

Adopted: September 14, 1942  
File No. 416-42

B-85

REPORT OF THE CIVIL AERONAUTICS BOARD  
of the  
Investigation of an Accident Involving Aircraft in Air  
Carrier Operation

An airline accident, which resulted in destruction of the left engine of Douglas DC-2, NC 13726, and minor damage to the airplane, owned and operated by Transcontinental & Western Air, Inc., occurred on March 2, 1942, at about 10:58 a.m. (EWT) near Allentown, Pennsylvania. The plane was powered with two Wright Cyclone GR-1820F-3A engines. No injuries were sustained by the two passengers or the crew of three.

The crew consisted of Captain Kalman J. Irwin, holder of an airline transport certificate with a single- and multi-engine land 150-4900 h.p. rating; First Officer Jack S. Gandy, who held a commercial certificate and an instrument rating; and Stewardess Wilma Jean Wilson. Both pilots were properly certificated for the flight in question.

The flight, designated by TWA as Flight 58, originated at Pittsburgh, Pennsylvania, with New York, New York as its destination. Intermediate stops were scheduled at Harrisburg and Reading, Pennsylvania, and Newark, New Jersey. The first two legs of the trip were completed under normal conditions with First Officer Gandy flying the plane from the left side as part of his familiarization training.

Flight 58 departed from Reading at about 10:37 a.m. At approximately 10:58 a.m. (EWT), while the flight was cruising at about 3000 feet, about 3 miles east of Bethlehem, Pennsylvania, a loud noise was heard and the left propeller control snapped forward. There was no warning, either from roughness or from the engine instruments. Quick inspection revealed that the propeller and nose section were gone from the left engine and that this engine had ceased functioning.

LaGuardia Field, New York, was immediately notified that the flight was returning to Allentown, Pennsylvania, and the radio frequency was changed to work the Allentown range station for altimeter setting, wind direction and velocity. The engine controls were adjusted for single-engine operation and the flight turned back, landing at Allentown at 11:06 a.m.

The propeller and nose section were found about 5 miles east of Bethlehem, Pennsylvania, and were taken to the Allentown Airport on March 2. The powerplant specialist from the Safety Bureau of the Civil Aeronautics Board was sent to the Allentown Airport where a preliminary investigation was conducted. This engine and the propeller, together with samples of oil and fuel, were shipped to the National Bureau of Standards in Washington, D. C. for inspection and analysis. The total operating time of the left engine prior to the accident was approximately 9,259 hours with about 544 hours having been put in since the last major overhaul.

The engine and propeller were dismantled under the supervision of the Board's powerplant specialist. At the conclusion of the tear-down it was determined that the master rod had failed at the crankshaft end. This master rod was turned over to the Metallurgical Division of the National Bureau of Standards for a detailed analysis.

The metallurgical examination of the failed master rod indicated that the failure was caused by a fatigue fracture which originated at the inner surface of the bore of the master rod behind the steel-backed bronze bearing sleeve. Pitted and scored areas on the surface of the bearing sleeve contained chromium flakes deposited from the rod. The nucleus of the fatigue fracture was centered in a pit in the bore or bearing surface of the master rod, the fracture progressing under the action of fluctuating stresses until all but a small portion of the rod section had been penetrated. This part then failed suddenly, completing the fracture. The sequence of events leading to the pitted condition of the chromium-plated surface on the master rod and the condition of the mating surface of the steel back of the bearing sleeve is uncertain, but the fact that the fatigue fracture originated at a point of stress concentration in a pit in the chromium plating, indicated that the pit was present at the time the fatigue fracture started.

It was evident that the damage to the engine was the result of the fatigue failure of the master rod. The failure apparently stopped the crankshaft so abruptly that the inertia of the propeller twisted off the nose section. The fuel characteristics were within proper limits and the condition of the sump and oil tank samples was not abnormal.

Disassembly and examination of the propeller by the Bureau of Standards revealed that the propeller was in normal operating condition up to the time of the powerplant failure, all damage to it being incurred by impact with the ground. The propeller did not contribute in any way to the powerplant failure.

A review of the air carrier maintenance and service records indicates that the failure of the master rod on this engine was an isolated case. Precautionary measures have been taken by TWA by altering their overhaul procedure on the type engine involved, to include complete disassembly of the master rod at each overhaul.

PROBABLE CAUSE: Failure of the master rod bearing.

BY THE BOARD

/s/ Darwin Charles Brown  
Secretary