

# National Transportation Safety Board

Office of Aviation Safety

Washington, DC 20594



WPR23FA323

## **NTSB ONSCENE AND WRECKAGE EXAMINATION REPORT**

August 25, 2023

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## **A. ACCIDENT**

Location: West Jordan, Utah  
Date: August 23, 2023  
Time: 1200 mountain daylight time  
1800 UTC  
Airplane: Experimental Amateur Built Cassutt III

## **B. PARTICIPANTS**

|                       |                                                                                  |
|-----------------------|----------------------------------------------------------------------------------|
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| Investigator          | Paul Basti<br>National Transportation Safety Board<br>Federal Way, Washington    |
| Subject Matter Expert | Jeremy Heidinger<br>Airframe and Powerplant Mechanic (IA)<br>Painesville, Ohio   |
| Investigator          | Fabian Salazar<br>National Transportation Safety Board<br>West Jordan, Utah      |

## **C. SUMMARY**

On August 23, 2023, about 1200 mountain daylight time, an experimental amateur built Cassutt airplane, N6291N, was substantially damaged when it was involved in an accident near West Jordan, Utah. The pilot was fatally injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

According to a witness, who was also scheduled to race the accident airplane in the upcoming Reno Air Races, he was standing near the threshold of runway 16 when he observed the accident airplane depart. He watched the tail rise when the airplane was about 1,000 ft into its ground run and then lifted off the runway about 1,750 ft from the approach end of the runway. The airplane entered a climb and then started an right turn towards the crosswind leg of the airport traffic pattern. After the airplane was established on the crosswind leg the right wing rapidly dropped about 45° and the airplane entered a nose down attitude. The airplane had rolled wings level as it maintained a nose down attitude when it disappeared from the witness' view.

Surveillance video from a nearby commercial building showed the airplane during its descent. The video showed the airplane on a northwest heading at an approximate altitude of about 80 ft above ground level and in a left wing low attitude. The airplane rapidly descended in a slight nose low attitude until it impacted the ground.

## **D. DETAILS OF THE EXAMINATION**

### **1.0 Accident Site**

The airplane struck a chain link fence and slid across a main thoroughfare before it came to rest on the curb of the north lanes. The address of the accident site was 4370 West New Bingham Highway. Elevation of the site was 4,457 ft above mean sea level.

The airframe was substantially damaged. The fuselage consisted of welded tube metal covered in fabric. The fuselage fractured and partially separated from the fire wall. The cabin area was breached, and the fuselage aft of the cabin area was partially separated. Only one control cable to the rudder held the aft fuselage to the cabin area.

The empennage partially detached from the aft fuselage. Only the rudder control cables held the empennage onto the aft fuselage. The rudder remained attached to the vertical stabilizer and articulated left and right. One of the rudder control cables remained connected to the rudder pedals and the other fractured and separated in the aft fuselage area. There was no elevator trim. The elevators remained attached to the T-tail-style horizontal stabilizer. Flight control continuity of the elevator was not examined.

The wings separated from the fuselage but came to rest on top of the fuselage. The left wing fully separated from the fuselage. The wooden wing spar fractured and separated inside of the left wing. The left aileron remained attached to the wing. The left-aileron control torque-tube remained attached to the aileron but separated from the system at the wing root. The right wing separated from the fuselage and remained secured to the wing spar. The wing spar separated from the fuselage. The right-wing aileron partially separated from the wing. The right-aileron control torque-tube remained attached to the aileron but separated from the system at the wing root.

The cockpit was breached and exposed to the environment. The seat was constructed of very lightweight sheet metal and that was wrinkled. The seat belts remained with the pilot, who was liberated from the cockpit.

The fuel tank remained within the fuselage but had fractured and was no longer attached to the airframe. According to law enforcement, the fire department first-responders cut a red wire and a black wire then removed the fuel tank, and turned

the fuel shut off valve from ON to OFF. The fire department drained about 3 gallons from the breached fuel tank. Visual inspection of the recovered fuel revealed clear, blue fluid with no evidence of contamination.

## **2.0 Airframe Examination**

The airplane was separated into 3 sections. The fuselage, empennage, and wings.



**Photograph 1: Fuselage (midsection) and empennage**

### **2.1 Fuselage**

The cabin section was fragmented and the canopy had separated from upper fuselage, and acrylic windscreen shattered with abrasions.

The fuselage midsection showed multiple bends in the steel tubing frame. The fabric skin was torn.



**Photograph 2: Empennage and fuselage from rear**

## **2.2 Empennage**

The empennage was separated from the aft fuselage. The elevators remained attached to the horizontal stabilizer at the T-Tail. Control continuity was established from the elevator to the control yoke through the bell crank at the empennage and the push pull tube control linkage. The horizontal stabilizer remained attached to the vertical stabilizer. Rudder control continuity was established from the rudder to the right pedal through the right rudder control cable. The left rudder control cable was fractured and separated approximately six inches from the left rudder pedal, but the cable was continuous to the rudder. The left rudder cable separation exhibited broomstrawing, consistent with overload separation.

## **2.3 Wings**

The right wing separated from the spar at the wing root. The right wing fractured into three large pieces; wing tip, mid-section, and inboard section. The right aileron remained attached at the hinges and the aileron torque tube remained attached to the aileron at the rod end bearing. The right side aileron push rod was separated at the wing root and exhibited fracture signatures consistent with overload separation at the rod end bearing. The rod end bearing at the fuselage was attached at the bellcrank and was continuous to the control yolk at the cockpit.



**Photograph 3: Right wing**



**Photograph 4: Right wing rod end bearing at wing root**

The left wing remained attached to the spar, which was separated from the fuselage. The left wing tip separated from the wing and the aileron was partially separated. The

left aileron remained attached at the hinges. The torque tube was separated from the bell crank at the fuselage consistent with overload separation, and was separated at the upper rod end bearing of the push pull tube. The flight controls were continuous from the rod end bearing to the control yoke at the cockpit.

## **2.4 Cockpit**

The throttle and mixture control remained attached to the airframe.

The cowling flap lever was observed in forward fully depressed open position.

## **2.5 Fuel/Fuel System**

The fuel drum remained intact, and had been partially separated from the fuselage. The fuel shutoff valve was in the ON position. The carburetor had separated from its mounting pad at the engine. The mixture and throttle control cables were intact, but had been cut from their levers at the cockpit for postaccident recovery. The mixture control arm remained attached at the carburetor and the rod end of the cable was secured to the arm with a castellated nut and cotter pin. The throttle arm remained attached to the butterfly valve, which could not be actuated by hand due to damage sustained during the accident. The carburetor bowl was fractured and the bowl was free of residual fuel. The floats were attached to their float arms, but the float assembly had separated from the bowl. The carburetor fuel screen was free of obstructions. The fuel strainer bowl was empty and the screens were free of debris.

## **3.0 Engine Examination**

The airplane was originally registered on December 31, 2001 with a Continental Engines O-200, a 100 hp, horizontally opposed, air cooled, normally aspirated, reciprocating engine. However, the engine make/model that was installed could not be confirmed as the original engine data plate had been removed or covered. The engine was equipped with two plenums that had been installed over the cooling fins for cooling efficiency. Both plenums remained attached and had sustained some damage near cylinders. Each of the four engine mounts were bent, but remained attached to the engine firewall and engine.



**Photograph 5: Engine prior to examination**

### **3.1 Crankshaft, valve train, and compression**

Mechanical continuity was established throughout the rotating group, valve train and accessory section as the crankshaft was manually rotated at the propeller by hand. Thumb compression was achieved at all four cylinders in the proper firing order and most of the valves displayed normal lift when the crankshaft was rotated. The cylinder 4 intake pushrod was bent, which inhibited compression and valve movement. After the push rod was straightened cylinder 4 exhibited normal compression and valve lift. Examination of the cylinders combustion chamber interior components using a lighted borescope revealed corrosion along the cylinders walls at each of the four cylinders, pitting, and longitudinal scoring. Each cylinder displayed normal piston face and valve signatures, and no indications of catastrophic engine failure. The valves were intact and did not display any eyebrow marks on the piston tops; however, some deterioration of the plated exhaust valves was observed.

### **3.2 Ignition system**

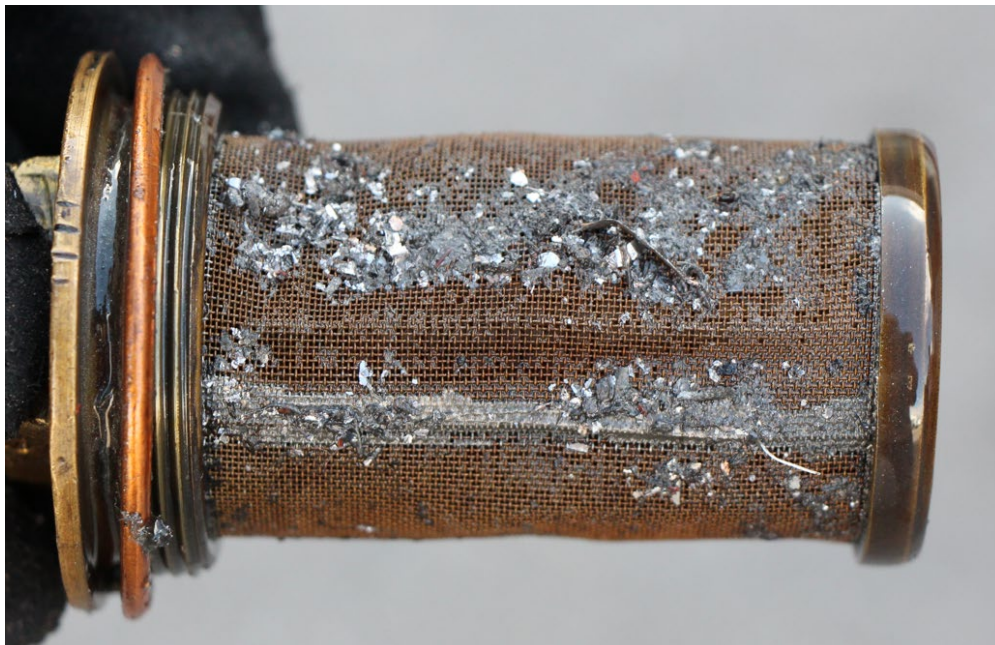
All four of the top ignition harness wires remained attached at the magnetos and corresponding spark plugs. The bottom ignition harness wires had varying degrees of impact damage, but each of the coils were unremarkable. The top spark plugs were Champion M40J fine wire automotive plugs and were free of mechanical damage. Each of the top plugs displayed coloration consistent with normal wear with some carbon sooting. The electrodes were undamaged. The bottom plugs were Champion REM40E massive electrode plugs. The cylinder 2 bottom plug was oil fouled and the other bottom plugs exhibited coloration consistent with normal wear.

The electrodes at each of the bottom plugs were unremarkable and no evidence of mechanical damage was observed. Both magnetos produced spark at all 4 terminals when the impulse coupling was rotated by hand.

### **3.3 Oil system**

The oil in the engine case and at the oil sump was purple in color. Two near empty containers of Lucas synthetic SAE 20W-50 racing engine oil were found in the pilot's hangar; however, the contents were yellow in color. Metallic debris was found along the outer circumference of the oil screen. The engine was not equipped with an oil filter. The oil pump exhibited some resistance when actuated by hand at the drive. Some foreign debris was observed within the pump housing. The oil cooler plenum was partially damaged, but remained attached to the oil cooler. No obstructions within the oil cooler were observed as water passed through the unit without resistance.

The oil pressure gauge needle could not be manipulated by hand and indicated about 21 psi. A mechanic, who was scheduled to race the accident airplane at the upcoming Reno Air Races reported that he observed the oil pressure gauge at 10 psi prior to the accident flight.



**Photograph 6: Oil screen**



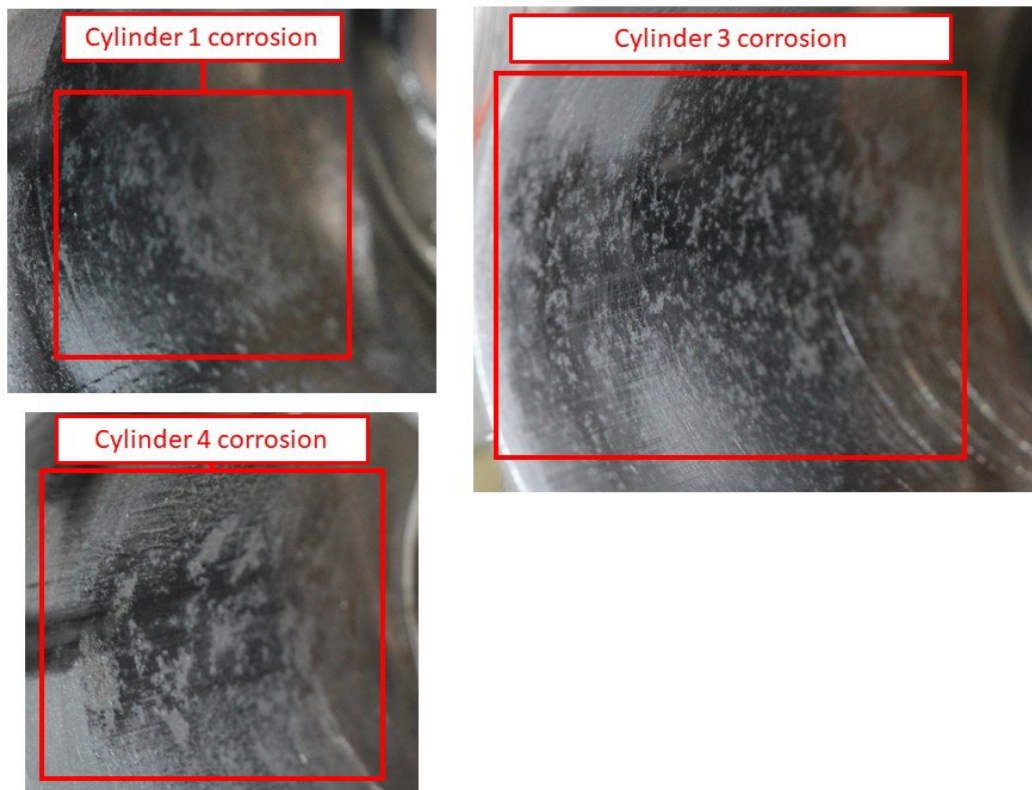
**Photograph 7: Oil pump gear**



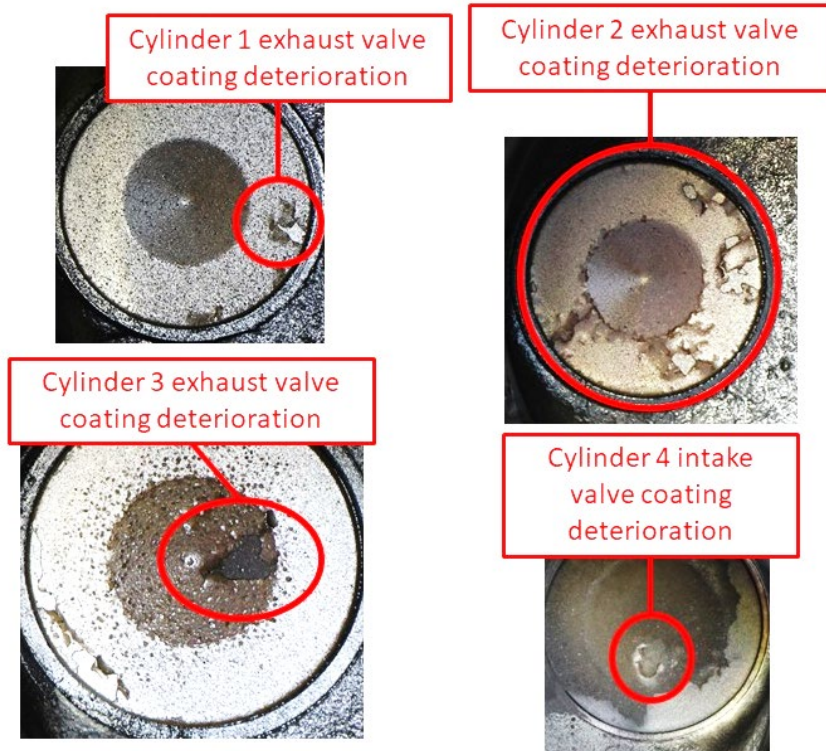
**Photograph 8: Oil pressure gauge**

### 3.4 Teardown

The cylinders were removed from the engine case along with the pistons, connecting rods and bearings. Corrosion and pitting was observed along the walls of each cylinder. In addition the walls exhibited longitudinal scoring and lateral scoring. Some of the lateral scoring marks were deep with a defined groove. The automotive piston rings remained installed at each piston and were unremarkable.



**Figure 1: Corrosion on cylinders walls**



**Figure 2: Valve coating deterioration**

The connecting rods all remained attached to the crankshaft at their respective journals; however, each of the four rods displayed about 1mm of play. Each crankshaft was otherwise unremarkable. The oil at the some of the connecting rod journals exhibited a blue hue.



**Photograph 9: Cylinder 3 bearings at connecting rod journal**

Each of the connecting rod bearings exhibited circumferential scoring and some wear was noted along the bearing races.



**Photograph 10: Cylinder 3 connecting rod bearing**

The camshaft lobes and valve lifters were undamaged; the lobes were not worn and the lifters were not spalled or pitted. Each of the connecting rod journals exhibited scoring along the circumference.



**Photograph 11: Crankshaft journals**

#### **4.0 Propeller Examination**

The Catto two bladed composite and wood fixed pitch propeller assembly included an extension that remained attached to the propeller hub and crankshaft flange. One blade had separated into three pieces; one at the blade root and the other at the blade tip. The other blade had separated about midspan. Neither of the blades exhibited any chordwise or spanwise striations.

Submitted by:

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