

UNITED STATES OF AMERICA  
NATIONAL TRANSPORTATION SAFETY BOARD  
WASHINGTON, D.C.

ISSUED: June 25, 1973

Adopted by the NATIONAL TRANSPORTATION SAFETY BOARD  
at its office in Washington, D. C.  
on the 6th day of June 1973

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FORWARDED TO: )  
Honorable Alexander P. Butterfield )  
Administrator )  
Federal Aviation Administration )  
Washington, D. C. 20591 )  
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SAFETY RECOMMENDATIONS A-73-39 thru 43

The National Transportation Safety Board has under investigation, three accidents involving: a United Air Lines Boeing 737 at Midway Airport, Chicago, Illinois, on December 8, 1972; a North Central Airlines DC-9, at O'Hare International Airport, also at Chicago, Illinois, on December 20, 1972; and an Eastern Air Lines Lockheed L-1011 at Miami, Florida, on December 29, 1972.

The Safety Board has identified several areas in occupant survival and evacuation common to these accidents which it believes merit remedial action by the Federal Aviation Administration. These areas are delineated below:

Shoulder Harness Restraint. Testimony at the Safety Board's public hearing concerning the United B-737 accident revealed that crew takeoff and before-landing checklists did not contain the item "Shoulder Harness Fastened." The injuries sustained by the captain, as well as the conditions of the captain's and first officer's shoulder harness in the wreckage, indicated that the shoulder harness had not been used.

In the EAL accident, we noted that the shoulder harness on the aft facing cabin attendant seats had been removed. In a letter dated March 12, 1973, the Board, in commenting on your Notice of Proposed Rule Making 73-1, expressed its concern about the absence of a requirement to have shoulder harnesses installed on aft facing seats. We pointed out that in crashes or emergency landings involving multidirectional inertia forces, shoulder harnesses would provide an additional,

and possibly vital, measure of protection for occupants of aft facing seats. The principal advantage of a shoulder harness, both in forward and rearward facing seats, is that it helps to restrain the user in an upright position, thereby keeping the spinal column in a more suitable position from the standpoint of load distribution. Additionally, the shoulder harness prevents the upper body from flailing, a frequent cause of serious injuries in aircraft accidents. The Board believes that increased protection from injury of the flightcrew as well as the cabin attendants is of vital importance, since their availability to guide and aid passengers during evacuation may make the difference between survival and disaster. Therefore, the Safety Board recommends that the Federal Aviation Administration:

1. Take the necessary steps to ensure that all air carrier before-landing and takeoff checklists contain a "Fasten Shoulder Harnesses" item.
2. Amend 14 CFR 25.785(h) to require provisions for a shoulder harness at each cabin attendant seat, and amend 14 CFR 121.321 to require that shoulder harnesses be installed at each cabin attendant seat.

Auxiliary Portable Lighting. During the investigation and public hearing held in connection with the EAL L-1011 accident, testimony indicated that the absence of lighting of any kind at the crash scene seriously hampered survivors' ability to orient themselves and prevented them from searching for and assisting other injured survivors. Additionally, this lack of light prevented cabin attendants from taking effective charge among the surviving passengers. In both Chicago accidents, a similar lighting problem was encountered. Although section 121.549(b) of the Federal Aviation Regulations requires each crewmember to have available a flashlight, cabin attendants usually stow their personal flashlights in their handbags, which tend to become lost in the debris of the wreckage. This, for example, was the case in both Chicago accidents. The Board believes that effective alternate means of lighting, which is not dependent on random stowage and location, should be readily accessible to the flight attendants. Therefore, the Safety Board recommends that the Federal Aviation Administration:

3. Amend 14 CFR 25.812 to require provisions for the stowage of a portable, high-intensity light at cabin attendant stations; and amend 14 CFR 121.310 to require the installation of such portable, high-intensity lights at cabin attendant stations.

Emergency Lighting. Evidence obtained during the investigation of the North Central DC-9 accident and the United B-737 accident in Chicago, indicated that many passengers had difficulties in escaping from the wreckage. These difficulties were a result of inadequate illumination, combined with a heavy smoke condition in one of these accidents. In the United accident, survivors specifically mentioned the absence of any light in the cabin. In the North Central accident, passengers experienced great difficulty in locating the exits, reportedly because of darkness and heavy smoke in the cabin. Yet, the crew testified that the emergency lighting system was armed, and the investigation indicated that they should have been operational. However, four of the nine fatally injured passengers apparently died while they were attempting to find an exit. One passenger was found in the cockpit, one near the cockpit door, and two others were found near the aft end of the cabin. The five remaining fatalities apparently had not left their seats.

Numerous recommendations and proposals to improve occupant escape capabilities in survivable accidents have been made over the years by various Government and industry organizations; and, indeed, significant improvements have occurred. Unfortunately, however, experience indicates that the existing escape potential from aircraft in which postcrash fire is involved is still marginal. These accidents illustrate the vital role that adequate illumination can play in contributing to such postcrash survivability.

A review of 14 CFR 25.811 and 25.812 indicates that paragraph 811(c) requires means to assist occupants in locating exits in conditions of dense smoke. Yet, information from the Civil Aeromedical Institute in Oklahoma City indicates that the illumination levels specified in paragraph 812 are not predicated on a smoky environment, and therefore may be ineffective under conditions of dense smoke. In order to eliminate this inconsistency, the Board believes that illumination levels should be specified in paragraph 812, which are consistent with the requirements of 14 CFR 25.811(c). Moreover, these and other accident experiences have shown that for various reasons aircraft emergency lighting systems often do not work or are proved ineffective in survivable accidents. Therefore, the Safety Board recommends that the Federal Aviation Administration:

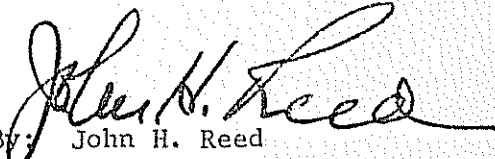
4. Amend 14 CFR 25.812 to require exit sign brightness and general illumination levels in the passenger cabin that are consistent with those necessary to provide adequate visibility in conditions of dense smoke.

5. Amend 14 CFR 25.812 to provide an additional means for activating the main emergency lighting system to provide redundancy and thereby improve its reliability.

Emergency Evacuation Problems: A recurring problem of galley security was encountered in the UAL B-737 accident when, during impact, food and service items fell from the two aft cabin galley units. The impact, which was described by cabin attendants as a series of mild to moderate jolts acting forward and rearward, caused the four oven units and food carriers, the cold food trays, and the liquor supply units to be thrown to the floor near the rear service door. The Board previously has commented on the evacuation hazard caused by loose galley equipment and acknowledges a letter from the FAA dated February 16, 1973, which cites corrective actions to alleviate the galley security problem. Specifically, we are encouraged by recent amendments to Parts 25 and 121 of the Federal Aviation Regulations, which cover the retention of items of mass in passenger and crew compartments. Nevertheless, we wish to reiterate our belief concerning the need for further improvements to ensure the security of galley equipment under crash landing loads. The Board is aware that an amendment to 14 CFR 25.789, which would require the installation of secondary retention devices on galley equipment, is under consideration for rulemaking action. In view of the steps that you have initiated to remedy this safety problem, the Safety Board is not making a formal recommendation at this time. However, we urge you to expedite your consideration of this matter in order that an amended galley retention regulation can be made effective at an early date.

This document will be released to the public on the date shown above. No public dissemination of this document should be made prior to that date.

Reed, Chairman, McAdams, Thayer, and Haley, Members, concurred in the above recommendations. Burgess, Member, was absent, not voting.

  
By: John H. Reed  
Chairman