

**NATIONAL TRANSPORTATIONS SAFETY BOARD  
Office of Aviation Safety  
Washington, DC 20594**

**November 26 ~ 27, 2011**

**SUMMARY OF ACCIDENT SITE AND ON-SCENE EXAMINATION**

**CEN12FA083**

**A. ACCIDENT**

Location: Crystal Lake, Illinois  
Date: November 26, 2011  
Time: 1026 central standard time  
Aircraft: Cirrus Design SR20 airplane, N223CD

**B. PARTICIPANTS**

Timothy Sorensen  
Air Safety Investigator  
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## Summary of Accident Site and On-Scene Examination

### C. SUMMARY

On November 26, 2011, at 1026 central standard time, a Cirrus Design SR20, N223CD, was substantially damage when it impacted a tree and terrain near Crystal Lake, Illinois. The pilot and three passengers were fatally injured. The aircraft was registered to Marion Pilots Club and operated by the pilot under the provisions of 14 Code of Federal Regulations Part 91, without a flight plan. Instrument meteorological conditions prevailed in the vicinity of the accident site. The personal flight originated from Marion Regional Airport (MZZ), Marion, Indiana about 0830. The intended destination was DuPage Airport (DPA), West Chicago, Illinois.

### D. DESCRIPTION OF ACCIDENT SITE

The airplane impacted a tree and an open field about 4 miles north-northwest of Lake in the Hills Airport (3CK). Multiple tree limbs up to about 4 inches in diameter exhibiting fresh breaks were distributed over an approximate 45-foot by 45-foot area immediately north of the tree. The wreckage path was oriented on a bearing of approximately 009 degrees magnetic. The debris field was about 400 feet long by 85 feet wide originating at the tree struck during the accident sequence.

The main wreckage came to rest approximately 97 feet north of the tree. The main wreckage consisted of the fuselage, right wing, and horizontal stabilizer. The vertical stabilizer, with the rudder attached, separated from the fuselage and came to rest about 30 feet north of the main wreckage. The remaining airframe components, including all control surfaces, were located within the debris field. The engine and propeller had separated from the airframe and were each located 155 feet and 131 feet north of the main wreckage, respectively.

### E. SUMMARY OF AIRCRAFT DAMAGE<sup>1</sup>

The fuselage was fragmented. The cockpit and cabin areas were compromised. The two front seats were separated from the airframe structure and located within the debris field. The rear seats were dislocated from the airframe structure, but remained with the main wreckage. The instrument panel was fragmented, and flight instruments were dislocated and damaged. The multi-function display unit was separated from the instrument panel and located within the debris field.

The entire span of the right wing remained with the main wreckage. The right wing came to rest inverted. Portions of the fiberglass wing structure were separated and/or delaminated consistent with impact damage. The right aileron remained attached to the wing. The right flap was separated. The flap was located near the vertical stabilizer, about 25 feet from the main wreckage. It was deformed consistent with impact. The flap hinges had separated from the flap and remained attached to the wing. The right main landing gear strut has separated from the wing structure, and the right main wheel assembly had separated from the strut.

The left wing was separated from the airframe. The outboard section of the left wing, from the wing tip to about midspan, came to rest approximately 55 feet east of the main

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<sup>1</sup> Directions related to accident site placement and component damage/deformation are with respect to an intact airframe unless otherwise noted.

## Summary of Accident Site and On-Scene Examination

### E. SUMMARY OF AIRCRAFT DAMAGE *(continued)*

wreckage. The aft shear web<sup>2</sup> was separated from the upper and lower wing skin structure. The fiberglass wing structure was split, delaminated, and torn. The inboard portion of the left wing was fragmented. A section of the left inboard upper wing skin was located about 40 feet southwest of the main wreckage. A section of the left lower wing structure, including the left main landing gear strut and wheel assembly, were located approximately 30 feet west of the main wreckage. The left aileron was separated from the wing and came to rest about 275 feet north of the main wreckage. The left flap was separated and located about 35 feet southwest of the main wreckage. The center flap hinge remained attached to the flap. The nose landing gear and a portion of the engine mount were located adjacent to the left flap.

The vertical stabilizer was separated from the fuselage at the base. The rudder remained attached to the stabilizer at all three hinge points. The rudder control tube remained attached to the rudder. The control tube was separated at rod end common to the forward end of the tube. Appearance of the fracture surface was consistent with overload failure.

The horizontal stabilizer was separated from the fuselage and located with the main wreckage. It sustained delamination and fragmenting of the fiberglass structure consistent with impact forces. Both elevators had separated from the stabilizer. The left elevator was located adjacent to the tree initially impacted during the accident sequence. It was deformed along the entire span of the control surface. The outboard tip and counterweight was separated from the elevator. The tip/counterweight was located with the main wreckage. The right elevator was located about 20 feet northwest of the main wreckage. The tip/counterweight remained attached to the control surface. The right elevator was bent approximately 90 degrees (tip upward) near midspan.

Aileron control cable continuity was confirmed from the console aileron actuation pulley, through the right aileron actuation pulley, and to the cross-over turnbuckle. The cable was separated at two locations; (1) near the cross-over turnbuckle, and (2) about 1-1/2 feet from the console aileron actuation pulley. The separated ends of the cable appeared consistent with overload failures. The left aileron actuation pulley was dislocated from the wing, along with an attached portion of the wing spar. Damage to the left aileron actuation pulley appeared consistent with impact. The aileron control cable was no longer engaged with the pulley. The elevator control cables were continuous from the cockpit area to the elevator sector assembly in the aft fuselage. The rudder control cables remained attached to the rudder pedal torque tube and was continuous to the aft fuselage control sector pulley. The flap actuator was extended approximately 4 inches consistent with a full UP flap position.

The aileron (roll) trim actuator was observed in the full left wing down position. The elevator (pitch) trim actuator was observed in the full nose up position. Both actuators were dislocated from the airframe and had sustained damage consistent with impact forces.

The engine was separated from the airframe and came to rest inverted. Several accessories had separated from the engine, including the left magneto, fuel pump, throttle

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<sup>2</sup> The aft shear web is located along the aft edge of the wing, immediately forward of the aileron and flap. It is an integral part of the wing structure, and is bonded to the upper and lower wing skin structure.

## Summary of Accident Site and On-Scene Examination

### E. SUMMARY OF AIRCRAFT DAMAGE *(continued)*

fuel control, fuel manifold, starter, and oil cooler. Those accessories were recovered from the debris field. The intake manifold and portions of the exhaust assembly had separated from the engine. The engine crankcase appeared intact. The oil sump pan exhibited damage consistent with impact. (The oil sump was removed to facilitate further examination.)

The cylinders remained attached to the engine crankcase, but sustained damage consistent with impact forces. Borescope examination did not reveal any anomalies related to the cylinders, pistons, or intake/exhaust valves. The crankshaft, camshaft, and connecting rods appeared to be intact when visually examined through the oil sump opening. The rocker arms appeared intact.

Both magnetos exhibited spark across all leads when rotated by hand. The spark plugs exhibited normal operating signatures. The fuel pump drive shaft and internal vanes were intact. The fuel manifold valve diaphragm was intact and the screen appeared free of debris. A small amount of fluid consistent in odor and appearance to aviation fuel was observed in the valve body upon disassembly. The oil screen appeared intact and was free of debris. The oil filter remained secured to the engine. The oil filter element appeared free of debris and sediment. The throttle control lever remained attached to the control assembly. The throttle plate appeared intact and was free to rotate. The throttle control cable rod end remained attached to the lever. The remainder of the throttle cable was separated.

The primary (engine driven) vacuum pump remained attached to the engine. The driven flex center and drive couplings were intact. Upon disassembly, the rotor and vanes were observed to be intact. The secondary (electric driven) vacuum pump assembly was separated from the engine. The pump was partially dislocated from the drive motor. Upon disassembly, the rotor and portions of the vanes were fractured.

The attitude indicator and directional gyro flight instruments sustained damage consistent with impact forces. The gyros of both units were free to rotate within their respective housings. No significant scoring was observed on the gyros or inside the housings. The airplane recording hour (Hobbs) meter indicated 1,758.7 hours.<sup>3</sup>

The propeller assembly had separated from the engine at the crankshaft, aft of the propeller flange. Appearance of the crankshaft fracture surfaces was consistent with overload failure. The spinner was deformed aft into the propeller hub. Both propeller blades were deformed over the entire span. One blade exhibited aft curling at the tip over approximately the outboard one-third of the blade. The second blade was bent and twisted in multiple directions over the outboard one-half of the blade. The propeller hub appeared intact.

The Cirrus Airframe Parachute System (CAPS) cockpit activation handle was observed in the holder.<sup>4</sup> The safety pin was not installed.<sup>5</sup> Cable continuity from the cockpit

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<sup>3</sup> The hour meter was recovered by the Sheriff's Department subsequent to the on-scene examination and transferred to the NTSB.

<sup>4</sup> The CAPS handle/holder assembly is mounted on the cockpit ceiling; centered above the front seats.

## Summary of Accident Site and On-Scene Examination

### E. SUMMARY OF AIRCRAFT DAMAGE *(concluded)*

activation handle to the rocket igniter was confirmed. The parachute deployment bag, rocket motor, and lanyards were located approximately 100 yards south of the tree impacted during the accident sequence. The lanyards were discolored consistent with exposure to the rocket exhaust. The fiberglass parachute enclosure cover was separated from the airframe and located approximately 100 yards southwest of the tree. The rocket motor propellant was expended. The access panel located on the aft baggage compartment bulkhead appeared undeformed. The parachute was torn, with fragments of the canopy caught on the tree. The remainder of the canopy, canopy risers, and support lanyards appeared intact and extended to the main wreckage. Examination of the CAPS support harness did not reveal any fabrication or rigging anomalies.<sup>6</sup>

----- *End of Summary* -----

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<sup>5</sup> The safety pin is installed when the airplane is on the ground in order to prevent inadvertent activation of the system. The pin is removed prior to flight so that the system will be available in-flight in the event of an emergency.

<sup>6</sup> The CAPS is activated when the cable connecting the cockpit handle and the rocket motor is displaced, resulting in firing of the igniter and subsequent ignition of the rocket motor propellant. The CAPS may be deployed when the cockpit handle is intentionally pulled by the pilot. However, it may also be activated when the igniter cable is displaced for any other reason; possible examples include an accident impact sequence. The avionics on-board the accident airplane was not capable of recording any flight parameters, including deployment of the CAPS.