

Log 1592

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: July 9, 1984

Forwarded to:

Honorable Donald D. Engen
Administrator
Federal Aviation Administration
Washington, D.C. 20591

SAFETY RECOMMENDATION(S)

A-84-65

On February 15, 1983, the captain of an Eastern Airlines Boeing 727-225, N8831E, made an intentional gear-up landing at Miami International Airport after the actuating system of the left main landing gear had malfunctioned following takeoff from the West Palm Beach Airport. The flightcrew reported that the cockpit light for the door of the left main landing gear did not extinguish at the completion of the post-takeoff gear retraction cycle. Subsequent efforts to remedy the malfunction included recycling of the landing gear and attempts to extend it manually, but the indicator never showed that the left main gear had been extended or retracted fully. Consequently, the right main and nose landing gears were retracted, and a gear-up landing was made. The gear-up landing damaged the lower fuselage keel beam, the inboard trailing edge flaps, and the landing gear doors. There were 67 passengers and a crew of 7, including 3 flight deck crew and 4 flight attendants. Seven passengers sustained minor injuries during evacuation of the airplane.

The Safety Board's preliminary investigation of the incident disclosed that the tires of the left main landing gear were jammed in the wheel-well door, which prevented extension of the gear either normally or manually, and that the attachment fitting for the landing gear door actuator was loose enough to move laterally. Consequently, the Safety Board issued Safety Board Recommendation A-83-2 on March 4, 1983, for correction of this condition.

Further investigation and tests have disclosed that all other gear and door actuating components functioned properly and were within prescribed tolerances. After the airplane was repaired, the landing gear on N8831E and another Eastern Boeing 727 were subjected to a series of retraction tests to determine the relationship between the loose actuator attachment fitting and malfunctions in the landing gear retraction mechanism. During these tests when the door with the loose fitting was moved toward the closed position while the gear was retracting, the retraction cycle was interrupted and the landing gear started to freefall. However, the precise malfunction that caused the incident could not be established.

The landing gear extension system of the Boeing 727 involved in the incident was equipped with a production safety feature consisting of a safety bar attached to the wheel-well door mechanism. The safety bar was designed to prevent the landing gear doors from interfering with the landing gear wheels and tires when they were extended manually. The airplane landing gear had been modified in conformance with Airworthiness Directive (AD) 79-04-01 with the exception of the safety bar feature.

During the past 18 years, there have been 18 reports of tires jamming on wheel-well doors as a result of malfunction during gear/door operation. In nine instances, the gear could not be freed, and the pilots landed with the affected gear only partially extended. In 14 cases, the malfunction was caused by a broken lock system component in the main landing gear. Three cases were attributed to excessive friction in the uplock bungee and hook assembly of the main gear. In one other case, improper assembly of the uplock mechanism was cited as the cause of the malfunction.

There have been eight reports of a tire jamming on the wheel-well door during manual extensions of the main landing gear, one of which resulted in landing with the landing gear partially extended. In these cases the wheel-well door opened too slowly. Two occurrences were attributed to discrepancies in the door safety valve and two to misrigging of the manual gear extension system. In the four remaining cases, the causes were undetermined. In these cases, when the main landing gear was extended manually, the wheel/tire contacted the safety bar on the wheel-well door. The safety bar did not prevent interference between the tire and door, possibly because the original production safety bar was fractured or deflected by the loads imposed by the free falling gear. In the incident of February 15, 1983, the production safety bar was bent and fractured.

The Boeing Company analyzed the problems related to these earlier difficulties and issued Service Bulletins (SB) to correct the identified problems. Also, the Federal Aviation Administration (FAA) issued Airworthiness Directive (AD) 79-04-01, effective March 12, 1979, which incorporated seven Boeing Service Bulletins. In March 1980, Boeing issued SB-727-32-275, which recommended the installation of a new, extensively tested safety bar mechanism designed to prevent the main landing gear from interfering with the wheel-well door. The FAA amended AD-79-04-01 to incorporate SB 727-32-275 but made the addition of the new safety bar an optional alternative to other modifications of the system.

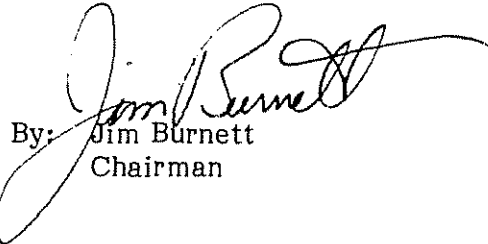
On October 28, 1983, the captain of a United Airlines Boeing 727 experienced an incident similar to the February 15, 1983, incident on takeoff from O'Hare International Airport in Chicago, Illinois. In this incident, the captain used "G" forces to extend the left main landing gear, and he returned the airplane for an uneventful landing at O'Hare. On this airplane the door actuator attachment fitting also was loose, and the airplane also was equipped with a production-type safety bar. There was no significant damage to the airplane.

The Safety Board believes that the Eastern incident is the first gear-up landing caused by a gear/door interference in which the airplane was configured with the other optional modifications permitted by AD 79-04-01. We believe that the conditions that caused this incident might exist on other Boeing 727 airplanes and could result in landing gear malfunctions.

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

In conjunction with the airplane manufacturer, evaluate the circumstances of recent incidents of main landing gear malfunctions involving Boeing 727 airplanes which have been modified in accordance with the original Airworthiness Directive 79-04-01, with particular emphasis on the geometric relationship between the main landing gear and the wheel-well doors that may permit the tire to jam on the wheel-well door so that the gear cannot be extended, to determine whether the provisions of revised Airworthiness Directive 79-04-01 regarding optional installation of the new safety bar identified in Boeing Service Bulletin 727-32-275 should be made mandatory as an added measure to preclude main landing gear/wheel-well door jams. (Class III, Longer Term Action) (A-84-65)

BURNETT, Chairman, GOLDMAN, Vice Chairman, BURSLEY and GROSE, Members, concurred in this recommendation.


By: Jim Burnett
Chairman