

National Transportation Safety Board

Office of Aviation Safety
Central Region



CEN22FA019

WRECKAGE EXAMINATION SUMMARY

ACCIDENT

Location: Marengo, Wisconsin
Date: October 23, 2021
Time: 1440 central daylight time (1940 UTC)
Airplane: American Champion Aircraft model 8KCAB, Registration No. N843AC

PARTICIPANTS

Investigator-In-Charge Andrew Todd Fox
National Transportation Safety Board
Denver, Colorado

Group Member Michael Brockel
Federal Aviation Administration – Milwaukee FSDO
Milwaukee, Wisconsin

Group Member (Remote) Les Doud
Hartzel Propeller
Piqua, Ohio

ACCIDENT SYNOPSIS

On October 23, 2021, about 1440 central daylight time, an American Champion Aircraft 8KCAB airplane, N843AC, was destroyed when it was involved in an accident near Marengo, Wisconsin. The pilot and his passenger were fatally injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

The pilot's sister-in-law reported that she received a phone call from the pilot about 5 minutes before the accident, during which the pilot told her to wait outside because he intended to fly over her house. The airplane overflew her position multiple times at a low altitude before she saw the airplane "doing a loop" shortly before she heard the airplane crash.

The pilot's sister-in-law used her mobile phone to capture several "live" photos of the airplane while it maneuvered near her house during the final minutes of the flight. These "live" photos consisted of several frames of video with sound to create a short movie clip. One of these movie clips showed the airplane as it flew over a residential yard at a low altitude, as shown in figure 1. Another movie clip showed the airplane in a steep nose down descent in the moments before the accident, depicted in figure 2. A review of the sound spectrum extracted from the movie clip that captured the final

descent determined the fundamental propeller blade passage was about 80 Hz, which corresponded to 2,400 rpm for the 2-blade propeller installed on the airplane.



Figure 1. Airplane flying low over the ground (still image extracted from a video that was recorded by a witness)



Figure 2. Airplane descending during final low altitude maneuver (still images extracted from a video that was recorded by a witness)

Another witness was driving when he saw the airplane flying “pretty low” about 200-400 ft above the ground. The witness stated that the airplane dove toward the ground while flying to the west before it “went back up going upside down” while flying to the south. The airplane then descended and crashed in a residential yard while flying toward north.

A postaccident review of the passenger’s mobile phone determined that it contained a video recording of the flight. The phone, which was handheld by the passenger who was seated in the rear-seat of the airplane, frequently changed its view throughout the recording. However, in general, the camera’s field of view was out of the airplane’s right-and-left rear seat windows.

The airplane’s general ground track in the vicinity of the accident location was constructed based on recovered video footage and is depicted in figure 3. The airplane’s bank angle with respect to the visible horizon was estimated for several turns, with each turn chronologically numbered 1-6 and annotated in figure 3. Additionally, the airplane’s maximum bank angle during each turn is listed in table 1.



Figure 3. The airplane’s estimated ground track in the minutes before the accident, with red numbers indicating where the bank angles were measured during each turn

Turn #	Bank Angle (estimated)
1	Right bank $\geq 55^\circ$
2	Left bank $\geq 55^\circ$
3	Left bank $\geq 80^\circ$
4	Unknown due to camera angle
5	Left bank $\sim 45^\circ$
6	Final maneuver, camera panned away from horizon with airplane in a left bank $\geq 80^\circ$

Table 1. Estimated maximum bank angle during turns

Based on the passenger's video recording, the final maneuver began with the airplane rolling into a wings level attitude before it pitched up into slight climb for about 3 seconds. The pilot then pitched the airplane into a negative G maneuver during which the passenger stated "Whooooa." About 2 seconds later, the pilot increased airplane pitch into a rapidly positive G maneuver. The pilot then rolled the airplane into a steep (at least 80°) left-wing-down bank before the camera view panned into the interior of the airplane and showed the rear control stick in a neutral roll and slightly nose up pitch input. About a second later, the rear control stick showed a nose up pitch input, which was quickly followed by a right roll input in addition to the nose up pitch input. During the final 3 seconds of the flight, the airplane's stall warning horn was audible, the passenger was laughing, and the pilot stated an expletive. The pilot maintained the slight nose up pitch input with a moderate right roll input until the video concluded with the sound of the airplane impacting the ground. There was no video evidence that the passenger interfered with the airplane's flight controls during the flight.

WRECKAGE EXAMINATION TIMELINE

The National Transportation Safety Board (NTSB) Investigator-in-Charge (IIC) traveled onsite and examined the wreckage October 24, 2021, with the assistance of a FAA Airworthiness Inspector. A Hartzell Propeller investigator provided additional support from a remote location. On October 25, 2021, the wreckage was released to a claims adjuster representing the insurance company.

AIRPLANE DESCRIPTION

The airplane was a 1999 American Champion Aircraft model 8KCAB Super Decathlon, serial number (s/n) 843-99, registration number N843AC. A 180 horsepower Lycoming AEIO-360-H1B engine, s/n RL-30887-51E, provided thrust through a two-blade, constant speed, Hartzell HC-C2YR-4CF propeller, s/n AU15923B. The aerobatic airplane was a tandem two-seat, strut braced high wing airplane with a conventional (tailwheel) landing gear. The airplane's empty and maximum takeoff weights were 1,329.5 lbs and 1,800 lbs, respectively. The airplane

was equipped with a 41.5-gallon capacity fuel system, consisting of two 20-gallon wing fuel tanks and a 1.5 gallon header tank.

MAINTENANCE SUMMARY

According to maintenance documentation, on February 19, 2021, the last annual inspection of the airplane was completed at 2,310.2 total airframe hours.

The engine and propeller were removed following a propeller strike event at 2,329 total airframe hours. The engine was shipped to the manufacturer to be factory rebuilt. On September 21, 2021, the factory rebuilt engine and a new propeller were installed at 2,329 total airframe hours.

The airplane's recording tachometer indicated 2,345.9 hours at the time of the accident. Based on available maintenance documentation, the airframe total time since new was 2,345.9 hours. The factory rebuilt engine and new propeller accumulated 16.9 hours since they were installed on the airplane.

A review of the maintenance logbooks revealed no unresolved discrepancies or maintenance actions.

WRECKAGE EXAMINATION (OCTOBER 24, 2021)

An onsite examination determined the airplane's right wing leading edge impacted the roof of a house before the fuselage impacted the ground in a nose down pitch attitude, as shown in figure 4. The main wreckage came to rest in the backyard of the house on a north heading. The main wreckage location was 46.406685° north latitude, 90.898016° west longitude, at 877 ft msl. The main wreckage consisted of the fuselage, empennage, engine, and propeller. Both wings separated from the upper fuselage during impact and were found about 20 ft north of the main wreckage, as shown in figure 5.

All structural components and flight control surfaces were located at the accident site. Flight control cable continuity could not be established; however, all observed separations were consistent with impact related damage.

The airframe examination revealed no evidence of a preimpact mechanical malfunction or failure that would have precluded normal operation.



Figure 4. Main wreckage at the accident site



Figure 5. Wings as found at the accident site

Engine

The engine remained attached to the fuselage mounts and did not exhibit any crankcase or cylinder fractures. The upper sparkplugs exhibited features consistent with normal engine operation. Internal engine and valve train continuity were confirmed as the engine crankshaft was rotated through the propeller governor drive gear. Compression and suction were noted on all four cylinders in conjunction with crankshaft rotation. Both magnetos provided spark at each post when rotated by hand. Fuel was observed in the electric fuel pump, engine-driven fuel pump, fuel servo, and the fuel line to the fuel manifold valve.

The engine examination revealed no evidence of a preimpact mechanical malfunction or failure that would have precluded normal operation.



Figure 6. Engine with propeller

Propeller

The propeller remained partially attached to the engine crankshaft, as shown in figure 6. One propeller blade exhibited compound bending; opposite rotation, aft, and twisted toward low pitch. The other propeller blade mostly exhibited aft bending. Both propeller blades exhibited chordwise/rotational scoring and leading-edge gouging.

The propeller examination revealed no evidence of a preimpact mechanical malfunction or failure that would have precluded normal operation.



Figure 7. Propeller



Figure 8. Propeller Blade