

UNITED STATES OF AMERICA
NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: June 15, 1973

Adopted by the NATIONAL TRANSPORTATION SAFETY BOARD
at its office in Washington, D. C.
on the 30th day of May 1973
(Revised)

FORWARDED TO:)
Honorable Alexander P. Butterfield)
Administrator)
Federal Aviation Administration)
Washington, D. C. 20591)

SAFETY RECOMMENDATIONS A-73-33 thru 35

The National Transportation Safety Board's investigation of a fatal accident (six fatalities) at Greensboro, North Carolina, on April 13, 1973, which involved a Cessna 402A, N4599Q, during a night takeoff, has increased our concern about the integrity of self-locking fasteners as used on general aviation aircraft primary control systems.

The loss of control occurred as a result of the separation of the forward elevator tube and fork assembly, P/N 5015031-1, from the elevator bellcrank, P/N 5015022-1. The self-locking nut had backed off, and the bolt subsequently worked out of those two elevator control elements. Both were found in the aircraft's aft fuselage area. Another Cessna 402 was inspected and found to have a loose self-locking nut at another location in the longitudinal control system.

The Safety Board's Recommendations A-72-106 and 107 which were forwarded to the Federal Aviation Administration on July 3, 1972, defined a related problem area concerning the elevator control system of a Cessna 310 aircraft.

In your response to the above recommendations, you referred to the redundancy provided by FAR 23.677(b), which we agree did provide the Cessna 310 pilot the capability of safe flight and landing from a level flight cruise condition by the use of trim after the disconnect of one element in the elevator control system. However, we do not believe that FAR 23.677(b) provides the

extra margin required for corrective pilot action when a primary control system failure occurs in a critical phase of flight, such as during takeoffs or landings.

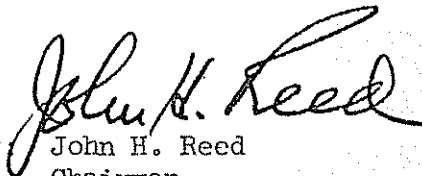
A review of a number of Cessna 400 series aircraft service manuals and associated parts catalogs revealed a change in the critical areas of the primary control systems. These publications now illustrate and call for the installation of castellated nuts and cotter keys in lieu of the self-locking nut fastener.

The Safety Board believes that the installation of dual locking devices on fasteners used in primary control systems is needed and, therefore, recommends that the Federal Aviation Administration:

1. Issue an Airworthiness Directive to replace, with castellated nuts and cotter keys, all self-locking fasteners used in the primary control systems on those Cessna 400 series aircraft not already modified under the product improvement change initiated in 1970 and 1972.
2. Conduct a Directed Safety Investigation of all Part 23 aircraft primary control systems to determine the integrity of the self-locking fasteners used therein and take necessary corrective action based on these findings.
3. Reconsider the Safety Board's Recommendation A-72-106 to modify section 23.607 to incorporate the provisions set forth in section 25.607.

These recommendations will be released to the public on the issue date shown above. No public dissemination of the contents of this document should be made prior to that date.

Reed, Chairman, Thayer, Burgess, and Haley, Members concurred in the above recommendations. McAdams, Member, was absent, not participating.

By 
John H. Reed
Chairman