹ As indicated earlier, postaccident examination of the accident airplane by the Safety Board's Systems Group revealed that insulation blankets partially blocked the forward outflow valve and almost fully blocked the aft outflow valve. Although the manual opening of the outflow valves would likely have allowed the airplane to depressurize, the depressurization would have occurred at a rate that is substantially slower than normal because of the partial blockage of the valves.

¹² The Airbus and American Airlines checklists for emergency ground evacuation do not include information about the operation of the pressurization system in manual mode.

manual does not contain this information. Further, because the American Airlines training program for the A300-600 airplane only covers the information in the American Airlines A300 operating manual, the training program also fails to address this issue.

The Safety Board is concerned that because of the lack of information in the Airbus Industrie A300-600 operating manual and the American Airlines A300 operating manual and training program about this issue, flight crews of A300-600 airplanes might be unaware that the Ram Air switch will not control the outflow valves if the pressurization system is being operated in the manual mode. The Board notes that if the pilots of the accident airplane had known that the Ram Air switch would not control the outflow valves when the pressurization system was being operated in the manual mode, they would likely have depressurized the airplane before permitting the door to be opened. Therefore, the Safety Board believes that the FAA should require that the Airbus Industrie A300-600 operating manual clearly state that the Ram Air switch will not control the outflow valves and depressurize the airplane when the pressurization system is being operated in the manual mode. Further, the Safety Board believes that the FAA should review all Airbus Industrie A300-600 operators' operating manuals and training programs and require revisions, if necessary, to ensure that they clearly indicate that the Ram Air switch will not control the outflow valves and depressurize the airplane when the pressurization system is being operated in the manual mode.

The Airbus Industrie A300-600 operating manual states that maximum differential pressure¹³ at landing should not exceed 1 pound per square inch (psi) and that the Ram Air switch should not be selected ON when the differential pressure exceeds 1 psi. These design limitations ensure that the airplane is not rapidly depressurized, which could cause passenger discomfort. Further, according to the Airbus Industrie A300-600 operating manual, the cabin doors should not be opened unless the cabin differential pressure is 0 psi because any pressure in the airplane would make operation of the doors difficult and could result in an opening similar to the one that occurred during this accident.

The Airbus Industrie A300-600 On Ground/Emergency Evacuation Checklist and the American Airlines A300 Ground Evacuation Checklist do not require the flight crew to ensure that the cabin differential pressure is 0 psi before signaling the flight attendants to begin the emergency evacuation (and, therefore, open the doors). Further, because the American Airlines training program for the A300-600 airplane only covers the information in the American Airlines A300 operating manual, the training program also fails to address this issue. The Safety Board notes that an additional item in the ground evacuation checklist directing the flight crew to check the differential pressure before signaling the flight attendants to begin the emergency evacuation would have alerted the accident flight crew that a pressurization problem existed. Therefore, the Safety Board believes that the FAA should require that the Airbus Industrie A300-600 On Ground/Emergency Evacuation Checklist direct flight crews to ensure that the cabin differential pressure is 0 psi before signaling flight attendants to begin an emergency evacuation. Further, the Safety Board believes that the FAA should review all Airbus Industrie A300-600

¹³ Differential pressure, indicated by a cabin differential pressure gauge on the pressurization panel in the cockpit, is the difference between the pressure inside the airplane and that outside the airplane.

operators' checklists and training programs for emergency ground evacuation and require revisions, if necessary, to ensure that they direct flight crews to verify that the cabin differential pressure is 0 psi before signaling flight attendants to begin an emergency evacuation.

Parking Checklist

The accident airplane was not parked at a gate; therefore, the pilots did not perform a parking checklist. However, the Safety Board notes that during its investigation of this accident, a safety issue related to parking checklists was identified that requires the FAA's attention.

The Parking Checklist in the Airbus Industrie A300-600 operating manual contains an item requiring the flight crew to ensure that the cabin differential pressure is 0 psi before permitting the flight attendants or gate agents to open the cabin doors upon arrival at the gate. However, the Parking Checklist in the American Airlines A300 operating manual does not contain this item. Further, because the American Airlines training program for the A300-600 airplane only covers the information in the American Airlines A300 operating manual, the training program also fails to address this issue. The Safety Board is concerned that a similar accident could occur anytime the cabin doors are opened and the cabin differential pressure has not been verified at 0 psi. Therefore, the Safety Board believes that the FAA should review all Airbus Industrie A300-600 operators' checklists and training programs for parking and require revisions, if necessary, to ensure that they direct flight crews to verify that the cabin differential pressure is 0 psi before permitting flight attendants or gate agents to open the cabin doors upon arrival at the gate.

Therefore, the National Transportation Safety Board recommends that the Federal Aviation Administration:

- Require that the Airbus Industrie A300-600 operating manual clearly state that
- (1) automatic depressurization of the airplane upon landing will not occur when the pressurization system is being operated in the manual mode; (A-01-16) and
 - (2) the Ram Air switch will not control the outflow valves and depressurize the airplane when the pressurization system is being operated in the manual mode. (A-01-17)

- Review all Airbus Industrie A300-600 operators' operating manuals and training programs and require revisions, if necessary, to ensure that they clearly indicate that
- (1) automatic depressurization of the airplane upon landing will not occur when the pressurization system is being operated in the manual mode; (A-01-18) and
 - (2) the Ram Air switch will not control the outflow valves and depressurize the airplane when the pressurization system is being operated in the manual mode. (A-01-19)

Require that the Airbus Industrie A300-600 On Ground/Emergency Evacuation Checklist direct flight crews to ensure that the cabin differential pressure is

0 pounds per square inch before signaling flight attendants to begin an emergency evacuation. (A-01-20)

Review all Airbus Industrie A300-600 operators' checklists and training programs for emergency ground evacuation and require revisions, if necessary, to ensure that they direct flight crews to verify that the cabin differential pressure is 0 pounds per square inch before signaling flight attendants to begin an emergency evacuation. (A-01-21)

Review all Airbus Industrie A300-600 operators' checklists and training programs for parking and require revisions, if necessary, to ensure that they direct flight crews to verify that the cabin differential pressure is 0 pounds per square inch before permitting flight attendants or gate agents to open the cabin doors upon arrival at the gate. (A-01-22)

Acting Chairman CARMODY and Members HAMMERSCHMIDT, BLACK, and GOGLIA concurred in these recommendations.

By: Carol J. Carmody
Acting Chairman