



National Transportation Safety Board

Washington, D.C. 20594
Safety Recommendation

Date: February 28, 1994

In reply refer to: A-94-33 and-34

Mr. Robert L. Crandall
Chairman, President, and CEO
American Airlines, Inc.
P.O. Box 619616, Mail Drop 5623
Dallas/Fort Worth International Airport
Texas 75261-9616

On April 14, 1993, about 0659:43 central daylight time, American Airlines flight 102 (AAL102), a McDonnell Douglas DC-10-30, departed runway 17 left, following landing at Dallas/Fort Worth International Airport, Texas, after a nonstop, overnight flight from Honolulu International Airport, Hawaii. It was raining at the time of the landing, and there were numerous thunderstorms in the area. There were 189 passengers, 3 flightcrew members and 10 cabincrew members aboard the airplane. Two passengers received serious injuries, and 35 passengers, 1 flightcrew member, and 2 cabincrew members received minor injuries during the evacuation of the airplane. The airplane sustained substantial damage.¹

The National Transportation Safety Board has determined that the probable cause of the accident was the failure of the captain to use proper directional control techniques to maintain the airplane on the runway.

¹For more detailed information, read Aircraft Accident Report--"Runway Departure Following Landing, American Airlines Flight 102, McDonnell Douglas DC-10-30, N139AA, Dallas/Fort Worth International Airport, Texas, April 14, 1993" (NTSB/AAR-94/01)

The investigation revealed that all three crewmembers on AAL102 had received cockpit resource management (CRM) training at American Airlines based on the program's principles of "Authority with Participation and Assertiveness with Respect." Interviews with a CRM program instructor and several captains and first officers established that the training focuses upon discussions of CRM issues in recent major accidents and incidents. However, with the exception of its Fokker 100 program, the Safety Board is concerned that American Airlines does not currently integrate a CRM "practice and feedback phase" through the use of video recording equipment and crewmember critiques in its Line Oriented Flight Training simulator training program.

In this accident, the actual transfer of control of the airplane probably took place about 40 feet above ground level. The captain's decision to assume control at that low altitude and land the airplane was certainly within his authority. However, the Safety Board believes that it left him with virtually no time to communicate with and receive feedback from the first officer or the flight engineer, or to assess weather conditions affecting the airplane. As a result of the captain overruling the first officer's decision to abort the landing, the airplane landed long on a rain and crosswind-swept runway. Based on the circumstances of this accident, the Safety Board recommends that American Airlines review the guidelines in Federal Aviation Administration Advisory Circular 120-51A, "Cockpit Resource Management Training," to ensure that its CRM program conforms to the guidance contained therein.

In a postaccident examination of the airplane, investigators found two misconfigured reverse thrust cascades on the No. 2 engine. The differences in the angles of thrust from the vanes of the two misconfigured cascades would have partially changed the reverser air flow pattern or "efflux." With the No. 2 engine in reverse thrust, the airflow would have been altered from a vertical (thrusting downward) direction to a near-horizontal direction, and from an inboard direction (toward the fuselage centerline) to an outboard direction (away from the fuselage). Moreover, in this configuration, the reduction in the vertical component of airflow would have reduced the nose-down pitching moment of the airplane and lessened the down force on the nosewheel.

Also, there would have been a component of thrust vectored horizontally away from the right side of the center engine, with the engine in full reverse thrust. The evidence showed that the force in full reverse would have generated a relatively small nose-right yawing moment of approximately 1/10 the

moment that could be generated by 10 degrees of rudder deflection during the turn off the runway. Therefore, ample rudder and elevator authority existed to redirect the airplane and overcome any input from the two misconfigured No. 2 engine cascades. Nonetheless, the Safety Board remains sufficiently concerned about this situation to recommend that American Airlines examine the maintenance procedures and practices that led to this misconfiguration and to determine whether this was an isolated incident or a more common procedural or maintenance error and make the appropriate changes.

Therefore, as a result of its investigation of this accident, the National Transportation Safety Board recommends that American Airlines :

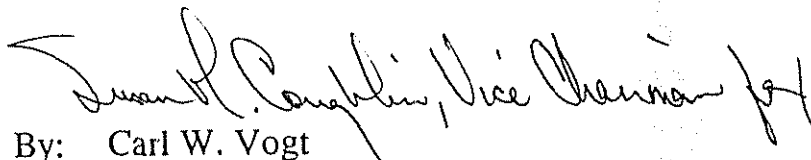
Review the guidelines for developing, implementing, reinforcing, and assessing Cockpit Resource Management (CRM) training programs for flightcrew members, as contained in FAA Advisory Circular 120-51A, and ensure that the CRM program conforms to the guidance contained therein. (Class II, Priority Action) (A-94-33)

Examine the maintenance procedures and practices that resulted in the misconfiguring of two reverse thrust cascades on the No. 2 engine of N139AA. Determine if this is a single incident, or a more common procedural or maintenance practice error and make the appropriate changes. (Class II, Priority Action) (A-94-34)

Also, the Safety Board issued Safety Recommendations A-94-24 through -31 to the Federal Aviation Administration and A-94-32 to Dallas/Fort Worth International Airport.

The National Transportation Safety Board is an independent federal agency with the statutory responsibility "...to promote transportation safety by conducting independent accident investigations and by formulating safety improvement recommendations" (Public Law 93-633). The Safety Board is vitally interested in any actions taken as a result of its safety recommendations and would appreciate a response from you regarding action taken or contemplated with respect to the recommendations in this letter. Please refer to Safety Recommendations A-94-33 and -34 in your reply.

Chairman VOGT, Vice Chairman COUGHLIN, and Members LAUBER, HAMMERSCHMIDT, and HALL concurred in these recommendations.


By: Carl W. Vogt
Chairman