

Reg 1846

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: December 13, 1985

Forwarded to:

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

SAFETY RECOMMENDATION(S)

A-85-138 through A-85-140

As a result of its participation in the investigation of the aviation accident involving the Japan Air Lines Flight 123 on August 12, 1985, the National Transportation Safety Board became concerned that the original "fail-safe" design of the Boeing 747 airplane's aft pressure bulkhead could be compromised by structural repairs which might be made during the airplane's service life. The Safety Board expressed this concern in a letter to the Administrator, Federal Aviation Administration (FAA) on December 5, 1985, which contained Safety Recommendations A-85-133 through A-85-137. One of these safety recommendations called for the FAA to reevaluate the "fail-safe" aspect of the B-747's aft pressure bulkhead by requiring Boeing to analyze and test further the bulkhead to demonstrate the validity of the fail-safe flapping failure mode. Another recommendation was to evaluate any procedures approved to repair aft pressure bulkheads to assure that the repairs do not affect the "fail-safe" concept of the bulkhead design which is intended to limit the area of pressure relief in the event of a structural failure.

The design of all transport category airplane structures must include consideration for failure due to fatigue, corrosion or accidental damage. The aft pressure bulkhead of the B-747 and other airplanes are designed in accordance with such considerations so that any failure resulting from damage will be limited to an area which would permit an acceptable rate of pressure relief between the pressurized cabin and the unpressurized empennage section of the airplane. This is accomplished by designing the pressure dome so that crack propagation will be directed along specific structural members. While the Safety Board accepts this design concept as valid, the Safety Board's recommendation is intended to prompt evaluation which would provide greater confidence that the design of the B-747 and other pressure dome bulkheads achieves this specific objective. Although the Safety Board has not determined the similarity of the design of the aft pressure bulkheads in other airplanes, the Board believes that the FAA should ascertain that the "fail-safe" aspects of all airplanes with a "pressure-dome" design have been satisfactorily evaluated.

The Safety Board is also concerned that the approval of repairs might be based upon an engineering evaluation conducted by persons in a manufacturer's customer support organization, an air carrier or contract repair facility, or an FAA engineering office who might not be aware of the initial "fail-safe" or "damage tolerance" design criteria for the structural element being repaired. Although the concern expressed in Safety Recommendation A-85-136 was limited to the B-747 and B-767 aft pressure bulkheads, it applies equally to the approval of repairs to nearly any principal structural element of any transport category airplane. Consequently, the Safety Board believes that FAA should emphasize in a maintenance alert bulletin that the approval of repairs to any principal structural element take into consideration the possible influence of such repair on the ultimate failure mode of the element or other fail-safe design criteria.

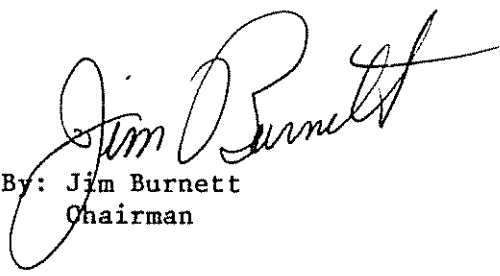
Therefore, the National Transportation Safety Board recommends that the Federal Aviation Administration:

Determine which transport category airplanes have dome-shaped aft pressure bulkheads and ascertain that the "fail-safe" criteria for the pressure bulkheads of those airplanes have been satisfactorily evaluated. (Class II, Priority Action) (A-85-138)

Evaluate any procedures approved to repair the aft pressure bulkhead of any airplanes which incorporate a dome-type of design to assure that the effected repair does not derogate the fail-safe concept of the bulkhead. (Class II, Priority Action) (A-85-139)

Issue a maintenance alert bulletin to persons responsible for the engineering approval of repairs to emphasize that the approval adequately consider the possibility of influence on ultimate failure modes or other fail-safe design criteria. (Class II, Priority Action) (A-85-140)

BURNETT, Chairman, GOLDMAN, Vice Chairman, LAUBER, Member, concurred in these recommendations.


By: Jim Burnett
Chairman