

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

ISSUED: November 15, 1972

Adopted by the NATIONAL TRANSPORTATION SAFETY BOARD
at its office in Washington, D. C.
on the 18th day of October 1972.

FORWARDED TO:)
Honorable John H. Shaffer)
Administrator)
Federal Aviation Administration)
Washington, D. C. 20591)

SAFETY RECOMMENDATION A-72-206

The National Transportation Safety Board's findings which resulted from the investigation of an engine failure which occurred on an Eastern Air Lines DC-8-61, N8764E, during a training flight in the Miami, Florida, area on June 13, 1972, have increased our concern about uncontained turbine disk failures.

The failed No. 2 engine, a Pratt & Whitney Aircraft JT3D-3B, sustained a 6-inch wide circumferential rupture in the turbine case. The cause of the rupture was a centrifugal failure of the third-stage turbine. Uncontained engine fragmentation caused damage to the No. 1 engine and pylon, the flaps, a tire, and the wing.

The failure resulted from a separation of a number of third-stage turbine nozzle case retaining lugs, which allowed a portion of the stator assembly to move axially rearward and contact the third-stage turbine disk. This contact between the stator assembly and rotating disk produced a progressive scoring of the disk resulting in the failure. The No. 2 engine, S/N 645690, had accumulated a total of 13,407 hours. The turbine nozzle case and retaining lugs had accumulated 10,892 hours of operation, with a period of 3,392 hours having elapsed since the latest nozzle case inspection.

A similar instance indicating the hazardous nature of a turbine disk disintegration occurred on Pan American B-707-321B, N761PA, at San Francisco on June 28, 1965. The loss of third-stage turbine axial clearance, due to improper attention to stacking tolerances at assembly, caused third-stage disk scoring and a resultant disk rupture. The disk failure caused a fire,

Honorable John H. Shaffer

an explosion of the outboard reserve fuel tank, and the separation of the No. 4 engine with an outboard section of wing from the aircraft.

To reduce the possibility of turbine disk failure on these engine models, the manufacturer has issued the following:

1. Pratt & Whitney Aircraft Service Bulletin No. 3270 (revision No. 4, July 26, 1972) which recommends closing pressure balance slots in the turbine air sealing ring to reduce lug temperature.
2. Pratt & Whitney Aircraft Alert Service Bulletin No. 3889 (July 19, 1972) which recommends increasing third-stage turbine axial spacing by parts replacement or by reoperation.

The manufacturer recommends that the above-listed modifications be incorporated during the first shop visit of the engine or turbine module.

The manufacturer also offers a turbine nozzle case with heavier retaining lugs as an approved spare part for JT3D engines produced before the introduction of the model JT3D-7 engine. Heavier retaining lugs reduce the possibility of a lug failure, thereby reducing the possibility of third-stage stator assembly axial movement which could produce disk scoring.

The turbine disk failures detailed herein clearly indicate the serious nature of this problem. High-velocity engine fragments released by an uncontained disk rupture could inflict severe or potentially disastrous penetration damage on adjacent portions of the aircraft.

In an effort to prevent future turbine disk failure, the National Transportation Safety Board recommends that:


The Federal Aviation Administration require operators using JT3D engines without the JT3D-7 turbine nozzle case to take one of the following actions: comply with the recommendation of Pratt & Whitney Aircraft Service Bulletin No. 3270 and Alert Service Bulletin No. 3889 on a concurrent basis, or install the improved turbine nozzle case with heavier retaining lugs.

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

Honorable John H. Shaffer

This recommendation will be released to the public on the issue date shown above. No public dissemination of the contents should be made prior to that date.

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


By: John H. Reed
Chairman