

AVIATION OCCURRENCE REPORT

A99Q0075

OBSTRUCTED ELEVATOR CONTROL

CESSNA 172 C-FKHS

LAC-À-LA-TORTUE, QUEBEC

23 APRIL 1999

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

Obstructed Elevator Control

Cessna 172 C-FKHS Lac-à-la-Tortue, Quebec

23 April 1999

Report Number A99Q0075

Summary

The Cessna 172, registration C-FKHS, serial number 36821, with two persons on board, was on a visual flight rules training flight at the Lac-à-la-Tortue, Quebec, airport. The student was in the left-hand seat and the instructor was in the right-hand seat. The student was practising a landing on soft ground; he was making an approach at low speed with full flaps (40 degrees). In this exercise, the student was to pull the elevator control fully to the rear. As the aircraft was about to touch down on the runway, the instructor told the student to go around and climb to circuit altitude. The student re-applied throttle and, as he attempted to push the control column forward to gain speed, the control column was jammed. He then asked the instructor for help, but the instructor also was unable to push the control column forward. The aircraft banked to the left and came to rest in trees. The two occupants evacuated the aircraft. There were no injuries.

Ce rapport est également disponible en français.

Other Factual Information

The records indicate that the instructor was certified and qualified for the flight in accordance with existing regulations. He had about 3,700 flying hours at the time of the occurrence. He held a commercial pilot licence and a class 2 instructor rating. The student was just starting his flight training.

The aircraft had flown 3,232 hours since it was manufactured in 1958. The new owners had purchased the aircraft on 19 March 1999. The annual inspection was performed and signed off by an aircraft maintenance engineer (AME) on 19 March 1999, in accordance with Appendices B and C of *Canadian Aviation Regulations* (CARs) Standard 625.86. The aircraft had accumulated 80 hours since that inspection. On 20 April 1999, an approved maintenance organization had changed the oil and cleaned the engine.

Examination of the cabin revealed a deficiency in the right stationary panel brace, part number 0513035-1. The brace provides a rigid attachment for the stationary panel that secures the socket control tube in which the elevator moves. After the occurrence, the brace was found to be broken. The stationary panel that secures the socket control tube in place could move and was preventing the flight control from moving freely, especially when pulled fully to the rear.

The brace was sent to the TSB Engineering Branch Laboratory in Ottawa, Ontario, for analysis. The TSB Engineering report determined that the part was fractured crosswise. Cracks were observed at the point where the brace attaches to the stationary panel that secures the socket control tube in place. The fracture surface showed evidence of crack termination typical of progressive fatigue failure. In addition, several cracks were visible on each side of the part. Fatigue propagated under reverse bending loads until the part was weakened to the point where it separated in overload. A surface area of 60 to 70 per cent of the fracture surface would have weakened the brace by fatigue until it failed in overload.

Given the function of the brace, the fatigue was caused largely by the movement of the control column. It is also reasonable to suppose that vibration loads may have contributed to crack initiation and propagation. The defect on the stationary panel was visible from the right-hand seat in the cockpit.

Furthermore, when the control column was pulled back, it contacted and rubbed against the lower rear part of the attitude indicator housing. The left stationary panel brace had been repaired previously at roughly the same location as the failure that occurred on the right side. The tachometer exhibited marks caused by the broken part of the brace rubbing against it. The socket control tube in which the right-hand controls move also has an opening into which the control lock is inserted.

CAR 605.86 requires that "all aircraft, other than ultra-light or hang-gliders, shall be maintained in accordance with a maintenance schedule, approved by the Minister, that meets the requirements of these standards." Also, under CAR 625.86(2)(c), the schedule is considered to be approved by the Minister for use by the owners of non-commercially operated small aircraft. Owners need only make an entry in the aircraft technical records that the aircraft will be maintained pursuant to the maintenance schedule.

Part I of Appendix B of the schedule lists the scheduled inspections for aircraft other than balloons. The tasks listed in the schedule are outlined only in general terms, since the specific items that will apply to any particular aircraft depend on the aircraft type. The inspection method for each schedule item must be consistent with the manufacturer's recommendations or current industry practices. The scope of the inspection for each item must be determined by the person performing the inspection, depending on the general condition of the aircraft and the type of operation. The schedule is not an inspection checklist.

Item 5 of the Cabin and Cockpit section of form AERO 215, which was used by the AME on the annual inspection, covered inspection of the flight controls and engine controls. In particular, the AME was to check the controls for incorrect assembly and incorrect operation. Only the last page of the form was signed and no individual item was initialled or signed.

The following Engineering Branch report was completed:

LP 53/99—Control Column Stationary Brace Failure.

Analysis

Privately owned aircraft must be maintained in accordance with a maintenance schedule. The owner can choose either a maintenance schedule provided by the manufacturer or a more general schedule like that proposed by Transport Canada at Appendices B and C of CARs Standard 625.86. The scope of the inspection for each item must be determined by the person performing the inspection, depending on the general condition of the aircraft and the type of operation. The annual inspection is an appropriate time to evaluate the airworthiness of the aircraft.

Item 5 of the Cabin and Cockpit section of form AERO 215 calls for a check of the condition and operation of the flight controls. The aircraft technical records show that no item on form AERO 215 was initialled by the person who performed the inspection and that the AME certified on the last page of the form that the aircraft was airworthy. The defect on the stationary panel was visible from the right-hand seat in the cockpit. However, it could not be determined when the brace progressive fatigue failure initiated, leading to the failure in overload.

Findings

1. The records indicate that the pilot was certified and qualified for the flight in accordance with existing regulations.
2. The annual inspection was certified by an AME.
3. The defect on the stationary panel was visible from the right-hand seat in the cockpit.
4. Laboratory analysis determined that the part showed evidence of progressive fatigue failure. Fatigue developed under reverse bending loads until the part was weakened to the point where it separated in overload.
5. It could not be determined when the brace progressive fatigue failure initiated, leading to the failure in overload.
6. Failure of the right stationary panel brace prevented the elevator control from moving freely and from being pushed forward.

Causes and Contributing Factors

Failure of the right stationary panel brace jammed the elevator control in the full rearward position, resulting in the crash of the aircraft.

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board, consisting of Chairperson Benoît Bouchard, and members Jonathan Seymour, Charles Simpson, W.A. Tadros and Henry Wright, authorized the release of this report on 13 January 2000.