

National Transportation Safety Board

Office of Aviation Safety

Washington, DC 20594



CEN23FA144

EXAMINATION SUMMARY

April 2, 2023

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A. ACCIDENT

Location: Oxford, Mississippi
Date: March 29, 2023
Time: 1853 central daylight time
Aircraft: Zenith CH-701 STOL, N43414

B. PARTICIPANTS

Investigator-in-Charge (IIC)	Timothy Sorensen ¹ Sr. Aviation Accident Investigator National Transportation Safety Board Denver, Colorado
Investigator	Jason Aguilera ² Sr. Aviation Accident Investigator National Transportation Safety Board Denver, Colorado
Party Coordinator	Scott Smira ¹ Aviation Safety Inspector Federal Aviation Administration Jackson, Mississippi
Party Member	Joseph Howard ¹ Aviation Safety Inspector Federal Aviation Administration Jackson, Mississippi
Accredited Representative	Jérôme Ouellet ³ Sr. Technical Analyst Transportation Safety Board of Canada Gatineau, Quebec (Canada)
Technical Advisor	Jordan Paskevich ^{2,3} Air Safety Investigator Rotech Flight Safety Vernon, British Columbia (Canada)

¹ Present for/participated in on-scene examination.

² Present for/participated in post-recovery engine examination.

³ Present for/participated in ignition harness examination.

C. ACCIDENT SUMMARY

On March 29, 2023, about 1853 central daylight time, a Zenith CH-701 STOL airplane, N43414, was destroyed when it was involved in an accident near Oxford, Mississippi. The pilot was fatally injured, and the passenger was seriously injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

An on-scene examination was conducted on April 1, 2023, by the NTSB investigator-in-charge with the assistance of the FAA. A post-recovery engine examination was completed on May 5, 2023, at AMF Aviation (Springfield, Tennessee) by the NTSB with the assistance of Rotech Flight Safety (Vernon, British Columbia), representing the engine manufacturer. A follow-up examination of the engine ignition harness was conducted on September 27, 2023, at Rotech Flight Safety with oversight provided by the Transportation Safety Board of Canada (TSB).

D. EXAMINATION SUMMARY

1.0 Accident Site

The airplane impacted trees and terrain about 13.15 miles east-northeast of the University/Oxford Airport. Tree heights in the vicinity of the accident site were estimated at 75 feet tall. Tree branches with fresh breaks were on and adjacent to the wreckage. No tree breaks away from the immediate vicinity of the wreckage were observed. The main wreckage consisted of the fuselage, right wing, empennage, and engine. The left wing and landing gear were separated from the fuselage and suspended in a tree about 15 feet northwest from the main wreckage and approximately 50 feet above ground level.

The fuselage came to rest inverted and oriented on an approximate heading of 220°. The elevation at the site was about 409 feet. The approximate coordinates of the main wreckage were 34.46671 north latitude / 89.29187 west longitude.

2.0 Airframe Examination⁴

Zenith CH-701 STOL (s/n 5523)

The engine cowling was damaged, and the nose landing gear partially collapsed. The cockpit area was compromised. The fuselage was deformed and buckled at various locations with the preponderance of the damage in the forward fuselage and cockpit areas. The empennage was dislocated and partially separated from the aft fuselage consistent with impact.

The left wing was separated. The left inboard flaperon (aileron/flap) was separated from the wing and located at the accident site. It was bent near the

⁴ Directions related to accident site placement and component damage/deformation are with respect to an intact airframe unless otherwise noted.

outboard end; the inboard actuating pin was intact. The outboard flaperon appeared to be with the wing.

The right wing was partially separated at the wing root. The forward wing root remained attached to the fuselage; however, the aft wing root structure was compromised and separated. The wing strut was bent but remained attached at all anchor points.⁵ The fixed wing slat was secure and exhibited damage consistent with impact forces. The right-wing fuel cap was securely installed. The fuel tank sump drain appeared intact.

The horizontal stabilizer exhibited a semi-circular indentation near the right tip consistent with impact to a tree. The elevator remained attached to the horizontal stabilizer at each hinge point. The vertical stabilizer exhibited minor deformation consistent with impact. The rudder remained attached to the vertical stabilizer at each hinge point.

The cockpit flight controls remained attached to the support structure; however, that structure was deformed as noted previously. Movement of the controls was limited due to that damage. Aileron control continuity was confirmed from the control stick to the wing roots. Continuity was confirmed from the control stick to the elevator, and from the rudder pedals to the rudder. The cockpit flap lever was separated from the floor structure; however, the control linkage was intact and continuous to the wing roots.

The pilot-side seatbelt/shoulder harness anchor points were compromised consistent with the separation of the left wing. The restraints appeared to be with the wing suspended in the tree. The copilot-side seatbelt/shoulder harness anchor points were intact. The restraints and buckle were secure and intact. The buckle operated normally when tested.

The ELT was securely installed. The antenna cable was connected to the unit, and the ON/OFF switch was set to the ARM position. The ELT was an ACK Technologies, Inc., model E-01, serial number 051711, TSO-C91a (121.5 / 243.0 MHz).

The altimeter was set to 30.32 inHg. The Hobbs meter indicated 748.9.

3.0 Engine Examination

Rotax 912UL (s/n 4406179)

The engine sustained damage consistent with impact forces. It remained attached to the engine mount. The exhaust system was deformed and separated from the muffler. The crankcase appeared intact. Internal engine continuity was

⁵ The right-wing strut lower attachment bolts were removed during the examination.

confirmed via crankshaft rotation. Borescope examination was unremarkable. Disassembly of the cylinders and cylinder heads revealed no anomalies with one exception. Cylinder #3 displayed the presence of exhaust soot and carbon on the cylinder head. The exhaust nuts were found to be corroded, and the exhaust pipe was loose in the cylinder head.

The reduction gearbox appeared to be intact. No anomalies were observed with the gearbox that would have affected normal engine operation. The magnetic plug was clean and was free of any metallic particle buildup.

Oil lubrication was observed throughout the engine during disassembly. The oil pump was unremarkable and appeared operational. The oil tank was separated consistent with impact forces and contained approximately 2 cups of oil.

The spark plugs appeared intact and operational. The ignition harness included one non-Rotax lead. Additionally, the contact on one of the wires running from the stator to the lower ignition module was not fully exposed.

Bench testing of the ignition modules revealed that they both misfired when operating about 4,000 rpm. The observed anomaly was consistent with rough engine operation at that speed, but not with a loss of engine power. Additionally, one ignition module did not provide current under 400 rpm, preventing that module from functioning during engine start. The electrical resistance of each ignition lead, including the non-Rotax wire lead, were within specification.

Both carburetors remained secured to the engine. Teardown examinations of both carburetors did not reveal any anomalies consistent with a loss of engine power. The floats were intact⁶; although, a small piece of cork gasket material was observed resting on one of the floats. The carburetor bowls were clean and free of residual fuel. The main fuel jets were clear and free of debris. The piston slides were intact, correctly installed, and appeared operational.

The mechanical fuel pump was separated from the engine consistent with impact. The fuel pump was hand-actuated and ejected about one tablespoon of yellow liquid. The color and odor of the sample was consistent with automotive fuel. No water was detected in the sample. The fuel filter appeared intact. Low pressure air passed through the filter with no obstruction detected.

The coolant system was breached; however, residual coolant was observed within the engine. No anomalies with respect to the coolant system that would affect normal operation were observed.

⁶ The carburetor floats appeared to be a superseded component that should have been replaced according to a Rotax service bulletin.

The intake air filters were secure and appeared intact. They pleats exhibited some dirt accretion but were otherwise unremarkable.

4.0 Propeller Examination

The propeller hub was secured to the engine propeller flange and appeared intact. Each of the three wooden propeller blades were separated at the root and fragmented consistent with the accident sequence.

----- *end of summary* -----