

National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



CEN22FA433

MATERIALS LABORATORY

Specialist's Fire Factual Report

09/27/2023

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A. ACCIDENT INFORMATION

Location: Yankton, South Dakota
Date: September 27, 2022
Vehicle: Airgyro AG915
Investigator: Michael Hodges
AS-CEN

B. COMPONENTS EXAMINED

Aircraft wreckage

C. EXAMINATION PARTICIPANTS

Investigator-in-Charge Michael Hodges
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D. ACCIDENT SUMMARY

On September 27, 2022, about 1030 central daylight time (CDT), an Airgyro AG915 Spartan gyrocopter, N499AG, was destroyed when it was involved in an accident near Yankton, South Dakota. The pilot sustained fatal injuries.

The gyrocopter was based out of a hangar at the Chan Gurney Municipal Airport (YKN), Yankton, South Dakota. The gyrocopter departed from runway 31 at YKN and traveled to the northwest. Shortly after the takeoff, the gyrocopter impacted a flat grass field on private property. The accident site, about 1,350 ft above msl, was located about 2.3 nm northwest from the departure end of runway 31.

A postimpact fire consumed most of the composite airframe. The wreckage was recovered from the accident site for further examination.

E. DETAILS OF EXAMINATION

According to maintenance records, the pilot was the builder of the gyrocopter, and it was manufactured in August 2022. As a repair technician, the pilot performed maintenance work on the gyrocopter several days prior to the accident. The maintenance records showed that at the last work entry on September 24, 2022, the gyrocopter had accumulated 37.8 flight hours.

The accident aircraft was recovered from the accident site and transported to Whisler Aviation for storage. The wreckage was removed from the storage crate for examination.

The majority of the carbon composite aircraft was damaged or destroyed (resin burned away leaving only the carbon fiber mat) by postcrash fire and impact. A photograph of the recovered wreckage in the storage crate is shown in Figure 1. Several sections of fuselage and empennage and the main rotor mast were found a significant distance from the impact point. The composite components exhibited signs of thermal damage that did not appear to be related to a postcrash fire. On-scene photographs of these components showed no evidence of a ground fire. These components are shown in Figures 2 and 3.

In addition to the thermal damage, there was also evidence of fluid consistent with oil, on both the interior and exterior on several fuselage and empennage pieces. The fluid on the exterior surfaces appears to be airflow driven patterns indicating that this occurred in flight. The spray patterns are shown in Figures 4-7.

The main rotor mast exhibited thermal discoloration and heavy sooting up to and including the swash plate. This is shown in Figures 8 and 9. The remaining rotor blade sections show no thermal damage or sooting.

The engine was found on scene in the impact area and near the postcrash fire. The gyrocopter was equipped with a Rotax Aircraft Engines 915 series engine. A photograph of the engine at the accident site is shown in Figure 10. Upon examination, the engine had oil coating over a large area of the exposed surfaces. The governor pad was heavily coated in oil with an area of coagulated oil directly beneath it as shown in Figure 11. The governor oil pressure feed line banjo bolt-a normally torqued fitting- was found finger tight. There was no evidence of torque paint/markings on the surface of the fitting or the adjacent area of the engine block. However, the torque paint may have been damaged or destroyed as a result of thermal exposure.

During the examination, it was observed that a governor had not been installed on the governor pad and the governor pad plate cover was still in place. According to the Rotax installation manual, the governor pad plate cover was

intended for shipping purposes only and may not be used in operational condition. However, it also stated that if the aircraft original equipment manufacturer (OEM) considered the cover plate as part of the hydraulic governor system, its usage and functionality may be subject to the aircraft manufacturer's responsibility, which in this case was the pilot. The cover plate bolts were found to be only finger tight, possibly a result of thermal exposure. According to the manufacturer's examination report, Rotax does not provide a specific torque specification for the cover plate bolts, and a general torque specification was applied based on the size of the bolts.

The only area not covered with oil was near the turbocharger and two of the exhaust ducts. This area also exhibited thermal discoloration as shown in Figure 12. Two aluminum valve covers (Cylinders 2 and 4) collocated in this area were melted along the bottom edge of the covers with evidence of dripping and material flow. This is shown in Figure 13. The flow direction of the melted areas indicate that the material was in an upright (inflight position) at the time the material started to flow as shown in Figure 14. Hoses and lines located in this area were either missing/presumed destroyed or thermally damaged. The oil return connection frange on the engine block located above the turbocharge exhibited thermal damage with melting on the threads. This is shown in Figure 15. The connector from this frange was found separated from the engine. There was resolidified aluminum on the connector as shown in Figure 16. The connector and frange are shown in the installed configuration in Figure 17. The cold side of the turbocharger and other aluminum engine components were also melted as shown in Figures 18 and 19. No other damage was observed.

Submitted by:

Nancy B McAtee
Fire and Explosion Specialist



Figure 1. Wreckage in storage crate



Figure 2. Empennage on scene



Figure 3. Piece of fuselage on scene



Figure 4. Fluid on exterior of aircraft



Figure 5. Fluid on exterior of aircraft



Figure 6. Fluid on exterior surface of aircraft



Figure 7. Fluid spray on interior of empennage.



Figure 8. Main rotor mast on scene



Figure 9. Close up photograph of thermal damage to rotor mast.



Figure 10. Engine on scene.

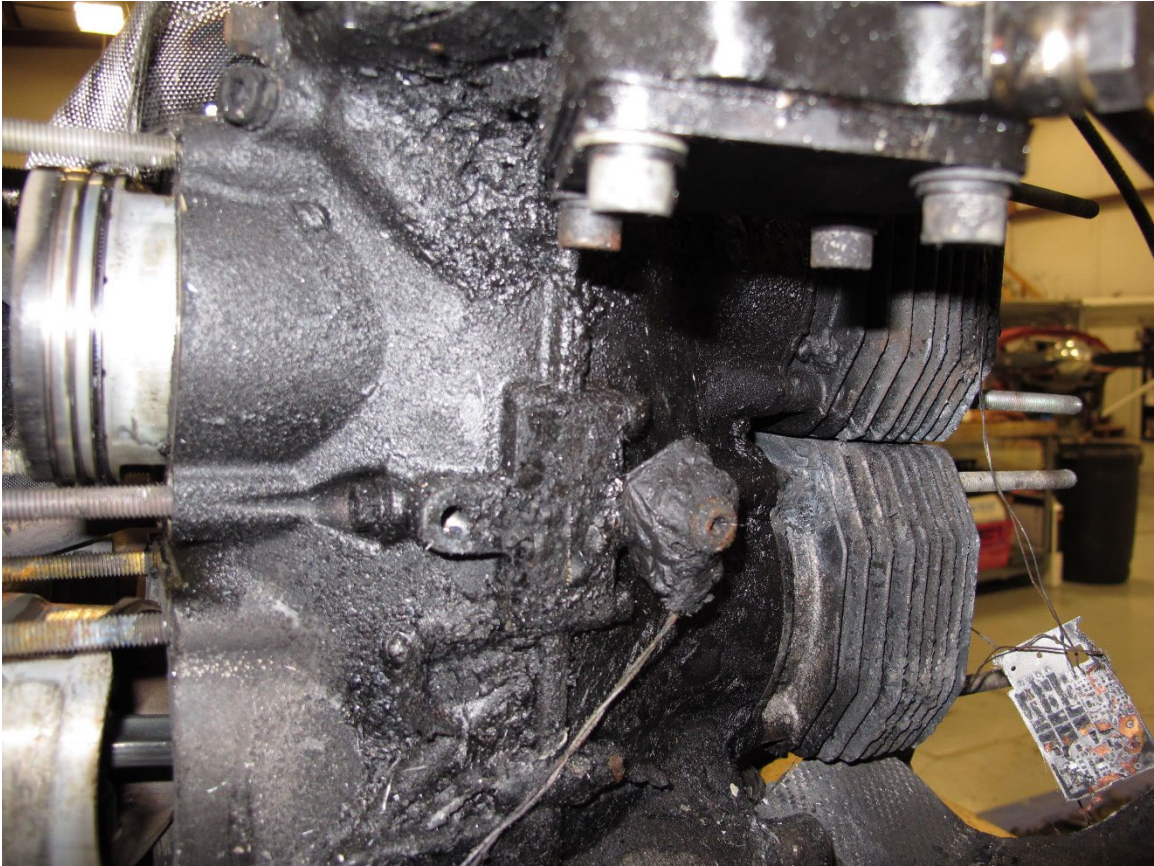


Figure 11. Area of engine block under governor pad.



Figure 12. Lower surface of engine and turbocharger.



Figure 13. Left side of engine (Cylinders 2 (upper) and 4 (lower))



Figure 14. Cylinder covers for Cylinder 4 (left) and Cylinder 2 (right).



Figure 15. Closeup of frange connection on engine block.



Figure 16. Separated frange connector.

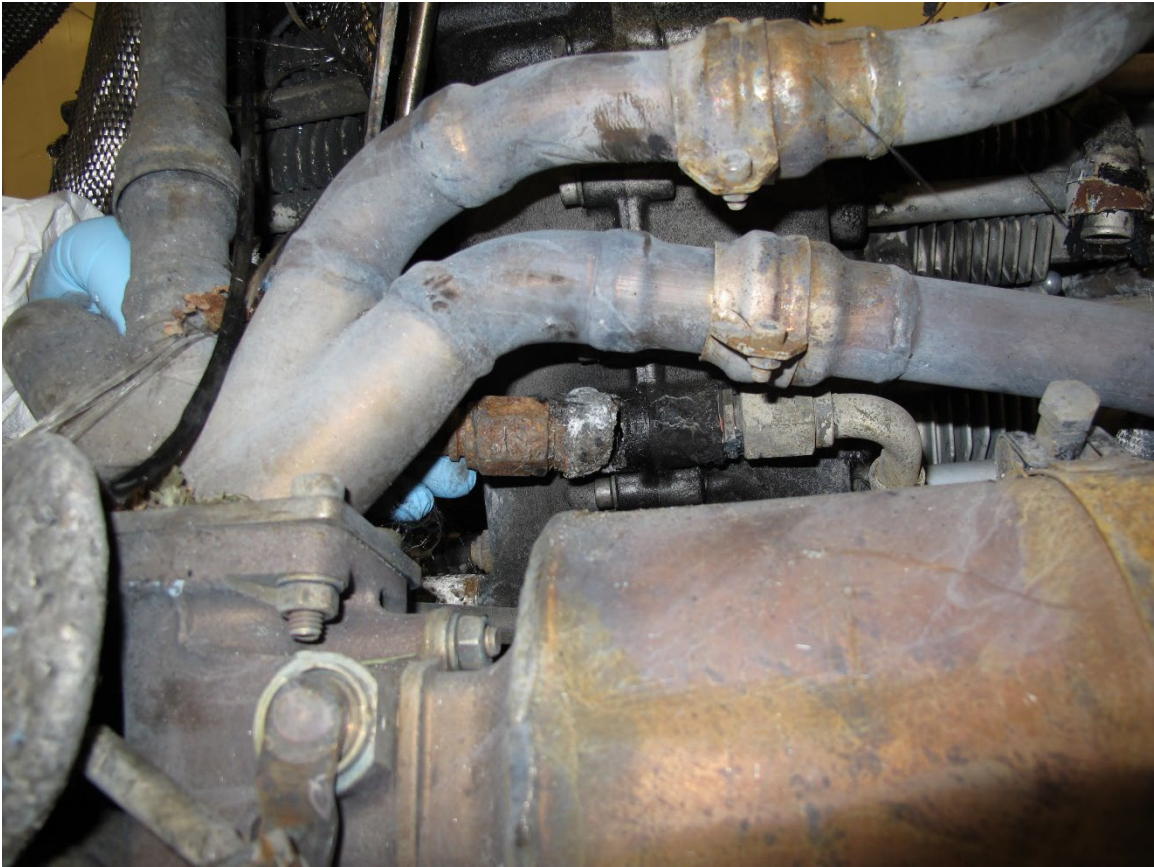


Figure 17. Oil frange connector with separated fitting.



Figure 18. Turbocharger intake ("cold" side).

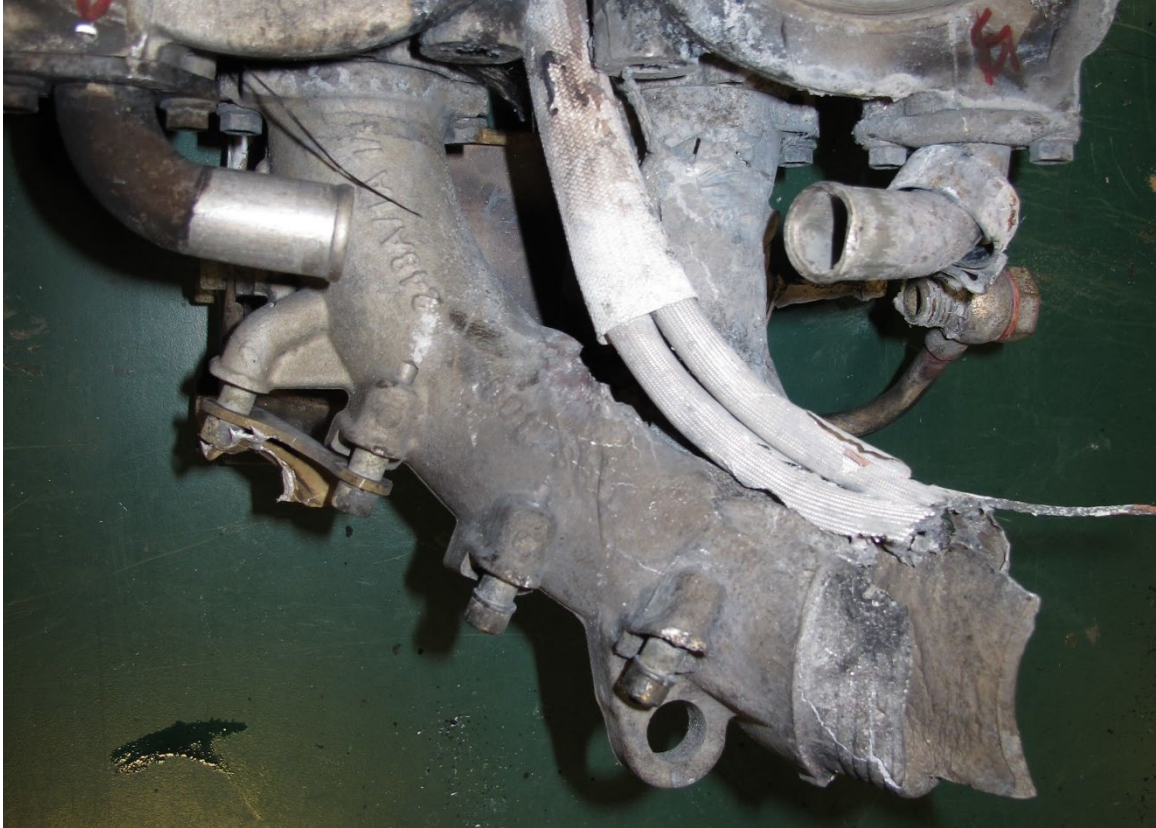


Figure 19. Melting on engine exhaust duct.