

National Transportation Safety Board

Office of Aviation Safety

Washington, DC 20594



WPR24FA185

EXAMINATION SUMMARY

August 14, 2024

A. ACCIDENT

Location: Picacho Peak State Park, Arizona
Date: June 8, 2024
Time: 0721MST
0221UTC
Airplane: N518D

B. EXAMINATION SUMMARY

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C. SUMMARY

Observation of the wreckage was accomplished June 9, 2024, after first responders manipulated the airframe to extricate the occupant (Figure 1 & Figure 2). The wreckage site terrain was steep, unstable, and merely allowed for confirmation of flight control continuity. Examination of the engine was accomplished after the airplane was transported to a secure facility, to ensure investigator's safety. Examination of the airframe and engine revealed no preimpact mechanical anomalies or malfunctions that would have prevented normal operation.

The airplane impacted the north side of the mountain, about 81 ft from the summit, in a descending, nose-down pitch attitude. The wreckage site was compact, and the airplane sustained impact damage to the nose section and fuselage. Both wings sustained impact damage with significant damage observed to the left wing. Both wings remained attached to the fuselage and the empennage was unremarkable. The engine remained attached to the aft fuselage with impact damage observed to the 1/3 carburetor, and the engine coolant system.

D. DETAILS OF THE EXAMINATION

1.0 Accident Site

Picacho Peak State Park

Lat/Long: 32.635398° / -111.400798°
Elevation: 3,358 ft



Figure 1: View of the airplane in the initial impact position, prior to first responder aircraft manipulation to facilitate extrication (Courtesy of social media).



Figure 2: View of the airplane onsite, after first responder occupant extrication, showing damage to the nose section and forward fuselage due to initial impact.

2.0 Airframe Examination

2.1 Fuselage

The airplane came to rest on the left side forward fuselage with the nose oriented to the south, toward the summit, and conversely, the tail was oriented to the north. The horizontal axis of the airframe was observed in left wing low (left bank) attitude. The nose section of the airplane was crushed upward and aft. The cabin exhibited uninhabitable space encroachment as the forward fuselage sustained the brunt of the impact damage. Flight control continuity was visually and physically observed from the left and right control stick to left and right aileron surfaces, as well as to the elevator, and the flaps were retracted. Control cable continuity was observed from the rudder pedals to the rudder control surface.

2.2 Empennage

The empennage pylon remained intact, with the horizontal and vertical stabilizers attached. The left side of the horizontal stabilizer did not appear to have sustained impact damage from the initial photos; however, the forward left outboard section of the horizontal stabilizer was damaged when the IIC arrived on site. The vertical stabilizer sustained impact damage and separated at the base of the leading edge. However, photographic evidence of the airplane prior to first responder efforts showed the vertical stabilizer as unremarkable. The rudder and elevator remained intact with control continuity from each of their respective control surfaces to the left

and right control stick and the left and right seat rudder pedals. The elevator trim surface remained intact, and the trim position indicator appeared to be in a neutral position.

2.3 Wings

Both wings remained attached to the upper fuselage and the wing lift struts. The left (Figure 1) and right wing lift strut sustained impact damage about midspan. The right wing exhibited impact damage to the forward outboard section and showed accordion-like folding signatures from the outboard flap attachment, through the wing root. The right flap and aileron remained attached to the wing and control continuity was confirmed to the left and right control stick.

The left wing sustained damage to the leading edge spar from about midspan outboard. The left flap remained attached to the aft wing structure and appeared to be retracted but sustained an upward buckling signature from impact forces that emanated from the middle attachment point. The left wing aileron remained attached and undamaged and control cable continuity was confirmed to the left and right control stick.

2.4 Landing Gear

The landing gear remained attached to the airframe and exhibited aft displacement. The nose wheel remained attached to its assembly and exhibited upward and aft impact displacement. Each wheel and tire were present at the site, along with their respective brake assemblies.

2.5 Cockpit

The cockpit was crushed upward and aft. The pilot was operating from the left seat, and an ice chest was affixed to the right seat. The instrument panel was found with impact damage and separated from the airframe. The altimeter was set to 29.80 inches of mercury, and the hour meter indicated 1,495.5 hrs. The airspeed indicator showed 0 knots, the vertical speed indicator showed a 900 fpm climb, the oil pressure indicator showed 0 psi, engine temperature indicator showed 0° C, engine RPM indicator showed 0 RPM, the turn and slip indicator ball was displaced to the left, the voltmeter showed 0 volts, the left and right magneto switches were broken off, the ignition key was broken and appeared to be in the on positions, and the trim indicator showed a neutral position.

2.6 Survivability

The pilot was extricated by first responders. Witnesses that were on site cut the pilot's harness. The airplane was equipped with a ballistic aircraft parachute system that was not deployed.

2.7 Fuel/Fuel System

On-site the fuel lines appeared intact. The wing tank was breached, and the faint odor of fuel was observed. The fuel cap was present and unremarkable. The engine driven and auxiliary fuel pumps remained intact, as did the fuel filter. The fuel selector was manipulated by first responders and found in the off position. The 1/3 carburetor sustained impact damage and the 2/4 carburetor remained intact (Figure 3).



Figure 3: View of the inverted engine and damage to the 1/3 carburetor.

3.0 Engine Examination

The airplane was transported to a secure facility for further examination. Examination of the engine revealed that the initial condition of the engine before the examination was as follows:

- The engine was separated from the aircraft.
- The engine was still attached to the engine mount.
- Impact damage was observed on the oil tank.
- The overall physical condition of the engine was unremarkable.

- The #1/3 carburetor was displaced from the intake manifold due to impact damage.
- The coolant radiator was not present for examination, and the coolant system was breached (Figure 4).
- All three propeller blades were broken off approximately 4 to 6 inches from the hub.



Figure 4: On-site view of damage to the engine coolant system radiator.

Details of the engine examination are as follows:

Spark Plugs & Spark Plug Caps

- All spark plug caps were non-standard NGK brand. All caps were in good physical condition and remained attached to their respective spark plugs.
- All spark plugs were removed and placed in a holding tray.
- All spark plugs functioned correctly during the test run.

No. 1 - (Top & Bottom) Spark Plug:

The electrode was found wet and oily but in good overall condition, with burn signatures indicating a proper fuel-to-air ratio and consistent with a normally functioning ignition system. The plugs were wet with oil due to the position which the engine was oriented during storage; the #1 cylinder was in a low position, causing oil to migrate into the combustion chamber.

No. 2 - (Top & Bottom) Spark Plug:

The electrode was black and sooty, indicating a rich running condition. The spark plug was unremarkable with no other anomalies observed.

No. 3 - (Top & Bottom) Spark Plug:

The electrode was unremarkable, with normal color and burn signatures indicating a proper fuel-to-air ratio and consistent with a normally functioning ignition system.

No. 4 - (Top & Bottom) Spark Plug:

The electrode was unremarkable, with normal coloring and burn signatures indicating a proper fuel-to-air ratio and consistent with a normally functioning ignition system.

Ignition System:

The ignition system was in good physical condition with no anomalies observed. The ignition system was function tested during the engine test run, and no issues were discovered that would preclude normal engine operation.

Fuel system including carb inspection and fuel lines:

The fuel feed line from the fuel tank to the fuel pump was severed and no longer attached. The fuel lines from the fuel pump to the carburetors remained intact, with no breaches detected. The fuel feed line was placed into a makeshift fuel tank in preparation for the engine test run.

The #1/3 carburetor was found displaced from its respective intake manifold, and the carburetor socket clamp that secured the carburetor to the intake socket was missing. The #1/3 carburetor was reattached to the intake manifold in preparation for the engine test run. The air filter attached to the carburetor was removed, and the piston slide was inspected. No anomalies were

observed with the piston slide or the bore of the carburetor. The throttle lever arm sustained impact damage and was found bent inwards towards the carburetor body. The throttle lever arm spring was found configured in the spring close position, in the event of a throttle cable breakage. Although this setup differs from the standard Rotax factory configuration, the RANS installation manual provided instructions for connecting the throttle arm spring in this manner. Slight fuel staining was observed on the outside of the carburetor body. The #1/3 carburetor was function tested during the engine test run and performed correctly.

The #2/4 carburetor remained attached to its respective intake manifold. The air cleaner was removed, and the piston slide was inspected. No anomalies were observed with the piston slide or the bore of the carburetor. The throttle lever arm spring was found configured in the spring close position in the event of a throttle cable breakage. While this differs from the Rotax factory setup, the RANS installation manual includes instructions for this configuration. Slight fuel staining was observed on the outside of the carburetor body. The #2/4 carburetor was function tested during the engine test run and performed correctly.

Fuel supply including fuel pump:

The fuel pump was the newer BCD brand with P/N: 893 115, S/N 20.2436. The fuel pump was function tested during the engine test, and no anomalies were discovered.

The fuel system did not incorporate the mandatory fuel return line as specified in the Rotax installation manual. No other anomalies were discovered with the fuel system.

Lubrication system

The oil system was found intact with no breaches observed. The oil tank was damaged from impact, and the oil level was checked and found to be low. This was due to oil draining from the tank as the engine was in an upside-down position for an extended period following the accident. Half a liter of engine oil was added to the tank for the engine test run.

The oil filter was the proper ROTAX type.

No optional oil cooler was found installed on the engine.

The lubrication system was function-tested during the engine test run, and no anomalies were discovered.

Cylinder and cylinder head:

The cylinders and cylinder heads were found to be in unremarkable physical condition, with no damage observed. Both components were function tested during the engine test run, and no anomalies were detected in either the examination or the test run.

Cooling system:

The coolant system was damaged, and the coolant radiator was not present for examination. The engine was test run without the coolant radiator or coolant in the system.

Exhaust system:

The exhaust system was an aftermarket system and routed above the engine. It was in good overall condition with minimal impact damage. The exhaust system was function-tested during the engine test run, and no anomalies were observed.

Test run:

The engine was mounted on a forklift, and the fuel feed line to the fuel pump was connected to a test fuel cell in preparation for the test run.

A battery and battery cables were used to power the engine starter.

To establish a live ignition system, the ignition P-leads were disconnected.

The fuel supply valve on the test fuel cell was opened, and the battery cables were connected to the starter. After a few starter rotations and manual adjustments of the choke and throttle, the engine started and idled smoothly. The throttle was advanced slightly, and the RPM increased as expected. The engine was then shut down to cool, as no cooling system was connected.

A second engine test run was conducted. Upon restarting, the engine idled properly. The throttle was adjusted by moving the carburetor levers, resulting in a normal RPM increase. The throttle was manipulated several times, and the engine responded correctly each time. After idling for several seconds, the engine was shut down.

A video of the engine test run was recorded for documentation.

No anomalies were detected during the engine test runs.

4.0 Propeller Examination

The propeller hub was configured with a Saber propeller extension. The Powerfin Inc. propeller hub was unremarkable, and the propeller hub

contained the base of three carbon fiber propeller blades (Figure 5). Each of the blades were fracture-separated evenly about 6 inches from the hub. The spinner sustained minor impact damage.



Figure 5: View of the inverted engine with unremarkable propeller hub extension, hub, damaged propeller blade and minor damage sustained to the spinner.

Submitted by:

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Investigator-in-charge