



National Transportation Safety Board

Washington, D. C. 20594

Safety Recommendation

LD92132

Date: March 10, 1989
In reply refer to: A-89-8 through -13

Mr. Robert E. Whittington
Acting Administrator
Federal Aviation Administration
Washington, D.C. 20591

On April 15, 1988, Horizon Air, Inc., flight 2658, a deHavilland DHC-8 registered in the United States as N819PH, was a regularly scheduled passenger-carrying flight between Seattle, Washington, and Spokane, Washington. Shortly after takeoff, with the captain at the controls, the aircrew noted a power loss on the right engine. The captain made the decision to return to Seattle for a precautionary landing. After lowering the landing gear on final approach, a massive fire broke out in the right engine nacelle. After the first officer shut the engine down, the captain proceeded to land the airplane; however, shortly after touchdown, the crew realized that almost all directional control and braking capability was lost. The airplane departed the paved surface of the runway, crossed a grass median area, entered the paved ramp area, and struck a runway designator sign, several baggage carts, and two jetways. The airplane came to rest against another jetway. Four of the 37 passengers sustained serious injuries. The airplane was destroyed by the fire and impact.¹

The National Transportation Safety Board is very concerned that the effectiveness of the engine fire suppression system was negated by apparent flaws in the design of the cowl and cowl latches on the deHavilland DHC-8. During this accident sequence, the left cowl on the right engine was blown off the nacelle when the fuel pooled in the nacelle ignited. Although it could not be determined positively, the right cowl on that engine probably was blown open during the initial explosion and fell off the nacelle during impact with the jetways. When the first officer activated the fire bottles on the engine shortly after the fire broke out, the fire suppressant was expelled quickly onto and around an essentially uncowed engine to no apparent avail. With no cowls to contain the fire suppressant, the fire suppressant system was rendered ineffective.

The Safety Board is aware of another instance of apparent center access panel latch failure on another Horizon Air DHC-8. On June 19, 1987, aircraft N813PH experienced a right engine fire due to a leaking fuel line. However, in this instance,

¹For more detailed information, read Aircraft Accident Report--*Horizon Air, Inc., deHavilland DHC-8, Seattle-Tacoma International Airport, Seattle, Washington, April 15, 1988* (NTSB/AAR-89/02).

the center access panels remained attached but in a loosened state, and the fire suppression system was effective.

The Safety Board is pleased to note that deHavilland is exploring means to enhance the effectiveness of the engine cowls to preclude their loss during engine fires. Although an evaluation of the DHC-8 engine cowl design and installation revealed that they meet the requirements of the regulations, the Safety Board believes that the regulations should be reviewed to determine whether more stringent requirements are necessary. It is obvious that engine cowls cannot be designed to preclude loss during a significant explosion; however, perhaps explosions involving lesser overpressures could be contained to preclude loss of the engine fire extinguishing agent. Among the options that should be considered are stiffener bands on the cowl panels, improvement of existing latches, an increase in the number and strength of the latches, or the incorporation of hinged pressure relief doors or blow-out doors.

Although the flightcrew's shoulder harnesses operated effectively during this relatively low-impact accident, the Safety Board is concerned that both cockpit shoulder harnesses on N819PH along with two others on another Horizon Air DHC-8 airplane examined by the Safety Board were worn beyond acceptable limits. Tensile tests on the harnesses on the accident airplane revealed that the pilot's and first officer's harnesses failed at 29 percent and 40 percent of their designed rating, respectively. The Board notes that new harnesses were placed on order by Horizon personnel during the investigation after the worn ones were discovered. The wear on the harnesses examined during the investigation was obvious however and should have been noticed by Horizon pilots or maintenance personnel. It is also disturbing that the Federal Aviation Administration (FAA) maintenance and operations inspectors failed to notice the harness wear and to order replacements as specified in FAA Action Notice A8300.11, dated November 1986. This notice required FAA inspectors to ensure that air carriers establish procedures to inspect periodically, repair, and replace restraint systems "when there is obvious damage, wear or chafing which could degrade the integrity of the system."

The Safety Board believes that shoulder harness wear similar to that discovered at Horizon Air is endemic to the entire DHC-8 fleet, even though the DHC-8 design is not old. When the Safety Board examined a factory-new DHC-8, it noted hard plastic covers over the shoulder harness guide rollers on the backs of the seats. This plastic cover had been broken away on older DHC-8 airplanes that were examined during the investigation, and its absence did not affect the operation of the harness. The Safety Board believes that the FAA should review the design of the shoulder harness guide cover on DHC-8 cockpit seats with the intent of determining the reason for excessive wear on the shoulder harness webbing.

In addition, the jumpseat hold-up strap on the cockpit bulkhead of N819PH was not in a serviceable condition, although it remained somewhat effective when a split in the bulkhead strap was looped over the jumpseat hold-down stud on the seat to hold the hinged seat in an upright, stowed position. The danger of inadvertent deployment of the unoccupied, stowed jumpseat during an accident and subsequent effect on pilot evacuation is obvious. This too, appears to be a problem that is widespread among older DHC-8 airplanes. Therefore, the Safety Board believes that the FAA should direct a one-time inspection of the jumpseat hold-up strap and mandate repair, replacement, or redesign as necessary.

The floor of the closet/wardrobe in the forward left portion of the passenger cabin was overloaded by about 50 pounds. The normal floor load limit for the closet was 100 pounds; however, 146 pounds of material was stowed on the floor of the closet, in addition to a small carpet sweeper that was not weighed during the investigation. The Safety Board is concerned that the door to the closet was never designed to contain such weight. Because it is conceivable that items in the closet could be expelled during an accident sequence, block exits from the cockpit or cabin, and impede evacuation, the Safety Board believes that a 1/4-turn latch should be installed on the closet door as recommended in Transport Canada's Airworthiness Directive (AD) CF-88-24 and that the FAA should ensure that this is accomplished by issuing a similar AD. Also, the Safety Board believes that the FAA should include compliance with placarded closet load limits in its routine in-flight and ground inspections of DHC-8 operations.

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

Reassess the design requirements for the engine cowls on the DHC-8 with the view toward amending the regulations to enhance the fire suppression capability of the engine cowling. (Class II, Priority Action) (A-89-8)

Take action to verify the compliance of Federal Aviation Administration (FAA) operations and maintenance inspectors with FAA Action Notice A8300.11, concerning cockpit shoulder harness/seat belt wear. (Class II, Priority Action) (A-89-9)

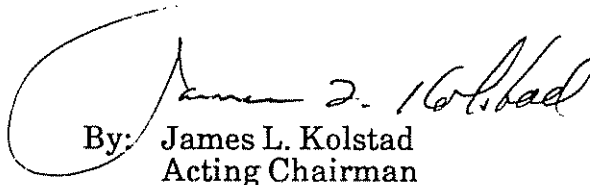
Review the design of the shoulder harness guide cover on DHC-8 cockpit seats with the intent to determine the reason for excessive wear on the shoulder harness webbing. (Class II, Priority Action) (A-89-10)

Direct a one-time inspection and review the design of the cockpit jumpseat hold-up strap on DHC-8 airplanes for excessive wear, and mandate repair, replacement, or redesign as necessary. (Class II, Priority Action) (A-89-11)

Issue an airworthiness directive (AD) to require the installation of the 1/4-turn latch on the closet/wardrobe door of DHC-8 airplanes as required by Transport Canada's AD CF-88-24. (Class II, Priority Action) (A-89-12)

Issue an air carrier operations bulletin for operations inspectors to review with operators of DHC-8 airplanes the requirement to comply with the wardrobe's placarded floor loading. (Class II, Priority Action) (A-89-13)

KOLSTAD, Acting Chairman, BURNETT, LAUBER, NALL, and DICKINSON, Members, concurred in these recommendations.


By: James L. Kolstad
Acting Chairman