



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Western Pacific Region

DATE September 16, 2021

AIRFRAME AND ENGINE EXAMINATION

WPR21LA070

This document contains 22 embedded photos.

A. ACCIDENT

Location: Heber, Utah
Date: December 16, 2020
Aircraft: SilverLight Aviation AR-1
NTSB IIC: Fabian Salazar

B. EXAMINATION PARTICIPANTS:

Fabian Salazar
IIC
NTSB

C. SUMMARY

The IIC did not travel to the accident site. The airframe and engine were examined by the IIC at a secure facility at the Heber Valley Airport (HCR), Heber City, Utah. The gyroplane manufacturer dispatched a mechanic to examine the wreckage but did not provide the IIC with a written report.

Engine data was extracted and shipped to Rotax and the NTSB Recorder lab for further examination. After examination of the airframe and the engine data, it was concluded that there were no mechanical malfunctions or failures with the gyroplane that would have precluded normal operation.

D. DETAILS OF THE INVESTIGATION

Airframe Examination

The gyroplane came to rest in a concrete reinforced ditch adjacent to a highway, on a magnetic heading of about 080°, and an elevation of about 5,600 ft mean sea level (msl). The accident site was about 500 feet from the center of HCR.

Gouge marks on the soil, immediately in front of the gyroplane was the first point of impact. Wire fencing was pulled from its supports and carried into the ditch by the fuselage. The cabin area was heavily damaged consistent with a nose down impact. The right side of the fuselage exhibited more damage than the left, with fracturing and separating of the composite fuselage material extending beyond the aft cabin area. The left side of the fuselage exhibited fracturing and separation of composite material extending back to about the rear of the front seat. The lower fuselage was substantially damaged with fragmentation and separation of composite material extending back to about the mid-cabin area.

The cabin configuration was tandem seating and the cabin damage extended to the rear seat. The overhead canopy was separated from the fuselage and fractured into multiple pieces. The front

seat was separated from the cabin and located outside of the cabin on the left side of the wreckage. The back seat remained attached to the aft cabin area. The back seat belt was open, and the shoulder straps appeared to be secured to the lap belts.

Empennage. The empennage remained attached to the fuselage, and consisted of a left and right horizontal stabilizer, a large two-piece center vertical stabilizer, two smaller left and right vertical stabilizers, and a large rudder. The left and right horizontal stabilizers exhibited minor damage with splits, cracking and deformation throughout. The right vertical stabilizer exhibited minor damage. The left vertical stabilizer exhibited substantial damage with a large section of the upper trailing edge separated, consistent with contact from the rotor system. The center vertical stabilizer exhibited substantial damage with separation of composite material along the leading edge. The top of the vertical stabilizer exhibited a loss of material and paint consistent with contact from the rotor system. The rudder separated from the center vertical stabilizer and was located near the wreckage. The rudder exhibited substantial damage with multiple cracks on the starboard side. The port side of the rudder exhibited minor cracks. The trim tab remained attached to the rudder.

Rotor system. The two bladed rotor system remained attached to the rotor mast, and the mast separated from the fuselage. One rotor blade stopped adjacent to the left vertical stabilizer and is identified in this report as rotor blade #1. The other rotor blade stopped nearly over the cabin and is identified in this report as rotor blade #2.

Rotor blade #1 exhibited chordwise bending aft (leading edge to trailing edge) with wrinkling of the blade aft of the spar. The blade also displaced upward spanwise bending mostly at the root of the blade. The tip of the #1 blade exhibited damage with a small section separated.

The #2 blade exhibited significantly more aft chordwise bending, than the #1 blade, and upward spanwise bending. A section beginning about 126 inches from the root, outboard, separated and was located in the debris area. Multiple dark scratches appeared on the underside of blade #2 about the 15-to-29-inch area. Multiple chordwise scratches were evident on the #2 leading edge with evidence of red paint transfer (or red gelcoat) in the same area, consistent with the red color of the fuselage.

Propeller. The propeller consisted of four composite propeller blades and an aluminum hub. The propeller blades were identified as A, B, C, and D. The propeller hub remained attached to the propeller flange, which remained attached to the engine. All four propeller blades separated from the hub and were in the debris area. All breaks in the propeller blades were clean, showing no sign of contact with soil or vegetation. All separated propeller tips were recovered, and all tips exhibited minor damage with no tips showing contact with an object. This is consistent with the propeller being struck by an object inboard of the tips of the blade.

Propeller blade A. The shank and about 13 inches of the blade remained attached to the hub. The break ran chordwise about an 80° angle.

Propeller blade B. The shank and about 10.5 inches of the blade remained attached to the hub. The break ran chordwise about a 70° angle

Propeller Blade C. The shank and about 17 inches of the blade remained attached to the hub. The break ran about a 45° angle.

Propeller D. The shank and about 8 inches of the blade remained attached to the hub. The break ran chordwise about a 60° angle.

Cockpit Documentation

The gyroplane was built with provisions for some flight instrumentation for the back seat occupant. According to SilverLight Aviation, it had “back seat digital instrument that showed airspeed, altimeter and vertical speed indicator (all in one).”

The instrument panel for the front seat partially separated from the cabin and remained attached by wires. The back of the multifunction display separated from the instrument panel and was shipped to the NTSB recorder's laboratory for download. Post-accident examination of the MFD revealed no usable data.

Airspeed indicator: 65 miles per hour.

Altimeter: 5,640 ft msl

Master switch: Key absent, switch position: ON

Engine Kill switch, cover down.

Avionics: Down or OFF

EFIS: Down or OFF

Heat: Down or OFF

NAV Lights: Switch broken

Strobe: Switch broken

Light switch right of the strobes: Switch broken

MFD Screen: Remained attached to the instrument panel but did not contain electronics.

Landing Gear

The right main landing gear strut remained attached to the fuselage. The right wheel separated from the strut along with the spindle. The right brake disk separated from the brake assembly. The left main landing gear strut remained attached to the fuselage, and the left wheel remained attached to the strut. The left brake assembly remained intact. The nose gear separated from the damaged nose of the gyroplane. The nose wheel separated from the nose gear assembly.

Engine. The engine remained attached to the airframe and exhibited minor damage. The engine performance data was downloaded and sent to Rotax and the NTSB recorder's laboratory for examination.

Flight Control Continuity. Flight control continuity was confirmed from the rudder pedals to the cable located at the base of the rudder. The nose steering rods separated from the nose wheel.

Control stick continuity was confirmed from the control sticks to the control torque tubes.

Throttle continuity was confirmed from the throttles to the fuel servo.

PHOTO EXHIBIT



Figure 1. Front-left view of N261MD. Photo Sheriff's Department.



Figure 2. Right-side view of N261MD. Photo Sheriff's Department.



Figure 3. Left-rear view. Photo Sheriff's Department.



Figure 4. Right-rear view. Photo Sheriff's Department.



Figure 5. Right-side view. Photo Sheriff's Department.



Figure 6. Left-side view. Photo Sheriff's Department.



Figure 7. Front View. Photo Sheriff's Department.



Figure 8. Front view showing gouges in the soil near road. Photo Sheriff's Department.



Figure 9. Front seat instrument panel.



Figure 10. Left-side of the front-seat instrument panel.



Figure 11. Front view while at the recovery site.



Figure 12. Front seat control stick.

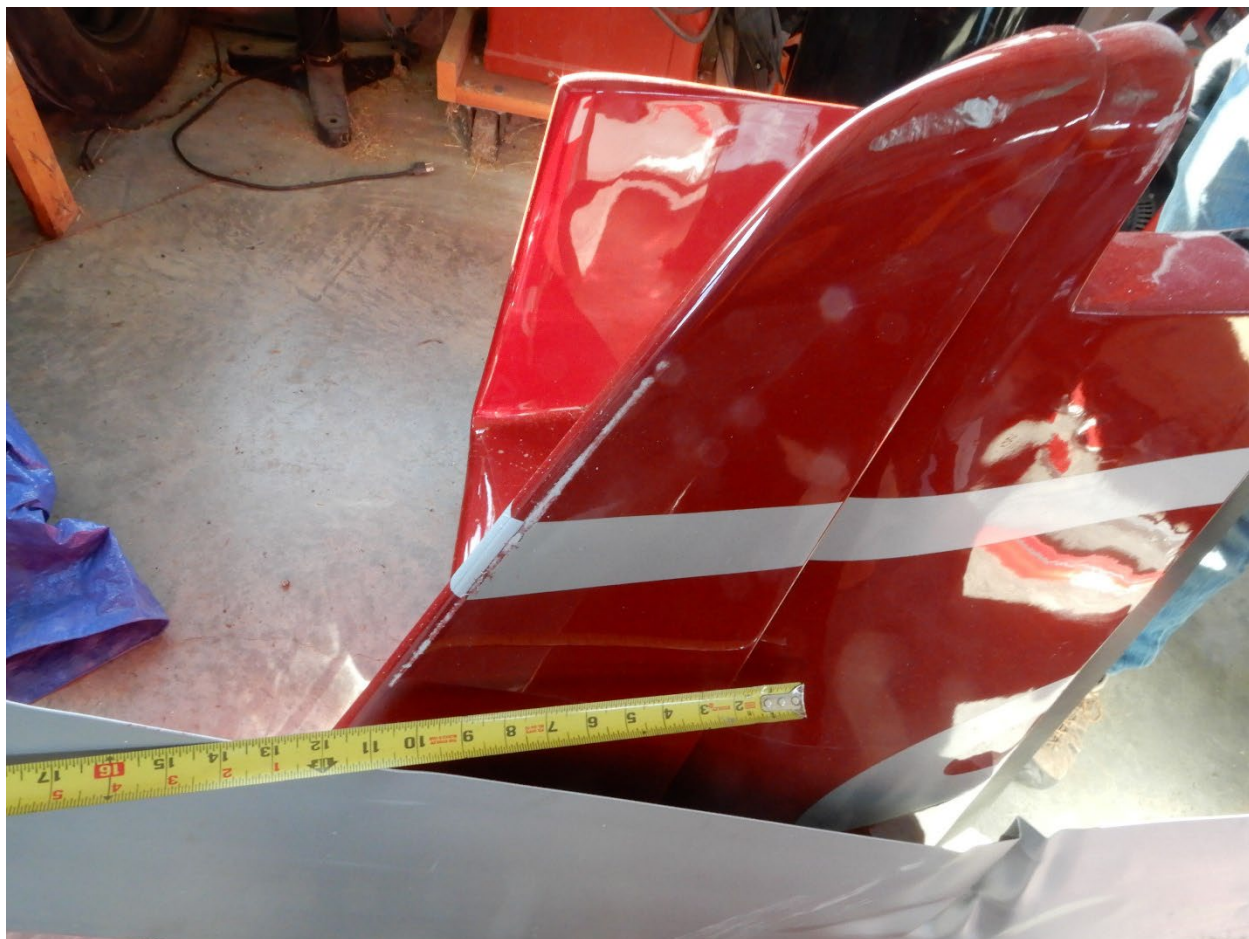


Figure 13. Center vertical stabilizer showing damage to the leading edge.



Figure 14. Left vertical stabilizer, showing damaged aft section.

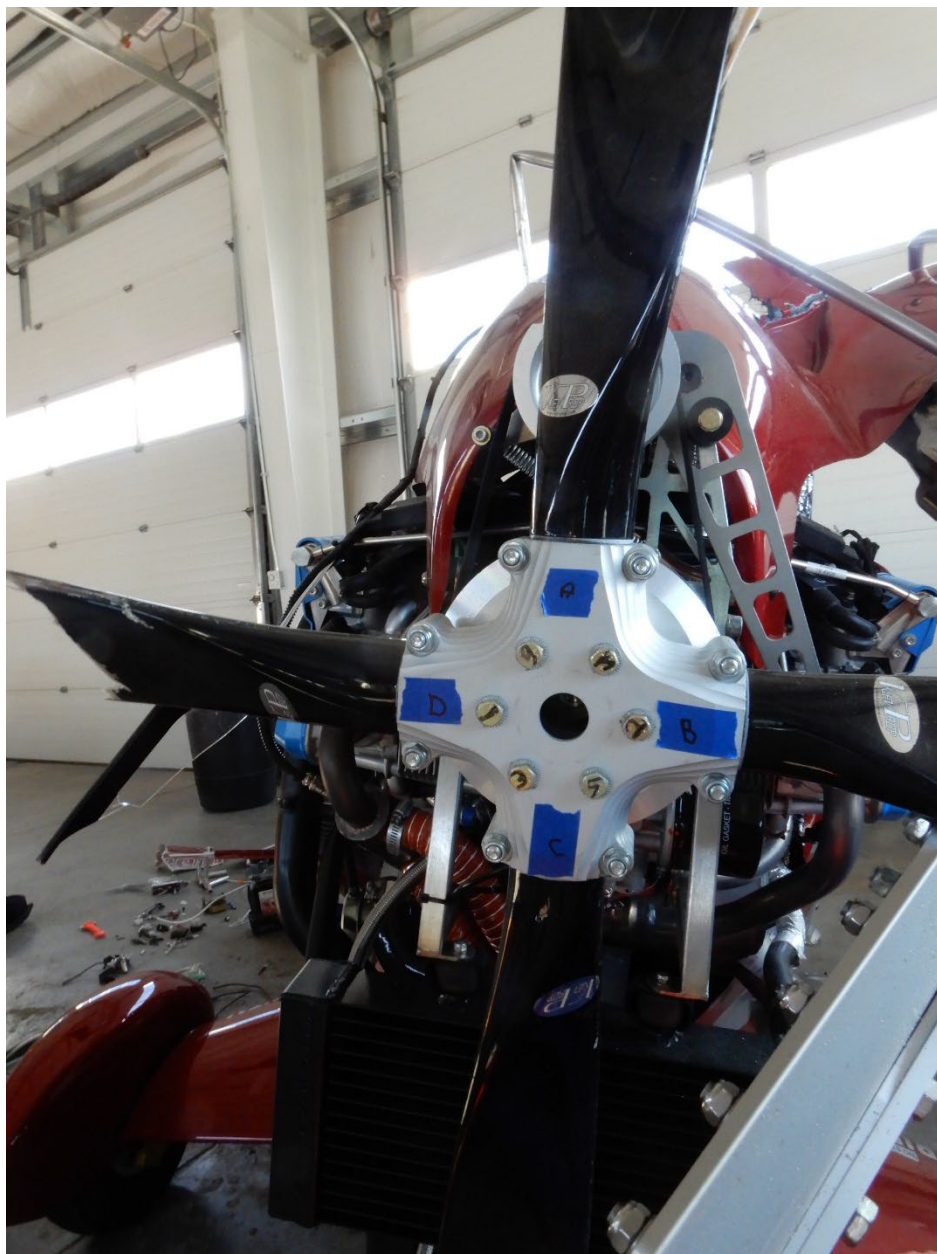


Figure 15. Propeller showing damaged blade shanks and the hub.



Figure 16. Propeller blade tips, showing minor damage at the tips.



Figure 17. Propeller blade tips, other side, showing minor damage at the tips.



Figure 18. Aft view of the empennage.



Figure 19. Right-side view, showing the rotor mast separation point.



Figure 20. Rotor head.



Figure 21. Rotor blade #1.



Figure 22. Rotor Blade #2