

AVIATION OCCURRENCE REPORT

A95Q0115

IN-FLIGHT LOSS OF PROPELLOR BLADE

CLASSAIR AVIATION INC.  
NORMAND DUBÉ AVIATION AEROCRUISER  
(ULTRALIGHT) C-FCOL  
LAVALTRIE, QUEBEC  
01 JULY 1995

The Transportation Safety Board of Canada (TSB) investigated this occurrence for the purpose of advancing transportation safety. It is not the function of the Board to assign fault or determine civil or criminal liability.

## Aviation Occurrence Report

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### *Summary*

The pilot instructor and his student were making touch-and-go landings on an Aerocruiser advanced ultralight. Shortly after take-off from the private runway of École de pilotage de Lavaltrie, Quebec, at a height of approximately 300 feet above ground level, one of the propeller blades separated. The pilot instructor shut down the engine and landed the ultralight in an unprepared field. On the ground, the aircraft struck a tree and flipped over. The two occupants of the aircraft sustained serious injuries in the ground impact.

*Ce rapport est également disponible en français.*

## *Other Factual Information*

The pilot was qualified for the flight.

The aircraft had been rented from a company that operated and maintained it. The aircraft had logged approximately 437 flying hours since new. It was equipped with a Rotax 912 four-stroke engine. A two-blade wooden propeller with a diameter of 72 inches (GSC International Inc.) was mounted on the engine. The propeller had been installed by the operator and had logged just over 300 flying hours since it was purchased in 1994. On several occasions, the operator of the aircraft had to adjust the pitch of one of the propeller blades. To rectify this problem, the operator had machined the propeller hub down 0.010 inch in order to apply greater torque at the blade roots.

The blade was recovered, and an examination of the propeller was conducted at the TSB Engineering Branch Laboratory. The marks made by the bolts running through the two blades show that the blades were set at a medium pitch before the accident and that the pitch had not changed.

The broken section of the propeller indicated that the failure was progressive. Two anomalies were found on the broken blade: there was a crack in the wood of the root, and a black adhesive tape covered the circumference of the urethane capsule at the blade root, increasing the adjustment of the capsule in the propeller hub. The hub measurements were within the manufacturer's specifications.

At the root of the second blade, there was a crack at the same location as in the broken blade. No other damage was observed on the blades. According to the engineering report, these cracks could have been caused by contact of the blades with a soft object, such as water or snow, or by insufficient or excessive torquing of each blade root.

The propeller load calculations corresponded to those of the manufacturer, and fabrication of the propeller complied with the required and applicable standards.

The propeller manufacturer reported that there had been four similar occurrences out of the 10 000 blades in service. These occurrences were attributed to engine overspeed beyond the operating range specified by the manufacturer, impact with an object, or improper installation of the blades in the hub.

## *Analysis*

Although the operator had machined the propeller hub down 0.010 inch to apply greater torque to the blade roots, the non-fractured blade presented a crack at the root at the same location as that observed in the fractured blade. This shows that the two blades were subjected to the same failure mechanisms.

Given that the propeller was fabricated with sufficient static load strength, and that the blade did not fail as a result of engine overspeed, pre-existing damage could be at the origin of the progressive failure and in-flight loss of the propeller blade.

The origin of this pre-existing damage could not be precisely determined, but it is plausible that it occurred when the blades struck a soft object such as water or snow, or as a result of insufficient or excessive torquing of each blade root in the hub.

The failures of this type reported by the manufacturer were due to factors external to the operating standards of the propellers.

The following laboratory report was completed:

LP 115/95—In-Flight Propeller Blade Separation

### *Findings*

1. The hub of the fractured propeller had been machined down 0.010 inch.
2. The non-fractured blade was cracked at the root, at the same location as in the fractured blade.
3. The propeller was fabricated with sufficient static load strength.
4. Failure of the blade was the result of a progressive failure caused by undetermined pre-existing damage.
5. Contact with a soft object or insufficient or excessive torquing can cause this type of damage.

### *Causes and Contributing Factors*

The blade failed in flight following a progressive failure caused by undetermined pre-existing damage. It is possible that this type of damage was caused by contact with a soft object or insufficient or excessive torquing.

*This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board, consisting of Chairman John W. Stants and members Zita Brunet and Maurice Harquail, authorized the release of this report on 12 March 1996.*