AOG 13641

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: October 6, 1981

Forwarded to:

Honorable J. Lynn Helms
Administrator
Federal Aviation Administration
800 Independence Avenue, S.W.
Washington, D.C. 20591

SAFETY RECOMMENDATION(S)

A-81-144

On June 23, 1981, while executing a landing at Washington National Airport, Washington, D.C., the crew of a U.S. Air McDonnell-Douglas DC-9-30, N943VJ, was alerted by the crew of an aircraft on the ground that the left main gear wheel assembly was in a cocked position. The landing was aborted and the aircraft was diverted to Dulles International Airport. The aircraft flew by the Dulles control tower and tower personnel verified that the left gear wheel assembly was cocked. After the runway was foamed, the aircraft touched down, rolled out, during which the wheel assembly rotated and tracked back to its normal landing position, and a safe landing was accomplished.

Examination of the left main gear assembly disclosed that the safety pin in the apex bolt of the main gear torque link had sheared and the nut on the apex bolt had been forced from its position on the bolt. This allowed the torque link to separate and the main gear shock strut piston to rotate and cock. The apex bolt, P/N 4925624, remained in position within the damper assembly; the nut was not recovered.

Metallurgical examination of the bolt revealed that the diameter of its shank was worn throughout its length an average 0.010 inch below the minimum limit of 0.998 inch specified in the Douglas Aircraft Company drawing No. 4925624. Further, the bolt was not cadmium plated nor was it permanently identified by a part number as specified in the Douglas drawing. It could not be determined by visual means whether the bolt conformed to specifications or was an unauthorized substitute.

On August 24, 1980, the crew of an Air Mexico DC-9 heard a loud noise during rotation and takeoff from Zihuatenejo, Mexico. The takeoff was completed and the landing gear retracted with all indications normal. Shortly thereafter, the No. 2 engine oil quantity indication decreased and the crew elected to return to the departure airport. The crew was not aware that the lower end of the right main landing gear shock strut piston had failed and had separated from the aircraft. The crew made a normal approach and touchdown. After touchdown, as the airspeed decreased, the right wing dropped until the right main landing gear strut and right wing tip contacted the runway. The aircraft came to a stop about 5,500 feet down the runway and to the right of the centerline.

Investigation of this latter accident revealed that the main landing gear shock strut failed after the torque link apex bolt, P/N 4925624, failed. Failure of the bolt allowed the torque link to separate and the main gear shock strut piston to rotate about 90°. The shock strut piston failed above the axle when loads generated by the cocked wheels exceeded the design limit loads on the shock strut piston.

McDonnell Douglas performed a failure analysis of the recovered apex bolt which indicated that the safety pin failed or fell out and that the apex attachment nut backed off from its installed position on the apex bolt. The face of the fracture on the apex bolt was damaged to the extent that the mode of failure could not be determined. As a result of this analysis, Douglas Aircraft Company issued All Operators Letter (AOL) 9-1261 on April 24, 1981, to change the method of securing the apex bolt attachment nut by replacing the safety pin, washer, and cotter pin with a bolt, nut, washer, and cotter pin. This method double locks the attachment nut to the apex bolt, P/N 4925624.

Since the disengagement of the main landing gear torque link assembly results in a potentially hazardous situation to the aircraft and its occupants, the National Transportation Safety Board recommends that the Federal Aviation Administration:

> Issue an Airworthiness Directive to require immediate and periodic inspections of the main landing gear torque link apex bolts, P/N 4925624, for missing safety pins or loose apex nuts, excessive wear, lack of permanent identification, or the absence of cadmium plating and to require that if any of these conditions are detected, the bolts should be replaced with new bolts incorporating the double locking feature referenced in the Douglas Aircraft Company's All Operators Letter 9-1261. (Class II, Priority Action) (A-81-144).

KING, Chairman, DRIVER, Vice Chairman, McADAMS, GOLDMAN, and BURSLEY, Members, concurred in this recommendation.

Francis H. McAdams
for

By: James B. King
Chairman