

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

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Forwarded to:

Honorable Alexander P. Butterfield
Administrator
Federal Aviation Administration
Washington, D. C. 20591

SAFETY RECOMMENDATION(S)

A-74-115 & 116

The National Transportation Safety Board is investigating the durability of CF6 engines with drilled fan blades. During its investigation, the Safety Board has discovered problems with the tail engine installation (No. 2 position) of wide-bodied, three-engine aircraft. The Safety Board is concerned about the consequences of foreign object damage to high-bypass ratio turbo-fan engines, and believes that corrective action is needed.

In December 1973, during severely cold weather, fan blades were damaged on the tail (No. 2) engines of four DC-10 aircraft. The Safety Board believes that this damage was caused by the ingestion of ice which had accumulated in the inlet duct. To alleviate this problem, the McDonnell Douglas Corporation issued Service Bulletin 71-46 which provides for a 3/4-inch-diameter drain hole to be added to the transition ring area, to improve the inlet draining capability of the tail engine. Although this service bulletin may alleviate the problem partially, there is no assurance that all operators will comply. In addition, there is no assurance that the drain, itself, will not be blocked by ice.

The presence of ice in the tail engine inlet of the DC-10 or L-1011 can only be determined by inspection of the inlet duct immediately forward of the fan. In addition to the inlet inspection guidance provided in FAA Handbook 8340.1A, Change 5, Appendix 10, the Safety Board believes that a specific inspection of the tail engine inlet area immediately ahead of the fan should be required for DC-10 and possibly for L-1011 aircraft.

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On August 23, 1974, the FAA issued Airworthiness Directive 74-18-17 which required that a main fuel hose shield be installed for the No. 2 engine on all G. E. powered DC-10 aircraft. This shield prevents fan blade fragments from damaging the fuel line. On October 15, 1974, the AD was amended to apply only to those airplanes powered by G. E. engines with drilled fan blades. During its investigation, the Safety Board found that the nacelle of a Northwest Airlines DC-10 with JT9D engines had been damaged by fan blade fragmentation which was probably caused by ice ingestion. The JT9D engines have solid fan blades. Therefore, the Safety Board believes the AD should not have been limited.

Most in-service damage to large fan engines is caused by bird ingestion. We have made bird-control recommendations to the FAA in the past, and much has been accomplished through the Airport Development Aid Program and by other FAA efforts such as those detailed in FAA Order 5200.5, dated October 16, 1974. However, the potential hazard to wide-bodied aircraft created by bird ingestion demands even more attention to the problem of bird control. The Safety Board urges, therefore, that the FAA continue to emphasize its environmental factors bird-control program, as well as place increased emphasis on other promising bird-control programs.

In view of the above-mentioned hazards involving the tail-engine area, the National Transportation Safety Board recommends that the Federal Aviation Administration:

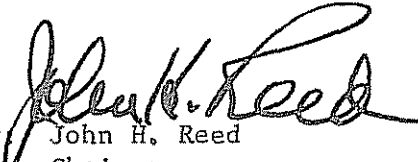
1. Issue an Airworthiness Directive which requires that the tail engine inlet duct (No. 2 position) be modified to prevent ice from accumulating in the ducts of DC-10 aircraft. The AD also should include a requirement, until the duct is modified, for a preflight inspection to be made after precipitation during cold weather to assure (1) that ice in the inlet duct area immediately forward of the fan is detected and removed; and (2) that the fan rotates freely. Also, consider extending these requirements to the L-1011 aircraft.

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2. Amend AD 74-18-17 (Amendment 39-1951 dated 10-15-74) to require fuel line protection for all DC-10 aircraft, regardless of the engine installed.

Our Bureau of Aviation Safety staff is available for consultation if desired.

REED, Chairman, McADAMS, THAYER, BURGESS, and HALEY, Members, concurred in the above recommendations.

By 
John H. Reed
Chairman

THESE RECOMMENDATIONS WILL BE RELEASED TO THE PUBLIC ON THE DATE SHOWN ABOVE. NO PUBLIC DISSEMINATION OF THIS DOCUMENT SHOULD BE MADE PRIOR TO THAT DATE.