

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: January 21, 1980

Forwarded to:

Honorable Langhorne M. Bond
Administrator
Federal Aviation Administration
Washington, D.C. 20591

SAFETY RECOMMENDATION(S)

A-80-8

On April 4, 1979, a Trans World Airlines B-727 entered a high-speed spiral dive while cruising at 39,000 feet (FL390) near Saginaw, Michigan. The aircraft did not recover from the dive until the aircraft reached an altitude between 5,000 and 6,000 feet m.s.l. despite flightcrew actions to counteract the maneuver. The aircraft was then landed under emergency conditions at an alternate airport. The aircraft was damaged extensively, and the No. 7 leading edge slat on the right wing, the No. 10 spoiler panel, and several other components were missing.

During its investigation, the Safety Board examined the effects of full extension of the No. 7 slat on aircraft performance and control during level flight and descent. Using a Boeing engineering simulator, it was determined that the extended slat will generate a right roll which will be countered by the autopilot until its roll authority is exceeded. At the onset, the roll is readily recognizable and controllable as long as lateral controls are used with minimal delay and only to the extent needed to return the aircraft to a wings-level attitude. If the application of corrective controls is delayed and then used to full travel, an uncontrollable, steep descending spiral will develop. This occurs at certain Mach number and angle of attack relationships where the extended slat generates rolling moments that exceed the control authority available to the pilot. The spiral will continue until Mach number and angle of attack values are reduced or until the slat separates from the aircraft. The simulation results confirm the flightcrew's description of the spiral dive and the loss of roll control until the slat separated from the aircraft. Under certain conditions, recovery would not be possible.

The Safety Board believes that an extended No. 7 slat precipitated control problems that culminated in a loss of control. The Safety Board is also aware of TWA Safety Bulletin 79-3 and Boeing Operations Manual Bulletin 75-7 that, to a degree, inform flightcrews of the recognition and control aspects of an asymmetric slat configuration. The Safety Board believes that flightcrews must be able to recognize and react to such a condition and that there is a need to more widely disseminate comprehensive guidance to flightcrews.

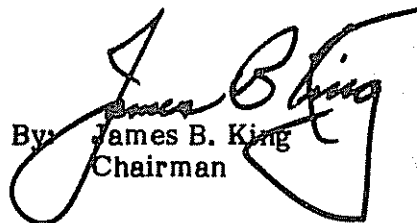
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Therefore, the National Transportation Safety Board recommends that the Federal Aviation Administration in cooperation with the Boeing Company:

Disseminate to all Boeing 727 operators and flightcrews information of the type included in Boeing Operations Manual Bulletin 75-7 and TWA Flight Operations Safety Bulletin 79-3 which address control problems associated with high-speed asymmetrical leading edge slat configuration on B-727 aircraft. (Class II, Priority Action) (A-80-8)

KING, Chairman, DRIVER, Vice Chairman, McADAMS, GOLDMAN, and BURSLEY, Members, concurred in the above recommendation.


By: James B. King
Chairman