

Log 23605



# National Transportation Safety Board

Washington, D.C. 20594

## Safety Recommendation

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Date: October 21, 1992

In reply refer to: A-92-106

Honorable Thomas C. Richards  
Administrator  
Federal Aviation Administration  
Washington, D.C. 20591

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On January 15, 1992, about 1020 Central Standard Time, Air Canada flight 173, a McDonnell Douglas DC-9-32, en route from Toronto, Ontario, to Chicago, Illinois, experienced "frozen" aileron controls while at flight level 310. The flight crew determined that lateral control of the airplane was possible with the five degrees of bank angle achievable using the aileron trim and rudder controls. Attempts to free the aileron controls while airborne were unsuccessful. The captain declared an emergency while in Canadian airspace and made an uneventful landing at Toronto.

The National Transportation Safety Board acted as liaison and provided an accredited representative to assist the Transportation Safety Board of Canada in their investigation of the incident.

Inspection of the airplane after landing in Toronto disclosed a large accretion of ice on the aileron and wing spoiler control cables located in the left main gear wheel well. The ice restricted movement of the aileron and speed brake cables, effectively disabling these controls. Examination of the ice revealed no contaminants typically associated with slush or snow from a runway environment.

Further examination and subsequent tests of the airplane disclosed a leaking left over-wing window exit that allowed significant quantities of water to enter the fuselage, drip into the center wing box area, and pool forward of the slant pressure panels. As the airplane was pressurized during the test, the collected water leaked onto the cables below. A check of 35 other Air Canada DC-9s revealed seven airplanes in which water had leaked past the over-wing exits and entered the fuselage.

The weather at Toronto on January 15 when flight 173 departed for Chicago was reported as: broken ceilings at 1,600 and 4,500 feet, with a surface temperature of -1 degree Fahrenheit and a dew point of -7 degrees Fahrenheit. On the day before the incident flight, the airplane was parked outside during a major winter storm in the Toronto area that began as rain and changed to sleet and snow. The airplane was subsequently brought into a

heated hangar to melt the approximately one inch of accumulated ice and snow in preparation for the flight to Chicago on January 15. The moisture accumulated on January 14 was evidently the source of water that froze on the control cables of the incident airplane.

Reports from DC-9, C-9, and MD-80 series airplane operators indicate that there may be several methods by which water can leak into the center wing box area. These include rain or melted ice/snow leaking through door seals, runoff from precipitation on cargo pallets, and leakage of the potable water system. Although many of the incidents reported to Douglas occurred during extremely cold weather, the problem of water freezing on the lateral control mixer and control cables is not restricted to cold-weather operations. Any extended flight at altitude could result in ice accumulation on control cables if water is allowed to enter the center wing box area.

Numerous incidents similar to that experienced by the Air Canada airplane, including an asymmetrical spoiler deployment that caused a wing tip to contact the runway, prompted Douglas Aircraft Company to issue three separate service bulletins (SBs) to address ice accumulation on the DC-9, C-9, or MD-80 lateral control mixer and control cables. SB 53-109, dated August 20, 1971, recommended installation of drains in the wheel well pressure panel to reduce the possibility of water entrapment in the pressure panel and controls bracket area. (This SB applied only to cargo DC-9 airplanes, since the source of water was attributed to water runoff from cargo pallets.) SB 38-27, dated May 16, 1978, recommended installation of a shroud over the potable water pipes under the cabin floor in the center wing box area, since a rupture of the pipes in this area could lead to the introduction of water. SB 53-179, dated January 18, 1985, recommended installation of a water drain system for the slant pressure panels in the left and right main landing gear wheel wells to allow water trapped forward of the panels to be drained overboard. This SB provided modification instructions for DC-9, C-9, and MD-80 series airplanes, production numbers 1 through 1149. The drain system has been incorporated during production on MD-80 series airplanes with production numbers 1150 and above.

Prior to actual publication of SB 53-179, Douglas Aircraft Company also issued an All Operator Letter (AOL), dated July 22, 1983, to operators of all DC-9, C-9, and MD-80 series airplanes that reiterated the potential for the freezing of control cables from water leaking past the slant pressure panels. The AOL discussed the potential sources of water and mentioned the drain system of the pending SB. Since any water introduced into the center wing box area is apt to pool forward of the slant pressure panels, the drain system described in SB 53-179 should adequately remove the water and eliminate the possibility of water freezing the control cables.

The Federal Aviation Regulation (FAR) under Title 14 Code of Federal Regulations Part 25.685 states that a "control system must be designed and installed to prevent interference from the freezing of moisture." Although no accidents have occurred as a result of the frozen lateral control cables, the Safety Board believes that restriction of the cables constitutes an unsafe condition, and that the intent of the FAR--to ensure unrestricted movement of the control cables--is not being satisfied. The Safety Board

believes that the Federal Aviation Administration should require that operators of the affected airplanes incorporate SB 53-179.

Therefore, the National Transportation Safety Board recommends that the Federal Aviation Administration:

Issue an Airworthiness Directive to require the installation of a water drain system for the slant pressure panels in the left and right main landing gear wheel wells on all applicable DC-9, C-9, and MD-80 series airplanes, in accordance with Douglas Aircraft Company Service Bulletin 53-179. The installation should be accomplished within an appropriate time but no later than the next major airplane maintenance check cycle. (Class II, Priority Action)(A-92-106)

Chairman VOGT, Vice Chairman COUGHLIN, and Members LAUBER, HART, and HAMMERSCHMIDT concurred in this recommendation.



By: Carl W. Vogt  
Chairman