

National Transportation Safety Board

Office of Aviation Safety

Washington, DC 20594



CEN23LA101

SURVIVAL FACTORS

Specialist's Factual Report

August 9, 2023

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A. ACCIDENT

Location: Bayport, MN
Date: February 4, 2023
Time: 1630 central daylight time (CDT)
1030 universal time coordinated (UTC)
Airplane: Bellanca 7ACA Champion, N9111L

B. SURVIVAL FACTORS SPECIALIST

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C. DETAILS OF THE INVESTIGATION

On March 6, 2023, a survival factors specialist was assigned in order to review postcrash photos and measurements taken of the airplane's restraints.

D. FACTUAL INFORMATION

1.0 Accident Summary

According to the NTSB Form 6120.1 accident report form the pilot was flying alone. Around 3 nautical miles from the airport he began to feel roughness in the engine. He decided he was going to make an emergency, off-field landing and called the airport to alert them to his position.

During the descent into a field, he reported that the left wing clipped a tree, causing the plane to nose over into the snow. After the airplane stopped moving, he shut off all the electronics and called 911. He was then able to egress the airplane through the left window and walk to the nearest road where he was eventually met by emergency services. The pilot reported to the NTSB investigator-in-charge that he sustained minor injuries, including head lacerations, but did not seek medical treatment.

2.0 Airplane Configuration

The airplane was a Bellanca 7ACA, a non-pressurized single engine airplane (see figure 1). It was configured with two seats in line, one in front and one in back. Both seats had a control stick, meaning the aft seat and could be used for passengers

or for flight instruction. The interior was accessed through a single, forward-hinged door next to the front seat.



Figure 1. The exterior of N9111L. (Source: Air-Britain Photographic Images Collection)

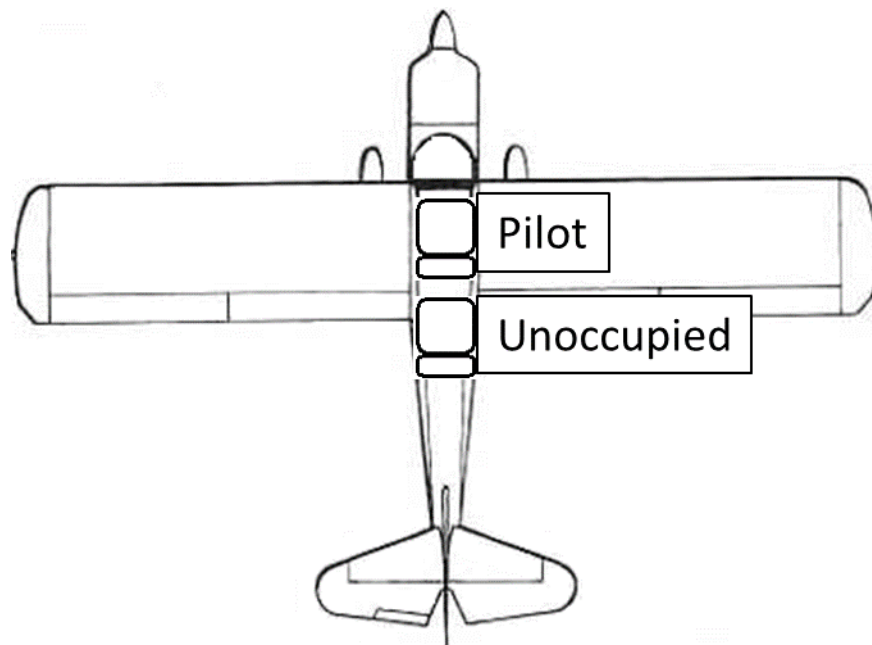


Figure 2. The seating configuration of N9111L.

3.0 Airplane Documentation

The airplane was found nose down in a field by first responders. The tail was bent over to the right (see figure 3). The wings, engine, and propellers were removed during salvage operations (see figure 4).

3.1 Airplane Exterior



Figure 3. Post-crash photograph of N9111L.



Figure 4. N9111L at salvage facility for tear down exam.

3.2 Airplane Exterior

3.3 Cabin Interior

The seats were accessed by the pilots using a single door on the right side which rotate forward to open. Measurements were taken at three locations to document the occupiable volume in the cabin. See figure 5 and 6. The seats were not adjustable for/ aft or up/ down.

Measurement Letter	Measurement Starting point	Measurement ending point	Dimension in Exemplar Airplane (inches)	Dimension in Accident Airplane (inches)	Difference (inches)
A	Front of seat back cushion	Instrument Panel	27.0	23.5	3.5
B	Top of seat bottom	Ceiling	39.5	38.5	1.0
C	Left side of airplane	Right side of airplane	29.5	29.0	0.5

Figure 5. Measurements from an exemplar airplane compared with the accident airplane.

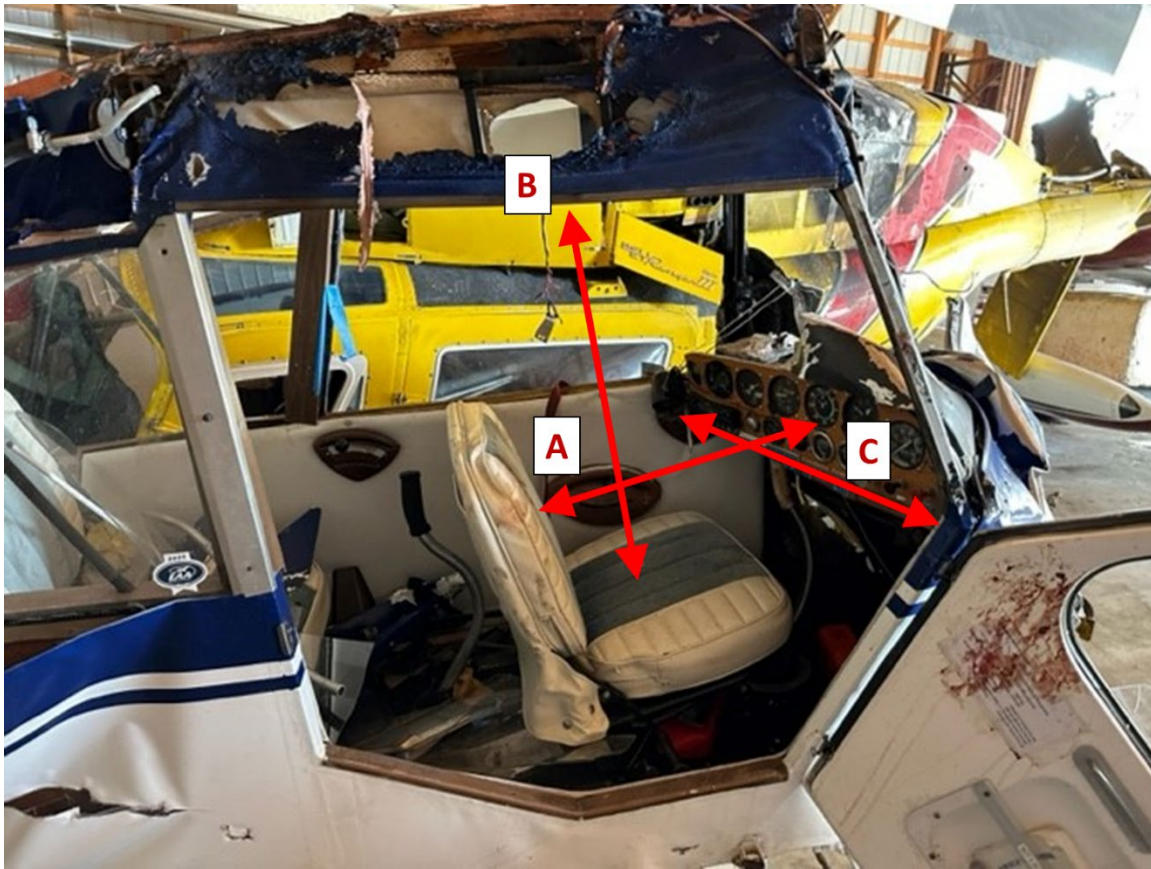


Figure 6. Diagram showing measurements from table 1.

3.4 Seats

Both seats remained secured to their four seat posts which secured the seat to the airplane floor. The seat pan and seat back cushions were a monolithic foam with a leather and fabric cover. Removal of the cushions revealed the seats were tube framed with metal straps across to support the seat cushions and occupants (see figure 7).



Figure 7. Pilot seat frame with cushions removed.

3.5 Restraints

Both seats had a four-point restraint system manufactured by Aero Fabricators (Lyone, WI) as an FAA-Parts Manufacturer Approval (PMA) part with a “rated strength of assembly [of] 1500 pounds.” Model numbers and dates of manufacturing are detailed in figure 8. The restraint system consisted of an adjustable lift latch-style lap belt, that was secured to attachment points at the seat back/pan junction on either side of the seat. A Y-belt shoulder harness was secured to overhead structure just aft of the occupants. The shoulder webbing was one piece folded over to form a “V”. The rear webbing, with the entrapped “V” was then sewn together to form the yoke of the shoulder harness (see figure 9 and 10).

Restraint	Left Lap Belt	Right Lap Belt	Shoulder Belt
Front Seat	90-91R60 JAN 11 2018	90-91R60 JAN 11 2018	H-702-300 DEC 15, 2017
Rear Seat	90-91R60 JAN 29 2010	90-91R60 JAN 29 2010	H-702-300 JUL 10 2009

Figure 8. Model number and date of manufacture for each restraint portion.



Figure 9. Rear seat belt showing the yoke of the shoulder belt.



Figure 10. Rear seat restraint.

Three anomalies were noted regarding the accident airplane's restraint system. First, there was a separation of the pilot restraint threading at the 'Y' junction. (see figure 11). Second, the lap belt portions were wrapped around the seat back instead of secured directly to the seat as designed¹. Finally, examination of the metal shoulder

¹ No photograph was taken before the restraint was removed.

harness fittings (through which the tang is normally inserted before being inserted into the buckle) were bent (see figure 12).



Figure 11. Bellanca Aircraft 7ACA, N9111L pilot's shoulder harness showing stitching failure at the "y" junction.



Figure 12. Bent shoulder harness fittings from the accident pilot's restraints. (Red lines indicate approximate normal orientation.)

4.0 Injury Information

4.1 Injury Table

Type of Injury	Crew	Passengers	Total
Fatal	0	0	0
Serious	0	0	0
Minor	1	0	1
None	0	0	0
TOTAL	1	0	1

Submitted by:

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