

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

ISSUED: August 4, 1972

Adopted by the NATIONAL TRANSPORTATION SAFETY BOARD
at its office in Washington, D. C.
on the 25th day of July 1972

FORWARDED TO:)
Honorable John H. Shaffer)
Administrator)
Federal Aviation Administration)
Washington, D. C. 20591)

SAFETY RECOMMENDATIONS A-72-112 thru 114

The National Transportation Safety Board's investigation of a recent fatal accident involving a Beechcraft EL8S, N42A, indicates that some changes in Airworthiness Directive 72-8-5 (Beech) may be required to reduce the possibility of similar accidents in the future.

The accident occurred shortly after takeoff from Hopkins International Airport, Cleveland, Ohio, on June 22, 1972, when N42A, being operated as a cargo flight, crashed into a residential area, killing the pilot. Two houses were damaged by the impact and fire, but there were no fatalities on the ground.

A fatigue failure occurred in the elliptical lower cap of the left wing spar at wing station 81. The fatigue crack that precipitated the failure originated at the toe of a gusset-plate weld on the outboard side of the landing-gear slide tube cluster. Aircraft records indicate that this area was inspected by X-ray and magnetic-particle methods, in compliance with AD 67-16-1, after 7,622 hours of service in July 1970 and after 7,927 hours of service in August 1971. No indications of a crack were noted during either of these inspections. The total time on the aircraft at the time of the accident was approximately 8,227 hours.

We examined the X-ray plates made in 1970 and by using laboratory methods, with knowledge of the point of the fatigue failure, we determined that there was an indication that a crack was present. The 1971 X-ray plates were aboard the aircraft at the time of the accident and were partly destroyed by fire. The portion of the plate containing the area of the fatigue failure was burned away.

Honorable John H. Shaffer (2)

As you know, this is one of a series of similar accidents involving Beechcraft models with tubular wing-spar construction. These accidents have been caused by fatigue failures originating at welds in the spar due to stress concentrations in areas where the resistance to crack initiation is low because of decarburization in the outside surfaces of the spar tubes. The cause was first determined by a National Bureau of Standards (NBS) investigation in 1947 and has been confirmed by subsequent investigations at NBS and in our own laboratory.

The Safety Board recognizes the efforts the Federal Aviation Administration has made to cope with this problem. Recommendations concerning action to be taken at this time are being submitted to you in an effort to help with a difficult and serious problem. The N42A accident occurred about 300 hours of service time after a presumably adequate inspection for cracks that included the area where the spar subsequently failed. Thus, the crack must have propagated to complete failure in 300 hours of service time from a size that was not detected by the inspection.

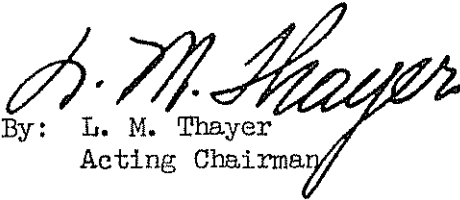
All of the fatigue failures in this type of Beechcraft spar that we are familiar with have started as small cracks along the edge of a weld bead. Such cracks are difficult to detect, either by X-ray or magnetic-particle inspection methods. X-ray techniques particularly must be carefully controlled with respect to alignment of the head of the X-ray machine and the density of the plate at the edges of the weld beads where there is a marked change in the thickness of metal penetrated by the X-ray beam.

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

1. Modify the inspection instructions in Airworthiness Directive 72-8-5 (Beech) to include an emphasis of the importance of extremely close attention to the spar tube at the edges of weld beads, including instructions for centering of the X-ray head with respect to each area where inspection is required.
2. Require an early inspection, complying with the modified AD 72-8-5 instructions of all aircraft that have accumulated more than 200 hours since the last inspection.
3. Reduce the inspection interval in AD 72-8-5 from 500 hours to 200 hours as specified in your telegraphic Airworthiness Directive of May 1967.

Honorable John H. Shaffer (3)

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.


By: L. M. Thayer
Acting Chairman