Transportation Safety Board of Canada

Bureau de la sécurité des transports du Canada

200 Promenade du Portage
Gatineau, Quebec
K1A 1K8

Our File Reference
A16O0137-D1-A1

06 December 2016

Mr. Aaron McCrorie
Director General, Civil Aviation
Transport Canada
330 Sparks Street, Place de Ville
Tower C, 5th Floor, Area A
Ottawa, Ontario
K1A 0N8

Subject: AVIATION SAFETY ADVISORY A16O0137-D1-A1
Zenair Zodiac CH-601A—Risk of structural failure of the horizontal stabilizer

Dear Mr. McCrorie,

On 24 September 2016, C-FSDN, a privately registered Zenair Zodiac CH-601A advanced ultra-light aeroplane, was on a VFR flight from Pembroke (CYTA), Ontario, to Kitchener/Waterloo (CYKF), Ontario. Approaching destination, the pilot reported radio problems to the CYKF Control Tower and advised of a diversion to Guelph (CNC4), Ontario. While on final approach for landing on Runway 32 at CNC4, the aircraft rapidly pitched down from approximately 500 feet and crashed into a wooded area 1 nautical mile from the runway. The aircraft was destroyed and the pilot, who was the sole occupant, was fatally injured.

In accordance with the TSB Occurrence Classification Policy, the circumstances of this occurrence were assessed, and the occurrence was deemed to be a Class 5. Consequently, TSB activity was limited to the collection of data, which have been recorded for safety analysis, statistical reporting, and archival purposes. The following paragraphs contain safety-related information derived from the assessment of this occurrence.

A structural inspection of the aircraft's tail section revealed inconsistencies between the actual assembly and the applicable drawing set. Inconsistencies with acceptable methods, techniques, and practices for inspection, repair or alteration, as outlined in Federal Aviation Administration Advisory Circulars 43.13 1B and 2B, were also identified. The complete tail assembly was sent to the TSB Laboratory in Ottawa for further analysis.

The exact drawing set and construction manual used to build the aircraft could not be obtained; however, a similar set that was published two years following the construction of the occurrence aircraft was located. The drawings are believed to be similar.

As per the drawing (Figure 1), the horizontal stabilizer forward structural attachment is designed to be constructed by riveting two aluminium angles (attachment bracket 6-T-2-1 and attachment doubler 6-T-2-2) with three rivets back-to-back and connecting the attachment bracket to the front surface of the forward spar (6-T-1-3) with five rivets.

In the actual installation, the three rivets connecting each attachment bracket to the associated attachment doubler were missing and the required holes were not drilled. Four additional holes were drilled through the left attachment bracket and continued through the forward spar. Rivets were installed in all of these additional holes; however, they were only installed in one of the five holes specified in the drawing.

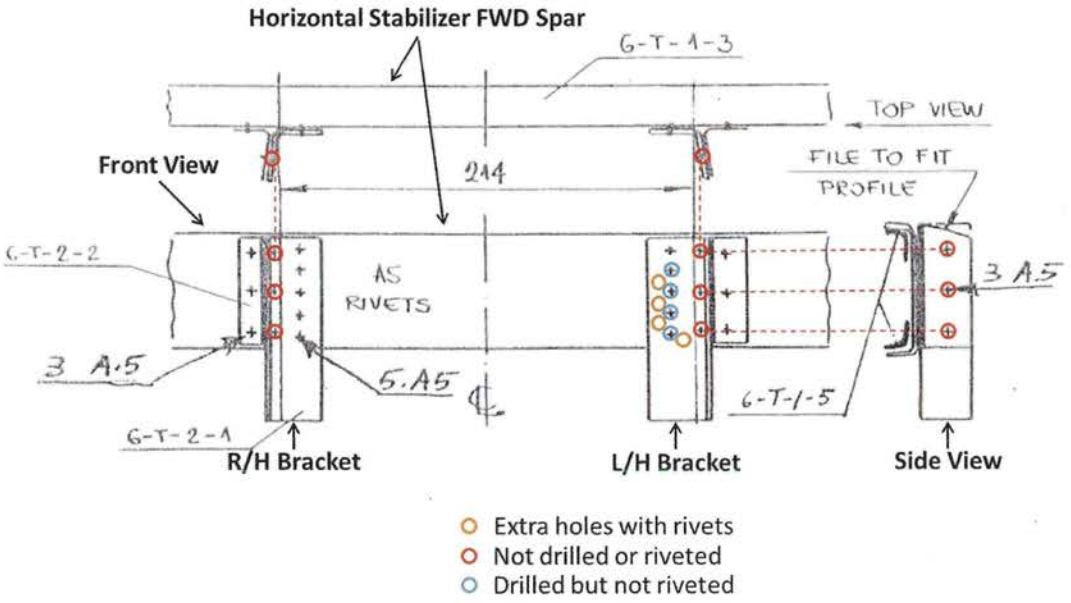

Figure 1. Horizontal stabilizer forward structural attachment—aircraft drawing. (source: Zenair, with digital annotations by the TSB)

Structural integrity of the horizontal stabilizer forward attachment point was compromised on both sides because of the missing rivets, and the strength of the forward spar itself was reduced because of the extra holes.

The occurrence aircraft was built by an individual in 1994, and was based on a kit manufactured by Zenair. It was registered with Transport Canada as an advanced ultra-light aeroplane (AULA). To apply for registration of an AULA, a Statement of Conformity (SOC) issued by the manufacturer is required.

Prior to issuance of a SOC, Zenair currently requires that two independent inspections be completed: a pre-closing inspection by a Minister's Delegate—Recreational Aviation, and a pre-flight inspection by a Transport Canada certified aircraft maintenance engineer.

The manufacturer introduced these requirements approximately five years ago therefore, at the time of construction and initial registration of the occurrence aircraft, neither of these independent inspections was completed. Numerous other Zenair aircraft were built and

registered before this requirement was in place and it is likely that these aircraft were not inspected either.

As shown in this occurrence, if adequate independent inspections are not conducted during the manufacturing of an aircraft, non-conformance with the intent of the drawing, and/or construction manual, and/or acceptable methods, techniques and practices could go undetected, thus increasing the risk of a structural failure and complete loss of control during any phase of flight.

The foregoing is provided for follow-up action as deemed appropriate. The TSB would appreciate being advised of any action taken.

Yours sincerely,

Yanick Sarazin
A/Director of Air Investigations
Transportation Safety Board of Canada

cc:
Mr. Michael Heintz, Zenair Ltd.
Mr. Bernard Gervais, President & CEO, Canadian Owners and Pilots Association
Mr. Gary Wolf, President, The Recreational Aircraft Association Canada
Ms Kathy Lubitz, Ultralight Pilots Association of Canada
Mr. David Gascoine, President & CEO, Light Aircraft Manufacturers Association of Canada
Mr Allan Mahon, Minister's Delegate—Recreational Aviation
Mr. Sean Elliott, Vice President of Advocacy and Safety, Experimental Aircraft Association

BACKGROUND INFORMATION

Occurrence No.:	A16O0137
TSB Laboratory Report:	In progress
Safety Communication No.:	A16O0137-D1-A1
TSB Contact:	IIC – Mario Boulet Phone: (905) 771-7692 Email: mario.boulet@tsb.gc.ca