

National Transportation Safety Board

Office of Aviation Safety

Washington, DC 20594



ERA23FA340

AIRWORTHINESS FACTUAL REPORT

August 7, 2024

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A. ACCIDENT

Location: Ft. Pierce, Florida
Date: August 17, 2023
Time: 1202 local
1602 UTC
Airplane: Piper PA28-161, N9855S

B. AIRWORTHINESS FACTUAL REPORT

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C. SUMMARY

On August 17, 2023, about 1202 eastern daylight time, a Piper PA28-161 airplane, N9855S, was destroyed when it impacted a building near Ft. Pierce, Florida. One flight instructor was fatally injured, and the other flight instructor sustained serious injuries. The airplane was operated by Aviator College under the provisions of Title 14 *Code of Federal Regulations* Part 91 as a training flight.

D. DETAILS OF THE INVESTIGATION

The NTSB investigator-in-charge traveled to the accident site and examined the wreckage on August 17-18, 2023. He was assisted by an NTSB structures specialist and party members from the Federal Aviation Administration (FAA), Piper

Aircraft, and Lycoming Engines. This report contains findings from the examination of the wreckage at the accident site and recovery facility in Ft. Pierce, Florida. This report also contains airplane maintenance information.

E. WRECKAGE AND IMPACT INFORMATION

The wreckage impacted a small aluminum frame building that housed a recreational vehicle (RV). The airplane came to rest partially through the building and partially into the RV. The engine remained attached to the fuselage. Both wings and horizontal stabilator separated from the aircraft in-flight and were located about 600-700 ft east of the fuselage in the debris area noted in the figure below. The horizontal stabilator had separated into two pieces and were found near each other in the debris field. Fragments of cockpit door were also located in this debris area along with miscellaneous items from the cockpit such as the tow bar and a pilot headset.

The left and right wing both separated at the wing attachment area at the fuselage. Both ailerons were located with their respective wings.

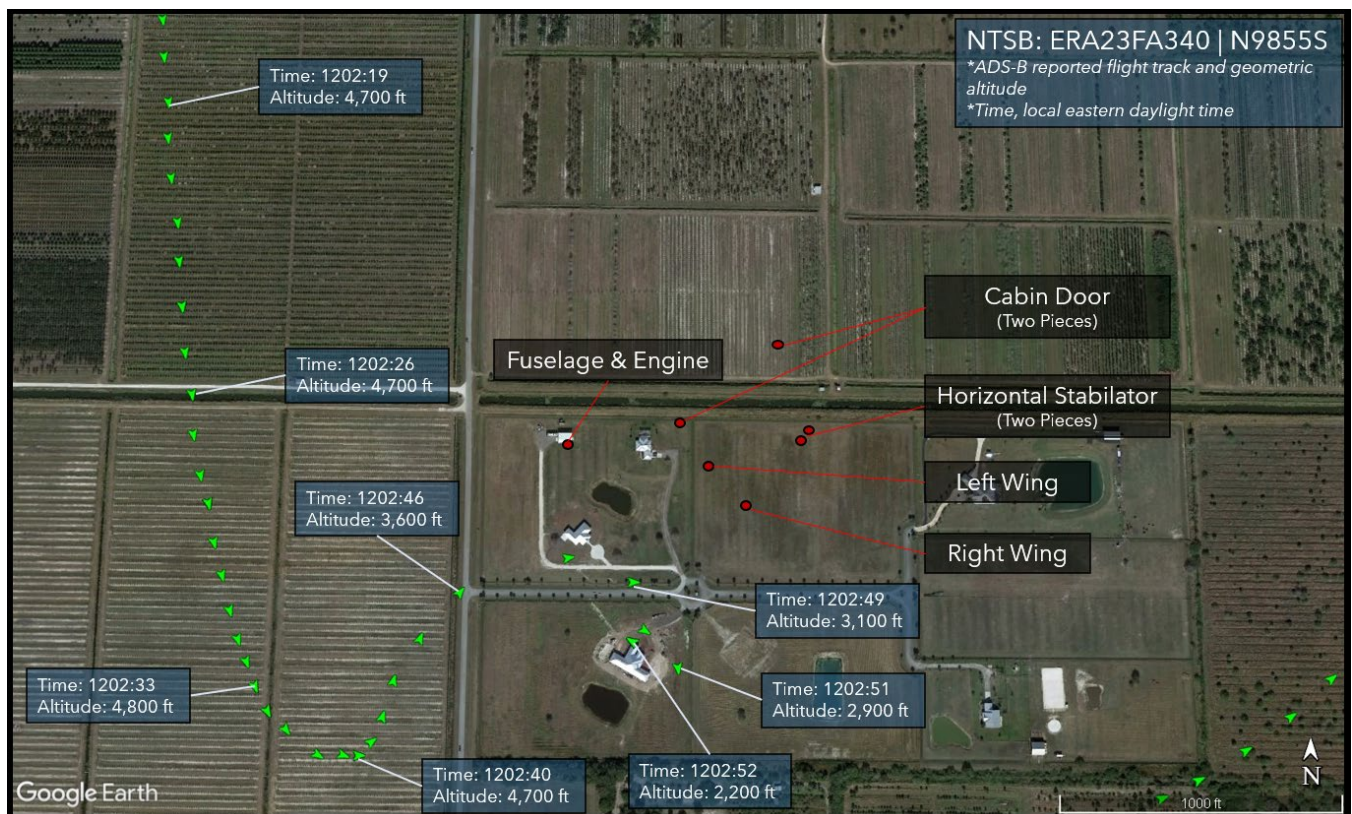


Figure 1: Overview of ADS-B flight track and wreckage distribution.



Figure 2: View of both wings, fuselage and engine at the accident site.

F. AIRFRAME EXAMINATION

Aileron continuity was confirmed from control column drive chains to about mid-cabin where separation of both ends of the cables occurred.

Left aileron - The primary aileron and aileron crossover cables remaining attached to the left wing bellcrank displayed overload signatures on the separated ends (frayed ends). The left aileron bellcrank remained intact and in place with both aileron cables attached. The cables were continuous to beyond the left wing root. The primary aileron cable was separated about 28 inches inboard of the left wing root. The crossover aileron cable was separated about 14 feet from the left wing root (separation located in the right wing). Both cables displayed overload signatures (fraying at ends). The left aileron control rod was broken.

Right aileron bellcrank was pulled from mounting location and pulled through the wing exiting at the wing root. The right aileron control rod was broken. The vertical stabilizer and rudder remained attached to the aft fuselage

Rudder - Continuity was confirmed from rudder pedals to the rudder surface. Both rudder cables were attached at the rudder horn.

Stabilator - Continuity was confirmed from control column to the stabilator control tube and bob weight in the aft fuselage. The stabilator cables remained

attached to the control tube. The bob weight remained attached to the stabilator control tube.

Stabilator trim - Continuity confirmed from the control wheel in the cockpit to the stabilator trim actuator. Position of the actuator was 0.7 inches extension of the threaded rod on the top side. This equates to a partial nose down trim setting.

Flaps - The flap selector handle in the cockpit was found in the flaps retracted position. The flap torque tube was deformed. The flap control rods at the right and left side of the fuselage were found in a flap retracted position.

Both wings separated from the airframe in-flight. The ailerons and flaps remained attached to their respective wings at all hinges. The main spar fractures, at the root of each wing, revealed positive loading signatures.

Left wing - The left wing displayed compression damage aft of the main spar on the top surface. The left flap was bent downward at the inboard 27 inches. The landing gear remained attached.

Right wing - All three flap mounting hinges were bent in an inboard direction. The landing gear remained attached to the wing. Aileron cable tear-through was noted on the top inboard end of the wing.

The top cap carry through spar was broken 21 inches inboard from the right wing root. The carry-through spar revealed deformation consistent with positive loading. When placed on a flat floor upright the carry-through spar section was observed to be bent upward from the floor approximately 5 inches on each side.

G. EXAMINATION OF SEPARATION SURFACES

The main spar center section box structure remained installed in the fuselage and was cut from the fuselage for further examination. Refer to the NTSB Materials Laboratory Factual Report for additional forensic examination of the wings and fracture surfaces.

There was a pronounced symmetrical upward curve of the upper and lower spar caps. The lower spar cap was intact and with the center wing box on the ground the right and left sides rested about 5 inches above the floor. The upper spar cap was buckled (s-bend) with an upward buckle about 12 inches from the left side and a downward buckle and fracture of the cap about 21 inches from the right side.

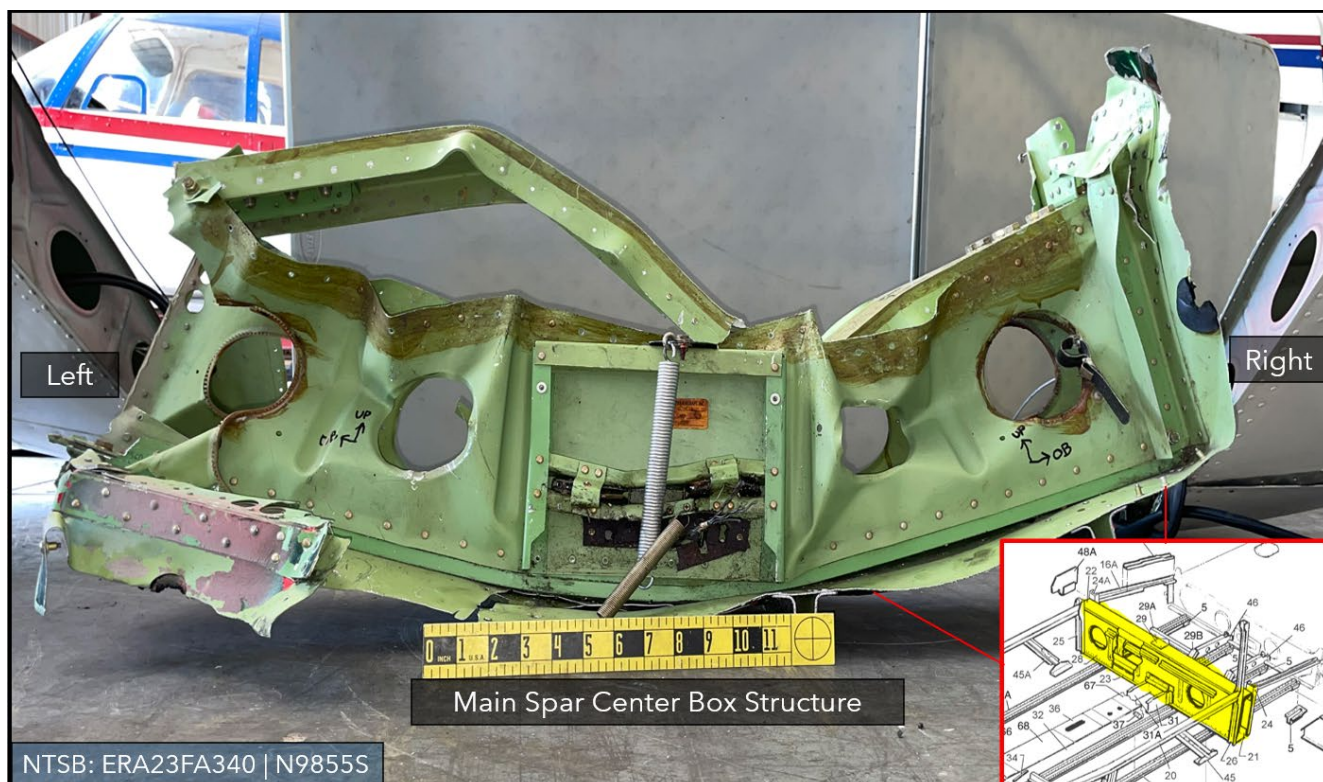


Figure 3: View of the main spar center box structure (with image from Piper Maintenance Manual).

The forward and aft spar webs were separated from the upper spar cap along most of the length and remained attached to the lower spar cap. The upper and lower left and right wing fittings were fractured with portions retained in the center section. The 8 wing attach bolts per side on the left and right sides of the upper spar cap were intact and installed. The 10 wing attach bolts per side on the left and right sides of the lower spar cap were intact and installed. The outboard two wing attach bolts on both the left and right sides had green torque stripe while all the other lower wing attach bolts had red torque stripe. There was no noticeable deformation of the right lower wing fitting horizontal leg that was retained in the center section, but the web was bent aft. The right upper wing fitting that was retained in the center section was deformed upward. There was no noticeable deformation of the left lower wing fitting horizontal leg that was retained in the center section, but the web was bent aft. The left upper wing fitting that was retained in the center section was deformed slightly upward. The fracture faces on the retained fittings all had an angled, dull, grainy appearance consistent with overstress separation when examined visually and with a 10x loupe.

The right wing was recovered separate from the fuselage and was mostly intact with little damage. The right flap, aileron, and landing gear remained installed on the wing. The forward and aft attach bolts remained intact and installed with portions of the fuselage structure attached and fractured from the fuselage. The upper main spar

wing fitting was fractured through the second rivet hole outboard of the outboard wing attach bolts on both the forward and aft legs. The fractured end of the main spar upper fitting was deformed upward. The lower main spar wing fitting was fractured through the outboard wing attach bolt holes and there was slight upward deformation at the fracture location. The angled spar web between the fittings was intact with no obvious deformation. A portion of the wing skin above the upper fitting was peeled up and outboard. There was a cable tear in the inboard root rib forward of the aileron cable hole and in the upper wing skin. The upper flange of the root rib had outward crushing damage. The fracture faces on the wing fittings all had an angled, dull, grainy appearance consistent with overstress separation when examined visually and with a 10x loupe.

The left wing was recovered separate from the fuselage and was mostly intact with little damage. The left flap, aileron, and landing gear remained installed on the wing. The forward and aft attach bolts remained intact and installed with portions of the fuselage structure attached and fractured from the fuselage. The upper main spar wing fitting was fractured about $\frac{3}{4}$ inch outboard of the outboard wing attach bolt hole coincident with the edge of the main spar upper center section spar cap. The fractured end of the main spar upper fitting was deformed upward slightly. The lower main spar wing fitting was fractured through the first rivet hole outboard of the outboard wing attach bolt holes on both the forward and aft legs. There was slight upward deformation at the fracture location. The angled spar web between the fittings was fractured and deformed forward. The upper flange of the root rib had outward crushing damage. The wing and flap aft of the main spar was crushed down and outboard. The fracture faces on the wing fittings all had an angled, dull, grainy appearance consistent with overstress separation when examined visually and with a 10x loupe.

The stabilator fractured into two pieces and separated from the airplane. The stabilator main spar was fractured about 3 inches right of the centerline. The left stabilator hinge bolt was intact and installed with fuselage structure attached and fractured from the fuselage. The right stabilator hinge bolt was intact and installed in the fuselage with portions of the right stabilator hinge fitting retained. The lower forward portion of the right stabilator hinge fitting was fractured.

The right stabilator and trim tab were mostly intact with some damage. The inboard end of the main spar was deformed upward at the fracture location. The left stabilator and trim tab were mostly intact with some damage. The center portion of the main spar was deformed aft and twisted leading edge down. The main spar web was deformed aft and fractured on the right side of the control rod cutout. The left stabilator skins aft of the spar were buckled and deformed and the left trim tab was curled upward.

H. ENGINE EXAMINATION

The engine remained attached to the firewall and fuselage. The propeller had separated from the flange and was found near the engine in the debris area. The most severe impact damage was sustained to the forward right side of the engine (No. 1 Cylinder). The engine displayed continuity until rotation reached the No. 1 cylinder area, which due to the impact damage, the engine could not rotate any further. The spark plugs displayed normal combustion signatures. The magnetos both produced spark. The carburetor contained fuel.

There was no evidence of preimpact mechanical malfunction of the engine that would have precluded normal operation.

I. MAINTENANCE AND AIRPLANE HISTORY INFORMATION

According to the airplane's maintenance records, the most recent 100-hour inspection was completed on June 29, 2023, at 298.5 tachometer hours. The endorsement noted that Airworthiness Directive AD 20-26-16 Wing Spar Integrity was complied with, and the factored hours were 1199.1. The endorsement noted that no further action was required until factored hours at 5,000 hours.

The airplane's tachometer was found to read 385.9 hours. As a result, the airplane had flown 87.4 hours since the last 100-hour inspection. Accounting for this additional flight time, at the time of the accident, the airplane had 1286.5 factored hours.

The most recent annual inspection was completed on September 16, 2022. The endorsement noted that Airworthiness Directive AD 20-26-16 Wing Spar Integrity was complied with, and the factored hours were 793.2. The endorsement noted that no further action was required until factored hours at 5,000 hours.

On March 22, 2021, the AD 2020-26-16 eddy current inspection was completed and both wings, and forward and aft spars were marked as accepted. At this inspection, the aircraft was noted to have aircraft total hour time in service (TIS) of 15572.9. The factored service hours for both wings was 15405.02. The inspection was completed by S.E.A.L. Aviation LLC. The endorsement noted that during the NDT testing no defects were found. New wing spar bolts and nuts were installed on March 22, 2021 in accordance with FAA AD 2020-26-16 and Service Bulletin 1345.

J. METEOROLOGICAL INFORMATION

Review of routine hourly weather observation data from the nearby weather reporting station Fort Pierce (FPR), St. Lucie County International Airport, and archived weather radar, found unremarkable conditions along the route of flight.

Hourly Observations

SPECI KFPR 171630Z 22008KT 10SM VCTS CLR 32/24 A3000 RMK AO2
LTG DSNT N AND SE T03220244=

Accident Time: 1202 local (1602 UTC)

METAR KFPR 171553Z 23005KT 10SM CLR 31/24 A3001 RMK AO2
SLP160 T03060244=

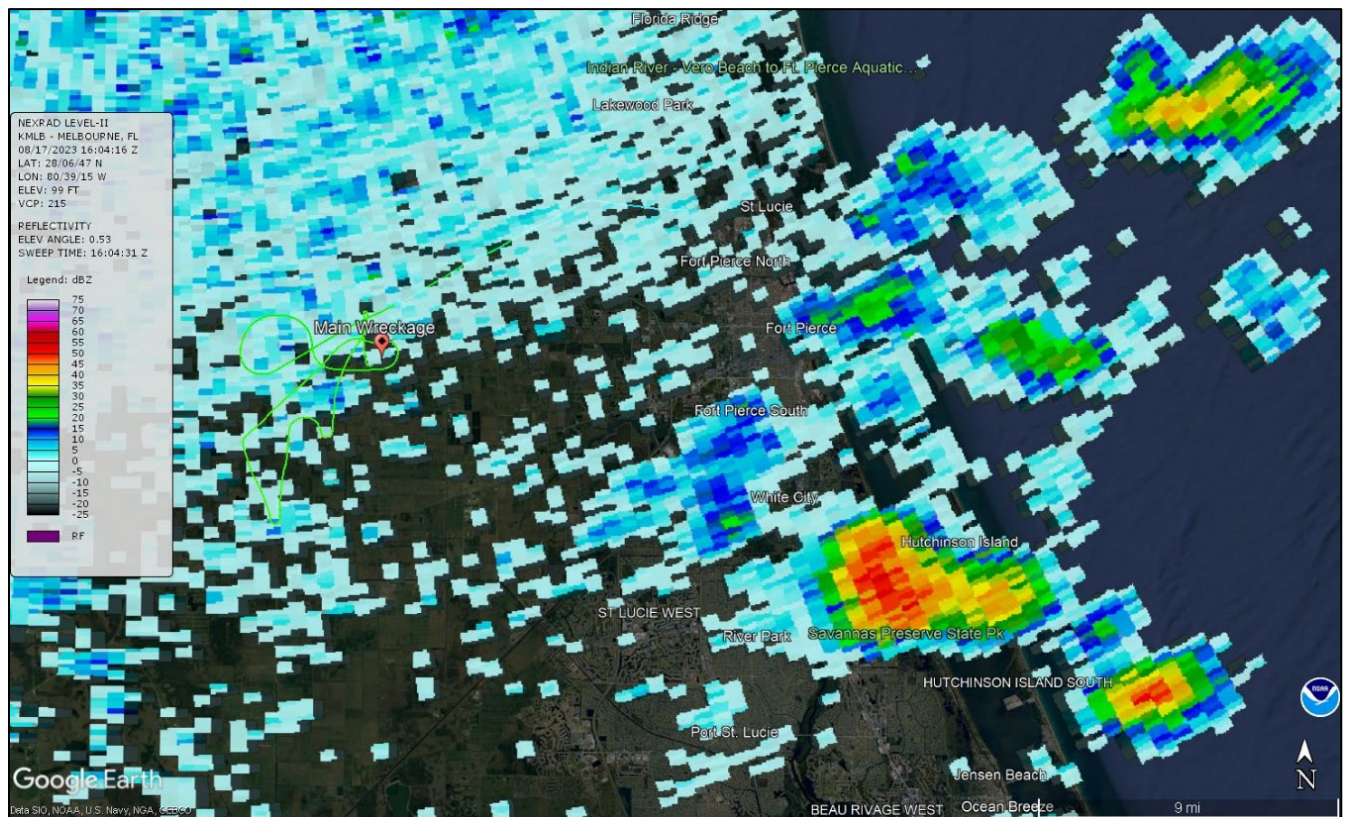


Figure 4: Nexrad Level II Melbourne, Florida Radar Reflectivity 1204 local. The flight track is depicted in light green, and the main wreckage location is marked with the orange and black arrow.

K. PHOTOGRAPHS AND FIGURES

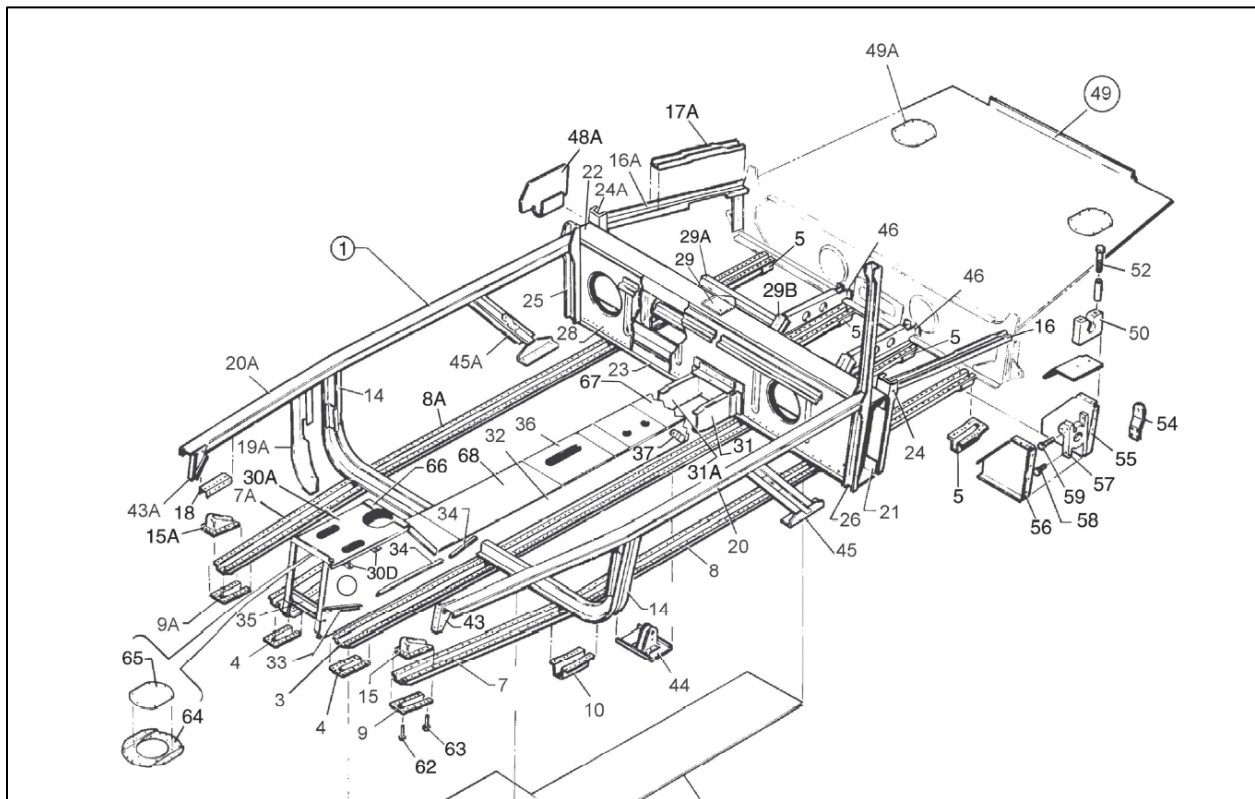


Figure 5: View of the Piper Airplane Parts Catalog, fuselage and center spar box.



Figure 6: View of fuselage, building, and Recreational Vehicle Impacted.



Figure 7: View of building and Recreational Vehicle Impacted.



Figure 8: View of the cockpit door which had fragmented into two pieces.



Figure 9: View of the left side of the cockpit and flight controls.



Left, Center-Box

Figure 10: View of the left side of the center spar box.



Figure 11: View of the right side of the center spar box.



Figure 12: View of the right side of the center spar box, lower spar.

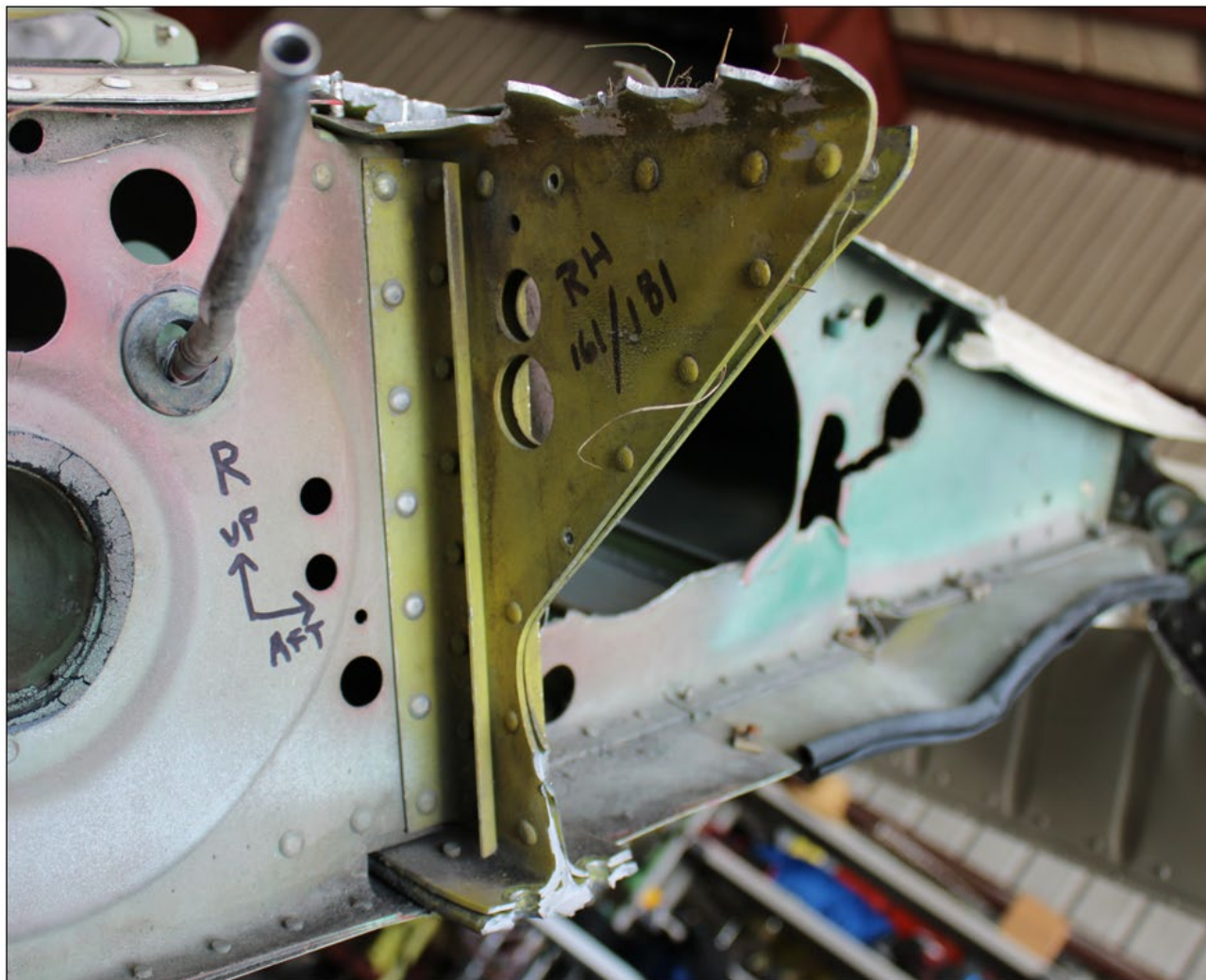


Figure 13: View of the right side of the center spar box, upper spar.



Figure 14: View of the left side of the center spar box.

Submitted by:

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