

NATIONAL TRANSPORTATION SAFETY BOARD  
WASHINGTON, D.C.

ISSUED: October 31, 1974

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Forwarded to:

Honorable Alexander P. Butterfield  
Administrator  
Federal Aviation Administration  
Washington, D. C. 20591  
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SAFETY RECOMMENDATION(S)

A-74-91

The National Transportation Safety Board's recent investigation of an engine failure on a Southern Airways, McDonnell-Douglas DC-9 has revealed a potentially hazardous condition in Pratt & Whitney JT8D engines.

The incident occurred on April 30, 1974, during a takeoff from St. Louis, Missouri. As the engines were accelerated to takeoff thrust, a failure in the right engine led to the separation of nearly all the turbine blades and vanes of the second- and third-stage turbines. Several pieces penetrated the aft fuselage skin and damaged bleed air ducts in that area. Elevator and rudder controls in the aft fuselage were also endangered by the loose parts which entered the aft fuselage area at high velocity.

Safety Board investigators, aided by Mr. John McGrath of your Northeast Region, Powerplant Engineering Branch, determined that the cause of the engine failure was a fracture of the low-pressure compressor drive shaft. The fracture originated as a crack in the forward spline of the shaft.

Cracks in the forward spline of the shaft have been a chronic problem in JT8D engines. They are caused by asymmetrical spline tooth loading and wear caused by shaft flexibility. Numerous service bulletins and inspection requirements issued by the manufacturer have not eliminated the problem.

The Safety Board is aware of 10 other failures of this shaft, similar to that described, and nearly 100 shafts have been found with cracks in the splines.

Honorable Alexander P. Butterfield (2)

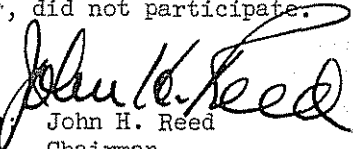
Pratt & Whitney has a shaft available with a greater wall thickness which provides greater strength and reduced flexibility. They have also developed a repair whereby a spline section with these improved features can be welded onto existing shafts. These are covered by Pratt & Whitney Service Bulletins 2550 and 4187, respectively.

The Safety Board believes that any penetration of a fuselage is extremely hazardous and that every effort should be made to prevent such occurrences. We further believe that the potential for recurrence of such fuselage penetration is high on aircraft powered by JT8D engines, which do not have the new or repaired shaft installed. The Safety Board, therefore, recommends that the Federal Aviation Administration:

Issue an Airworthiness Directive requiring that all operators of Pratt & Whitney JT8D engines comply with the provisions of Pratt & Whitney Service Bulletins 2550 or 4187.

Our Bureau of Aviation Safety staff is available for additional discussion of this matter if desired.

REED, Chairman, THAYER, BURGESS, and HALEY, Members, concurred in the above recommendation. McADAMS, Member, did not participate.

By:   
John H. Reed  
Chairman

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DEPARTMENT OF TRANSPORTATION  
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