

ACCIDENT INVESTIGATION REPORT

Adopted: May 13, 1949

Released: May 13, 1949

AMERICAN AIRLINES, INC.—COLUMBUS, NEW MEXICO—DECEMBER 3, 1948

On December 3, 1948, an American Airlines' DC-6, NC-90733, operating as Flight 183 between New York and Los Angeles, made an emergency landing at the CAA Auxiliary Field, Columbus, New Mexico, when a propeller blade failed in flight and caused the loss of the No. 4 engine approximately 30 miles northeast of that point.

The airplane departed Dallas, Texas, for Tucson, Arizona, at 1656* to cruise at 18,000 feet. After reaching cruising altitude, the flight proceeded in a routine manner until approximately 1950, at which time the crew felt a severe jolt. A visual check revealed that the No. 4 engine had been torn from the airplane and that the No. 4 nacelle was on fire. Emergency procedures were followed and the fire was extinguished. Unable to determine the extent of the damage in the nacelle, the crew elected to make an emergency landing at the nearest field, which was at Columbus, New Mexico. This was accomplished without further incident at 2010. As soon as the airplane came to rest, an orderly evacuation of the passengers was made. There were no injuries to either passengers or crew. Up to the time that the severe jolt was noticed, the airplane operated and handled normally. Following the loss of No. 4 engine, it operated and handled normally for three-engine operation.

An inspection of the No. 4 nacelle area revealed that the engine had let go at the vibration isolator mounts. All forces involved were absorbed by these mounts and consequently no structural damage was found aft of the firewall. It was obvious that the fire in No. 4 nacelle was the result rather than the cause of the engine loss. Fire damage was superficial and no other part of the airplane was damaged in any way.

An immediate search was initiated for the missing engine which was located from

the air on December 7, approximately 6-1/2 miles southeast of Cambray, New Mexico. A preliminary examination disclosed that the greater portion of one blade of the three-blade propeller was missing. On December 16 the missing portion of No. 1 blade was found several miles from the point where the engine had fallen.

Disassembly and tear-down of the engine was conducted to the extent necessary to determine that no malfunctioning or irregularity in its operation contributed to the propeller failure and that all damage sustained was directly traceable to impact with the ground. There is no difference of opinion that loss of one blade of a propeller could produce unbalanced forces of sufficient magnitude to tear the engine from its mountings.

The Curtiss-Wright propeller involved was installed on DC-6 airplane NC-90724 in No. 2 position on June 11, 1948, and was operated on this airplane until October 22 when it was removed for overhaul after 869 hours operating time. After overhaul the propeller was installed on airplane NC-90733 in the No. 4 position on October 29 where it was in service on the day of the accident. The total time on the propeller and the blade involved, Serial #290820, was 1,122 hours, 253 of which had been accumulated since overhaul.

The fracture of this blade was attributable to fatigue originating in a circumferential indentation of approximately 160° which was induced on the inside surface of the blade shank during manufacture at the time the deicing ring was installed by the upset process. This defect in the manufacture of the propeller blade was not detected by factory inspection. A limited number of this design blade were manufactured between December 22, 1947, and April 19, 1948. This ring upset process was not used on blade designs other than 744-6C2-0 and has been discontinued. The blade fractured at approximately the 9-1/2" station. Fatigue failure covered approximately two-thirds of the circumference before final rupture in tension took place. The failure

*All time referred to herein is Mountain Standard Time and based upon the 24-hour clock.

origin, as located by the concentric fatigue rings, was on the inside of the hollow blade shank, and visual examination showed that the nucleus for stress concentration was at the bottom of a .070-.080" depression on the internal surface. This depression was formed by the ring upset operation as indicated by the grain flow lines which were revealed by etching of a cross-section specimen taken through the fatigue failure.

In order to determine if similar internal irregularities exist in any other 744-6C2-0 blades, the manufacturer has withdrawn from flight operation all blades which have been subjected to the upset ring process during manufacture. Investigation disclosed only a limited number of these blades were manufactured,

all of which have been made the subject of a special reinspection program by the manufacturer. Only those that meet satisfactorily this revised reinspection program will be returned to service.

Upon the basis of all available evidence, the Board concludes that the probable cause of this accident was fatigue failure of the propeller blade resulting from circumferential indentation induced on the inside surface of the blade shank during manufacture.

BY THE CIVIL AERONAUTICS BOARD:

/s/ JOSEPH J. O'CONNELL, JR.

/s/ OSWALD RYAN

/s/ JOSH LEE

/s/ HAROLD A. JONES

/s/ RUSSELL B. ADAMS