

AVIATION OCCURRENCE REPORT

A980104

IN-FLIGHT WING SEPARATION

SKYHOPPER (AMATEUR-BUILT) C-FRDG
SMITHS FALLS-MONTAGUE
(RUSS BEACH) AIRPORT, ONTARIO 2 mi S
01 MAY 1998

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.

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Report Number A9800104

Summary

The pilot/owner of the Skyhopper aircraft went to the Smiths Falls airport to work on his aircraft about noon on the day of the occurrence. When he arrived at the airport, he stopped to talk to a friend and then went to his own hangar where the Skyhopper was stored. Around 1300 eastern daylight time the friend heard and observed the Skyhopper taxi past his hangar, but did not see or hear the aircraft take off. The aircraft would have departed from a 4 000 by 75 foot east/west oriented asphalt runway. Around 1400, a witness heard an unusual sound coming from the aircraft and then heard the aircraft engine sputtering. When she looked up, she observed that the right wing had separated from the aircraft, and the aircraft was descending out of control. It struck the ground less than a mile from the witness, fatally injuring the pilot/owner. The accident occurred during the hours of daylight in good visual meteorological flight conditions with light wind.

Ce rapport est également disponible en français.

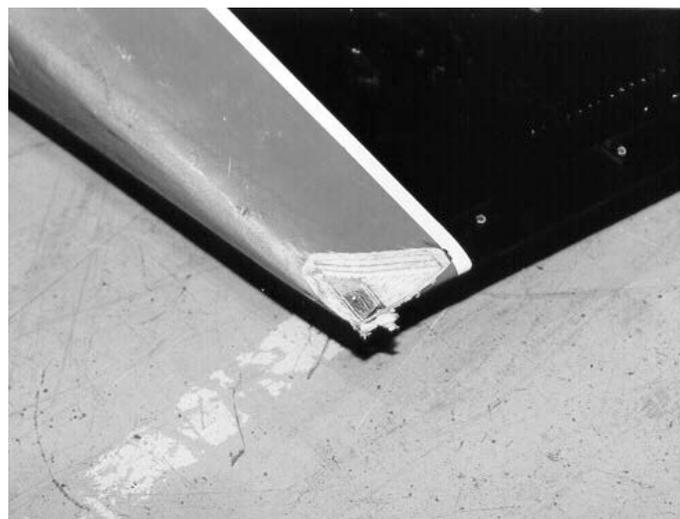
Other Factual Information

The pilot was issued his private pilot licence in 1958, commercial pilot licence in 1962, and airline transport pilot licence in 1968. According to entries in his pilot log book, most recent being 03 January 1998, he had flown a total of 7 556 hours. He was certified and qualified for the flight in accordance with existing regulations. Although never certified as an aircraft maintenance engineer, he served in the military as an aircraft airframe technician and had extensive experience as an aircraft maintenance engineer apprentice, carrying out maintenance on civilian aircraft.

The aircraft was an amateur-built, single-place, low-wing, tail-wheel type aircraft. It had a maximum gross weight of 1 300 pounds and was powered by a 108 horsepower Lycoming model O-235 engine. The wings were of wood construction, fabric-covered, with a metal-covered leading edge. Overall wing span was 26 feet.

Construction of the aircraft was completed in 1962. According to the most recent entry in the aircraft journey log, 09 April 1998, it had been operated a total of 756 hours flying time. Work reports on file indicate the wings were inspected and re-covered in June 1979. The pilot purchased the aircraft in August 1996 and according to log book entries had flown it a total of 35 hours since that date.

The main wreckage was located two miles south of the airport and the separated section of the right wing was 3 000 feet north of the main wreckage, resting above the ground in brush type trees. The right wing main spar separated from the aircraft 97 inches in from the wing tip, and the rear spar separated 56 inches in from the wing tip. The front spar had fractured in one location and the rear spar in three locations. There was no sign of rubbing on the surfaces of any of the spar fractures. The bottom surface of the trailing edge of the right wing tip was ground down through two layers of wood. The ground-off surface had a fresh appearance and was free of dirt or debris.



There were no marks on the runway that were associated with any abnormal operation of the Skyhopper aircraft. It is not known if the pilot operated the aircraft from any other aerodrome that day. The pilot's friend stated that the occurrence pilot had flown the Skyhopper in company with the friend's aircraft on the weekend prior to the accident. The friend reported that, to his knowledge, there were no abnormalities with the operation of the Skyhopper on that occasion.

A load and stress analysis of the two wing spars revealed they had a positive margin of safety when exposed to a 3.8 g load factor and a factor of safety of 1.5. It was also calculated that the main (front) spar had the lowest margin of safety and in the event of an overstress, it would be expected to fail before the rear spar. The wing had been constructed with wood of aircraft specification and quality. There was no sign of damage to the wood from decay or insect attack that would contribute to the cause of the wing failure. It was not possible to determine whether the wood had been damaged prior to the accident either by static overload or progressive fatigue nor was it possible to quantify the force that would have been applied to the wing spars associated with the ground-off portion of the lower rear corner of the right wing tip.

Analysis

The design strength and construction of the aircraft wing was found to be adequate, and there was no sign of deterioration of the wing material that would contribute to the in-flight failure of the wing. There was no reported weather phenomena on the day of the accident that would result in any excessive load or stress on the aircraft wing in flight.

The freshly ground-off surface on the bottom side of the aircraft right wing tip was typical of damage resulting from the wing tip contacting the ground during a recent ground loop or severe swerve to the left. The lack of dirt or debris on the scrape mark indicates the damage occurred from contact with an asphalt or concrete surface. Although it was not possible to quantify the forces applied to the wing as a result of the tip scrape, it can be concluded, from appearance alone, that the forces applied at the time of the scrape were significant enough to crack and weaken one or both of the right wing spars. The lack of any sign of rubbing on the fractured surfaces also indicates that any cracking of the wing spars was recent, possibly as recent as the last take-off or landing. Had there been cracks in the wood spars for a lengthy period of time there likely would have been signs of rubbing on the fracture surfaces as a result of the two surfaces of the crack rubbing together during normal wing loading in flight.

The spars failed in flight, likely under normal flight loads, and the right wing separated from the aircraft. The aircraft then descended out of control and struck the ground.

The following Engineering Branch report was completed:

LP 64/98 Failure Analysis - In-Flight Wing Separation

Findings

1. The pilot was certified and qualified to conduct the flight.
2. The aircraft was operated in the amateur-built category for more than 700 hours.
3. The right wing separated from the aircraft in flight.
4. The wing was constructed from aircraft grade wood, and there was no sign of deterioration of the wood.
5. The aircraft right wing tip was scraped on concrete or asphalt recently prior to the in-flight failure.

Causes and Contributing Factors

The right wing failed and separated from the aircraft in flight. A recent right wing tip scrape likely weakened the wing and contributed to the in-flight failure of the wing.

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board, consisting of Chairperson Benoît Bouchard, and members Maurice Harquail, Charles Simpson and W.A. Tadros, authorized the release of this report on 13 May 1999.