



National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: **MAY 17 2006**

In reply refer to: A-06-39 and -40

Honorable Marion C. Blakey
Administrator
Federal Aviation Administration
Washington, D.C. 20591

On August 13, 2004, about 0049 eastern daylight time, Air Tahoma, Inc., flight 185, a Convair 580, N586P, crashed about 1 mile south of Cincinnati/Northern Kentucky International Airport, Covington, Kentucky, while on approach to runway 36R. The first officer was killed, and the captain received minor injuries. The airplane was destroyed by impact forces. The flight was operating under the provisions of 14 *Code of Federal Regulations* Part 121 as a cargo flight for DHL Express¹ from Memphis International Airport, Memphis, Tennessee, to Covington. Visual meteorological conditions prevailed for the flight, which operated on an instrument flight rules flight plan.²

The National Transportation Safety Board determined that the probable cause of this accident was fuel starvation resulting from the captain's decision not to follow approved fuel crossfeed procedures.³ Contributing to the accident were the captain's inadequate preflight planning, his subsequent distraction during the flight, and his late initiation of the in-range checklist. Further contributing to the accident was the flight crew's failure to monitor the fuel gauges and to recognize that the airplane's changing handling characteristics were caused by a fuel imbalance.

Convair 580 Fuel Crossfeed Operations

At 0017:49, about 50 minutes into the flight, the captain told the first officer that he was going to "balance out the fuel," and the first officer acknowledged. From 0038:22 to 0044:16, the first officer repeatedly told the captain that the airplane was not handling well. Specifically, he

¹ Under a lease agreement, Air Tahoma supplied flight crews and airplanes to DHL to carry freight between several cities on a scheduled basis.

² For more information, see *Crash During Approach to Landing, Air Tahoma, Inc., Flight 185, Convair 580, N586P, Covington, Kentucky, August 13, 2004*, Aircraft Accident Report NTSB/AAR-06/03 (Washington, DC: NTSB, 2006).

³ Fuel crossfeed operations are used to balance out the fuel in an airplane's fuel tanks.

stated numerous times that the control wheel was requiring a “lot of force.” About 0046, while performing the landing checklist, the captain stated that they had an “imbalance on this...crossfeed I left open.” This was the only comment recorded by the cockpit voice recorder regarding fuel crossfeed operations since the captain started the operation almost 30 minutes earlier.

The Convair 580 type certificate data sheet and Air Tahoma’s Flight Operations Manual (FOM) prohibit fuel transfer from one tank to the other while the airplane is on the ground or in flight. The type certificate data sheet also states, “When operating with the crossfeed system, turn off fuel valve for tank not being used,” which would preclude fuel transfer. The Aircraft Flight Manual also prohibits the transfer of fuel from one tank to the other and cautions, “to do so might build up excessive pressure in a tank, which could result in structural failure or cause fuel to overflow through the vents.”

Step 5 of Air Tahoma’s Quick Reference Handbook fuel crossfeed procedures states that the fuel tank shutoff valve for the fuel tank not being used must be closed during fuel crossfeed operations. Further, the Convair 580’s overhead fuel panel has a placard on the bottom that states the same thing. However, the captain stated that he did not shut off the right fuel tank shutoff valve, and wreckage examinations confirmed that both the left and right fuel tank shutoff valves were open at impact. Postaccident fuel boost pump testing revealed that, in this configuration, all of the fuel from the left fuel tank not used by the engines could transfer into the right fuel tank in a relatively short period of time.

During postaccident interviews, the captain stated that he was aware of the step to close the fuel tank shutoff valve for the tank not being used. However, the captain added that he intentionally kept the valve open because he thought that Convair fuel tank shutoff valves tended to fail after being shut off, preventing the use of the fuel in the closed tank.⁴ The captain also stated that a previous employer (Nolinor Aviation) allowed company pilots to decide whether or not to close the valve.⁵ The Safety Board is concerned that Convair 580 pilots’ mistaken belief that the fuel tank shutoff valves have a tendency to fail may cause these pilots to intentionally keep the fuel tank shutoff valves open during fuel crossfeed operations, which could allow fuel to transfer and cause either structural damage or fuel overflow.

The Safety Board concludes that, although fuel transfer is prohibited on the Convair 580 airplane, fuel transfer can occur during fuel crossfeed operations if the fuel tank shutoff valve for the tank not being used is left open. The Safety Board further concludes that all of the fuel from the airplane’s left tank that was not used by the engines transferred into the right tank because the captain intentionally kept the right fuel tank shutoff valve open during fuel crossfeed operations, which was not in accordance with approved fuel crossfeed procedures. Therefore, to prevent similar accidents from occurring in the future, the Safety Board believes that the Federal Aviation Administration (FAA) should issue a flight standards information bulletin to all principal

⁴ During postaccident interviews, other Convair 580 pilots indicated that they also thought that Convair fuel tank shutoff valves tended to fail. However, manufacturer and Federal Aviation Administration service difficulty reports data did not indicate a history of Convair fuel tank shutoff valve failures.

⁵ At the time of the accident, Nolinor Aviation’s FOM stated that the fuel tank valve on the tank to be shut off should be closed, “subject to the captain’s discretion.” After the accident, Nolinor removed this remark from the crossfeed procedures contained in its FOM.

operations inspectors of Convair 580 operators that familiarizes operators with the circumstances of the Air Tahoma flight 185 accident, including the importance of closing the fuel tank shutoff valve for the tank not being used during fuel crossfeed operations.

Differential Fuel Boost Pump Output Pressure Settings

Prop-Jet Convair Bulletin (PJCB) 10-21, "Aircraft Fuel Boost Pump Output Pressure Limit-Reduce," which was published in October 1969, provided details on an optional procedure that allowed Convair 580 operators to reduce the typical fuel boost pump output pressure setting of 21 pounds per square inch (psi) to 15 psi to "improve the service life of the aircraft fuel boost pump." The bulletin stated that, although an aircraft could be operated with different boost pump output pressure settings, "preferably, aircraft should be operated with identical boost pump pressure settings." Postaccident testing of the accident fuel boost pumps revealed that the left and right fuel boost pumps had output pressure settings of 20 and 15 psi, respectively.

Air Tahoma maintenance personnel reported that they were not aware of PJCB 10-21 or the provision to lower the fuel boost pump output pressure setting to 15 psi. In June 2004, Air Tahoma replaced the left fuel boost pump on the accident airplane with a pump that had an output pressure setting of 21 psi. However, Air Tahoma did not replace the right fuel boost pump and did not measure or alter the output pressure setting. As a result, Air Tahoma was unaware that it was operating the airplane with different left and right fuel boost pump output pressure settings. The Safety Board is concerned that other Convair 580 operators may not be aware of PJCB 10-21 and its provision to allow fuel boost pumps to be set at different output pressure settings.

On September 21, 2004, a Nolinor Aviation Convair 580 experienced an in-flight fuel imbalance. The incident flight crew reported that a passenger had seen fuel coming from the right wing and that, about the same time, the fuel quantity indicators showed that the left and right fuel tanks had 4,000 and 6,000 pounds of fuel, respectively. The flight crew closed the fuel crossfeed valve after noticing that the valve was open. Nolinor Aviation ground maintenance personnel determined that the right and left fuel boost pumps had output pressure settings of 15 and 21 psi, respectively, and that the crossfeed valves had been left open, which allowed fuel to transfer from the left to the right fuel tank. Nolinor Aviation indicated that the incident airplane's left fuel boost pump had been replaced and had not been bench checked before installation. As a result, the company was unaware that the incident airplane's left fuel boost pump was operating with an output pressure setting of 21 psi. Nolinor Aviation indicated that it typically operated its Convair 580 airplanes with a fuel boost pump output pressure setting of 15 psi.

Kelowna Flightcraft, the Convair 580 type certificate holder, indicated that most operators normally set the fuel boost pumps to the same output pressure settings. However, the Safety Board is concerned that PJCB 10-21 allows Convair 580 airplanes to operate with different output pressure settings. Further, given the age of the Convair 580 fleet, current operators might not have a complete history of the airplanes, including possible changes made to the fuel boost pumps in accordance with PJCB 10-21. Although operating the Convair 580 with different fuel boost pump output pressure settings does not in itself create an unsafe operating

condition, the Board notes that crossfeed valves are not monitored⁶ and that the only indication that these valves are open is the switch position in the cockpit. Such operation did not factor in the accident; however, the Nolinor Aviation incident did reveal that, if an airplane operates with different fuel boost pump output pressure settings and with the crossfeed valves unintentionally left open, a large amount of fuel can transfer from one tank to another in a short period of time, possibly causing structural failure or fuel overflow.

The Safety Board concludes that fuel transfer can occur on the Convair 580 airplane if it is operated with different fuel boost pump output pressure settings and with the fuel crossfeed valves unintentionally left open. Therefore, the Safety Board believes that the FAA should require Convair 580 operators to set the left and right fuel boost pump output pressure settings on their airplanes to the same setting.

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

Issue a flight standards information bulletin to all principal operations inspectors of Convair 580 operators that familiarizes operators with the circumstances of the Air Tahoma flight 185 accident, including the importance of closing the fuel tank shutoff valve for the tank not being used during fuel crossfeed operations. (A-06-39)

Require Convair 580 operators to set the left and right fuel boost pump output pressure settings on their airplanes to the same setting.⁷ (A-06-40)

Acting Chairman ROSENKER and Members ENGLEMAN CONNERS, HERSMAN, and HIGGINS concurred with these recommendations.



By: Mark V. Rosenker
Acting Chairman

⁶ No positive indication, such as a light, exists in the cockpit to indicate whether the crossfeed system is operating.

⁷ This safety recommendation was also made to Transport Canada (A-06-41).