



National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: April 30, 1999

In reply refer to: A-99-37 and -38

Honorable Jane F. Garvey
Administrator
Federal Aviation Administration
Washington, D.C. 20591

On August 30, 1998, about 11:08 p.m. eastern daylight time, a Cessna 172RG, N4726V, registered to American East Airways, Inc., landed with the left main landing gear partially extended at Daytona Beach International Airport, Daytona Beach, Florida, while on a personal flight subject to Title 14 *Code of Federal Regulations* Part 91. Visual meteorological conditions prevailed at the time, and no flight plan was filed for the flight from Daytona Beach International Airport to Spruce Creek Airport in Daytona Beach. The airplane received minor damage, and the pilot and one passenger were not injured. The flight originated about 10:30 p.m.

The pilot stated that after takeoff, during landing gear retraction, he heard a loud noise. The landing gear retracted indicator light did not illuminate. Visual inspection of the landing gear showed that the left main landing gear was in an intermediate position. Attempts to fully retract or to extend the landing gear using published procedures were unsuccessful. The pilot then landed with the nose and right main landing gear retracted and the left main landing gear in an intermediate position.

Examination revealed that the left main landing gear actuator body (P/N 1281001-3) was cracked and slightly deformed. The actuator body was sent to the Safety Board's materials laboratory for metallurgical examination. The actuator body had cracked due to fatigue near the cups for the P/N S1997C7-8 bearings. This resulted in the body spreading open and jamming the actuator, which prevented the left main landing gear from fully retracting or extending. The fatigue initiation location was at the corner formed by the intersection of the 2.25-inch, inner-diameter surface of the gear housing and the 1.0-inch, inner-diameter surface of the linear actuator portion of the actuator body. Visual examination of the corner revealed the presence of grinding or filing marks.

Cessna Aircraft Company (Cessna) is aware of numerous P/N 1281001-3 actuator bodies that have cracked or fractured. At the request of the Safety Board, Cessna sent another cracked actuator body to the Safety Board's materials laboratory for comparison with the incident actuator body. This actuator body had fatigue cracks that were similar to the cracks in the actuator housing from N4726V. Fatigue cracking in the comparison actuator housing also initiated at the corner formed by the 2.25-inch, inner-diameter surface of the gear housing and the

1.0-inch, inner-diameter surface of the linear actuator portion of the actuator housing. Grinding or filing marks were also found on this corner.

The Safety Board's examination showed that the grinding or filing marks at this corner had increased the local stresses and greatly reduced the fatigue life of the parts. The grinding or filing marks were apparently introduced onto the part in an attempt to smooth the sharp corner between the two inside diameter surfaces. Smoothing the sharp corner would be expected to increase the fatigue life of the actuator body, but only if the newly created surface is not rougher than the surface of the removed area.

The actuator housing (P/N 1281001-3) is part of the main landing gear actuator assembly (P/N 9882015-2). This main landing gear actuator assembly is used on Cessna models 172RG and 182RG airplanes. A review of FAA Service Difficulty Report data from January 1982 to September 1998 showed 30 reports of cracked actuator housings (P/N 1281001-3) on Cessna models 172RG and 182RG airplanes. Cessna manufactured 1,191 model 172RG airplanes between 1980 and 1985, and 2,041 model 182RG airplanes between 1978 and 1986.

There is a high probability that additional Cessna models 172RG and 182RG airplanes will experience failure of the main landing gear actuator and the resultant jamming of the main landing gear in an intermediate position. The Safety Board is concerned that pilots of these airplanes could become distracted from their primary duties while in the air or could lose directional control of the airplane during landing, resulting in an accident. Based on its investigation findings, the Safety Board believes that the FAA should require Cessna to (1) develop an inspection procedure for identifying cracks in the corner between the two inner diameter portions of the main landing gear actuator housings (P/N 1281001-3) used in the main landing gear systems of Cessna models 172RG and 182RG airplanes; (2) determine an appropriate interval for inspection of the housings until any grinding or filing marks have been removed and the component has been found to be crack-free; and (3) develop a repair procedure for the removal of grinding or filing marks from the corner between the two inner diameter portions of the housings. The Safety Board also believes that the FAA should issue an airworthiness directive requiring, in accordance with procedures developed by Cessna Aircraft Company, (1) repetitive inspection for cracking in the corner between the two inner diameter portions of the main landing gear actuator housings (P/N 1281001-3) used in the main landing gear systems of Cessna models 172RG and 182RG airplanes until any grinding or filing marks have been removed and the component has been found to be crack-free; and (2) the removal of grinding or filing marks from this same area.

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

Require Cessna Aircraft Company to (1) develop an inspection procedure for identifying cracks in the corner between the two inner diameter portions of the main landing gear actuator housings (P/N 1281001-3) used in the main landing gear systems of Cessna models 172RG and 182RG airplanes; (2) determine an appropriate interval for inspection of the housings until any grinding or filing marks have been removed and the component has been found to be crack-free; and (3) develop a repair procedure for the removal of grinding or filing marks from the corner between the two inner diameter portions of the housings. (A-99-37)

Issue an airworthiness directive requiring, in accordance with procedures developed by Cessna Aircraft Company, (1) repetitive inspection for cracking in the corner between the two inner diameter portions of the main landing gear actuator housings (P/N 1281001-3) used in the main landing gear systems of Cessna models 172RG and 182RG airplanes until any grinding or filing marks have been removed and the component has been found to be crack-free; and (2) the removal of grinding or filing marks from this same area. (A-99-38)

If you have any questions, you may call (202) 314-6535.

Chairman HALL, Vice Chairman FRANCIS, and Members HAMMERSCHMIDT, GOGLIA, and BLACK concurred in these recommendations.

By: Jim Hall
Chairman