

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: November 1, 1974

Forwarded to:

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

} SAFETY RECOMMENDATION(S)
A-74-89 and 90

On July 8, 1974, a National Airlines, Inc., DC-10, N60NA, was involved in an accident near Tampa, Florida. The National Transportation Safety Board's investigation of the accident has revealed a need for corrective action on the digital flight data recorder (DFDR) system. The aft cowling on the No. 1 engine separated in flight and part of it was ingested by the No. 2 engine. Heavy engine damage, vibration, and fire resulted.

The DFDR readout showed that much data were lost during the flight, because of data dropouts or loss of synchronization during periods when the flight recorder was evidently subjected to airframe vibration. The Safety Board is concerned because immediately after the cowling separated 3 1/2 minutes of the data were lost and in the next 7 minutes about 70 percent of data were lost. In addition to these losses of vital data, 8.2 seconds of data were lost during take-off and 7.7 seconds after touchdown.

A Lockheed Aircraft Service Model 209 digital flight data recorder was installed in the aircraft. It had been certificated to operate properly during vibrations up to 10g. There is no evidence that the vibrations during this flight approached 10g.

The Safety Board is aware that an Airworthiness Directive is being considered to correct this and other problems with the recorder. We urge prompt action in this regard. We do believe, however, that intervals between maintenance checks on the modified recording system should be shortened until the system's reliability is established.

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In addition to the above-mentioned Airworthiness Directive, the Safety Board also believes that further corrective actions are needed to improve the reliability of the Lockheed Aircraft Service digital flight recorder systems. The maintenance checks on these recording systems should include either a readout by computer so that engineering unit printouts or plots of all parameters are obtained, or a readout by analog methods so that strip-chart records of all parameters are obtained. These data should be extracted from a previous flight of the aircraft and should include data from the various regimes of flight (takeoff, climb, cruise, descent, and landing). Several carriers, as you know, are currently conducting their maintenance checks with an electronic test unit, which can only sense data recorded a few seconds earlier and, therefore, actual flight data are not read out. Many malfunctions of the recording system caused by in-flight vibration, high temperatures, humidity, intermittent system failures, and tape track problems may go undetected and also are not likely to be sensed by the system's built-in test equipment.

The Safety Board has found loss of data as a result of a single electrical component (transducer, synchro, pot, etc.,) failure, and from recorders with contaminated tape heads. The maintenance check should require that all parameters be read out and that the tape heads are cleaned.

The Safety Board has previously recommended certain similar corrective actions in its Safety Recommendations A-73-116 through 118 concerning a complete loss of data following an in-flight engine disintegration.

Therefore, to insure that digital flight data recorder systems in the current fleet of wide-bodied jets are operating as specified in 14 CFR 121.343(a)(1)(2) and Appendix B, the National Transportation Safety Board recommends that the Federal Aviation Administration:

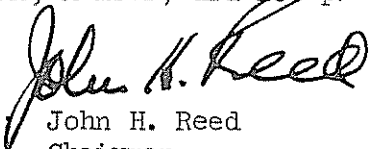
1. Issue as soon as practicable an Airworthiness Directive on the Lockheed Aircraft Service Company Model 209 to prevent DFDR data dropouts caused by airframe vibrations.
2. Modify the periodic maintenance check procedures for all digital flight data recording systems which use Lockheed Aircraft Service Company recorders, as follows:
 - a. Revise the maintenance check intervals so that they are commensurate with each operator's mean-time-between-failure rate, but do not exceed 3,000 hours.

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- b. Require at each prescribed maintenance check a readout of actual flight data for all parameters either by computer or by analog methods for proper recorder performance.
- c. Require that the tape heads in the recorders be cleaned every 2,000 hours or at every maintenance check period, whichever is later (not to exceed 3,000 hours).
- d. Require maintenance checks every 500 hours on DFDR systems whenever a major modification is made as a result of service difficulties until a longer check period can be justified by the operator's new mean-time-between-failure rate for the system.

Personnel from our Bureau of Aviation Safety office will be made available if any further information or assistance is desired.

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


By John H. Reed
Chairman

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