

Log 2029



# National Transportation Safety Board

Washington, D.C. 20594

## Safety Recommendation

Date: April 4, 1988

In reply refer to: A-88-50

Honorable T. Allan McArtor  
Administrator  
Federal Aviation Administration  
Washington, D.C. 20591

On November 1, 1987, at London's Heathrow Airport, the flightcrew of British Airways flight 293, a Boeing 747-136, heard a loud bang as they increased thrust for takeoff with the brakes set. Engine parameters were normal and the takeoff was continued. No abnormal indications were encountered during the takeoff, climb, or during flap retraction. At approximately 5,000 feet a steward reported that a wing panel was damaged on the left wing forward of the inboard spoiler. The flightcrew jettisoned fuel and returned to London where a normal landing was made. The crew reported that no abnormal handling qualities existed on the return flight.

Inspection of the airplane revealed that the left wing landing gear support beam outboard end fitting had separated through the bore of the bushed housing for the spherical bearing. The beam incorporates a fail-safe design that is capable of sustaining 90 percent of the ultimate design load after failure of the outboard fitting; however, such a failure allows considerable relative movement between the beam and the wing rear spar. This movement ruptured the wing skin panel above the fitting area and damaged secondary structure. Additionally, the inboard track of the No. 2 flap assembly, mounted to the gear support beam, subjected the flap assembly to abnormal movement.

Metallurgical examination of the fractured end fitting by Boeing and the Royal Aircraft Establishment disclosed that areas of preexisting cracking existed in the steel fitting material beneath the copper/beryllium bushing. The bore surface was severely pitted as was the bearing retention pin. The cracks initiated from these pits and propagated by stress corrosion. The failed part was originally delivered with the airplane in 1971 and had last been disassembled in 1973. Disassembly and inspection of the right wing landing gear support beam outboard fitting on the incident airplane also revealed the presence of extensive corrosion. Currently, there are no requirements for disassembly or nondestructive testing of the fitting during inspection. Periodic lubrication of the bushing and pin is the only recommended maintenance practice for this item.

The investigation remains active under the auspices of the Air Accidents Investigation Branch, Department of Transport, United Kingdom (UK). However, soon after the incident the Civil Aviation Authority (UK) issued emergency airworthiness directive No. 012-11-87 that required an ultrasonic inspection of the

landing gear support beams on British-registered model 747 airplanes with over 7 years service. The airworthiness directive also required the operators to establish inspection and corrosion control programs acceptable to the authority to ensure continued structural integrity of the fitting.

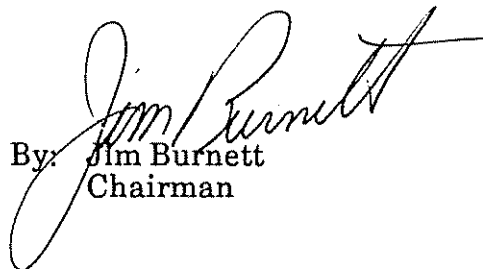
Boeing also has accomplished remedial actions, including the development of an ultrasonic inspection procedure for the fitting assembly. Rework limits and rework procedures for the repair of corroded or cracked fittings also have been devised. Improved corrosion protection assembly techniques in the fitting area will be employed in new production airplanes beginning with production line number 696. Additionally, service bulletin 747-57-2244, applicable to all 747 models from production line Nos. 1 through 695, will be published during the first quarter of 1988. The bulletin will recommend ultrasonic inspection of the fittings within 12 months on airplanes with more than 30,000 hours time in service or 8 years after delivery, whichever comes first. Repeat inspections will be recommended at 12-month intervals.

Many of the model 747 airplanes on the United States registry have already exceeded the inspection threshold limits recommended in the proposed Boeing service bulletin. Though no failures of wing landing gear support beam fittings have been experienced by U.S. operators, the Safety Board is concerned that similar corrosion mechanisms may be degrading the integrity of these fittings on the model-747 airplanes in the U.S. fleet. Therefore, the Safety Board believes that inspection procedures and improved corrosion protection methods are needed to prevent similar instances of fitting failure.

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

Issue an Airworthiness Directive to require ultrasonic inspection of the wing landing gear support beam fittings on all Boeing 747 airplanes at an appropriate inspection threshold time interval. Repair of cracked or corroded fittings found during the inspection should incorporate increased corrosion protection measures upon reassembly of the fitting. (Class II, Priority Action) (A-88-50)

BURNETT, Chairman, KOLSTAD, Vice Chairman, and LAUBER and NALL, Members, concurred in this recommendation.

By:   
Jim Burnett  
Chairman