

1. All crewmembers and air traffic controllers were properly certified to perform their duties.
2. There was no evidence of flightcrew activities during the preflight inspection or during the accident flight that were causal to this accident.
3. There was no evidence of air traffic controller activity that was causal to this accident.
4. Weather was not a factor in the accident.
5. There was no evidence of engine or flight control malfunctions.
6. The accident was precipitated by the loss of the left horizontal stabilizer leading edge when the airplane was in a descent 12 knots below its maximum safe operating speed, within its operating envelope.
7. The airplane pitched severely nose down upon the loss of the left horizontal stabilizer leading edge, and the wings stalled negatively.
8. The violent motion of the airplane and the extreme airloads that resulted from the loss of the left horizontal stabilizer leading edge caused the airplane to break up in flight.
9. An in flight fire occurred during the structural breakup.
10. The left horizontal stabilizer leading edge separated from the airplane because the upper row of screw fasteners (47) was not in place. The airloads during the descent caused the surface to bend downward and separate.
11. The upper row of fasteners for the left horizontal stabilizer leading edge had been removed during scheduled maintenance the night before the accident, and a breakdown in procedures failed to detect that the work was incomplete.
12. The Continental Express FAA-approved General Maintenance Manual (GMM) contained adequate procedures for maintenance and quality control.
13. There was a lack of compliance with the GMM procedures by the mechanics, inspectors, and supervisors responsible for ensuring the airworthiness of N33701 the night before the accident.
14. The lack of compliance with the GMM procedures by the Continental Express maintenance department led to the return of an unairworthy airplane to scheduled passenger service.

15. The replacement of the horizontal stabilizer deice boots, which required removal of the leading edges, should have been treated as a required inspection item (RII). This would have required the proper quality control of work performed on this critical aerodynamic surface.
16. Continental Express failed to follow established requirements for performing maintenance during repair of the right elevator and following an engine overtorque on N33701, although these oversights were not causal to the accident.
17. The deficiencies noted in the maintenance department at Continental Express indicate that the airline's management did not instill an adequate safety orientation in its maintenance personnel by emphasizing the importance of adhering to procedures.
18. The routine surveillance of the Continental Express maintenance department by the FAA was inadequate and did not detect deficiencies, such as those that led to the accident involving N33701.
19. The accident was nonsurvivable.

### **Probable Cause**

The National Transportation Safety Board determines that the probable cause of this accident was the failure of Continental Express maintenance and inspection personnel to adhere to proper maintenance and quality assurance procedures for the airplane's horizontal stabilizer deice boots that led to the sudden in-flight loss of the partially secured left horizontal stabilizer leading edge and the immediate severe nose-down pitchover and breakup of the airplane. Contributing to the cause of the accident was the failure of the Continental Express management to ensure compliance with the approved maintenance procedures, and the failure of FAA surveillance to detect and verify compliance with approved procedures.