

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

Log 916

ISSUED: August 11, 1978

Forwarded to:

Honorable Langhorne M. Bond
Administrator
Federal Aviation Administration
Washington, D.C. 20591

SAFETY RECOMMENDATION(S)

A-78-53 through -55

On February 10, 1978, a Columbia Pacific Airlines Beechcraft Model 99 attained an excessively steep climb immediately after takeoff from the Richland Airport, Washington. The aircraft stalled and crashed, killing its 15 passengers and 2 crewmembers. As a result of its investigation of the crash, the National Transportation Safety Board believes that certain corrective action is warranted. Examination of airplane components disclosed several faults within the airplane's horizontal stabilizer trim system which cannot be related to impact damage and are thus believed to have existed before the crash--a result of inadequate maintenance.

The trim actuator is a twin jackscrew driven by an electric motor; it includes a clutch mechanism designed to slip if electrical power is applied to the motor after the jackscrew reaches the end of its travel or encounters excessive stabilizer air loads. The clutch consists of two plates separated by six ball bearings which are restrained in detents by a spring load. Torque is transmitted through the ball bearings during normal operation. If an excessive load is imposed on the jackscrew, it will react against the spring load, separate the plates, and allow the ball bearings to move freely; thus, torque cannot be transmitted. In the actuator from the accident airplane, four ball bearings were found loose in the actuator case--all exhibited little or no wear. The design of the clutch is such that the balls could not have been displaced during operation. The two balls which were still installed between the plates of the clutch were worn to an oval shape.

During bench tests of the actuator, the clutch slipped in both the main and standby trim modes under load conditions well below the minimum value specified. This slippage would have slowed or stopped the movement of the stabilizer when it was subjected to certain air loads. Thus, the pilot's ability to retrim the airplane would have been affected adversely.

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In addition, examination revealed that the stabilizer trim position indicator was faulty because of a possible electrical defect. The defect caused an erroneous indication on the instrument which could have led the pilot to believe that trim was neutral, when in fact it could have been in an extreme airplane noseup position. Review of the maintenance records disclosed that the trim-in-motion system was malfunctioning. Furthermore, examination showed that an improperly positioned microswitch would have prevented operation of the out-of-trim warning horn.

The trim position indicator and trim-in-motion and out-of-trim warning systems are minimum equipment list items. Only one of these items can be inoperative if the airplane is to be used to carry passengers. If the out-of-trim warning system is inoperative, pilots must visually check the stabilizer position before flight. Since the check must be done from outside the airplane and may not be part of a pilot's normal routine, it may be inadvertently omitted.

The foregoing conditions could result in a crew's initiating a takeoff with full noseup trim and becoming unable to reduce control forces while using the trim system. Recent flight tests have shown that the airplane performance and corrective control forces which would be encountered after takeoff with a full airplane-noseup trim could result in a stall at low altitude from which the crew could not recover.

The examination of two other Beechcraft 99 airplanes operated by the same company disclosed similar discrepancies in their horizontal stabilizer trim indicating and warning systems.

The Safety Board, therefore, concludes that timely action is needed to insure that other Beechcraft Model 99 aircraft do not have discrepancies which can induce a crew to take off in an out-of-trim condition. Accordingly, the National Transportation Safety Board recommends that the Federal Aviation Administration:

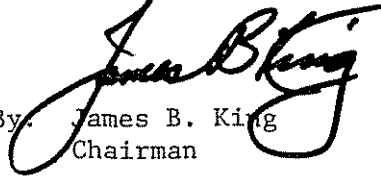
Issue an Airworthiness Directive applicable to all Beech 99, 99A, A99, A99A, and B99 model aircraft to require an immediate one-time inspection of the horizontal stabilizer trim system to ascertain that all components of the system and its associated position-indicating and -warning circuits are operational within specified tolerances. (Class I, Urgent Action) (A-78-53)

Require an inspection to insure that the primary and secondary mode of the horizontal stabilizer actuator are capable of deflecting the stabilizer under specified airloads. The exact instructions should be furnished by the Beech Aircraft Company. The inspection should be made as soon as the Beech instructions are available and repeated at 2,000-hour intervals. (Class II, Priority Action) (A-78-54)

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Change the minimum equipment list to make the out-of-trim
warning system a mandatory requirement for flight.
(Class II, Priority Action) (A-78-55)

KING, Chairman, McADAMS, HOGUE, and DRIVER, Members, concurred in
the above recommendations.


By: James B. King
Chairman