

National Transportation Safety Board

Office of Aviation Safety
Central Region



CEN23FA239

WRECKAGE EXAMINATION SUMMARY

ACCIDENT

Location: Watertown, Wisconsin
Date: June 14, 2023
Time: 0903 central daylight time
Airplane: Mooney M20R, Registration No. N1025C

PARTICIPANTS

Investigator-In-Charge Andrew Todd Fox
National Transportation Safety Board
Denver, Colorado

Group Member (on-site) Peter Hupfer
Federal Aviation Administration – Milwaukee FSDO
Milwaukee, Wisconsin

Group Member (on-site) Daniel O. Johnson
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Group Member (off-site) Les Doud
Hartzell Propeller
Piqua, Ohio

ACCIDENT SYNOPSIS

On June 14, 2023, about 0903 central daylight time, a Mooney M20R airplane, N1025C, was destroyed during an accident near Watertown, Wisconsin. The pilot and passenger were fatally injured. The airplane was operated as a Title 14 Code of Federal Regulations (CFR) Part 91 personal flight.

WRECKAGE EXAMINATION TIMELINE

The National Transportation Safety Board (NTSB) Investigator-in-Charge (IIC) traveled to the accident site on the afternoon of June 14, 2023, where he met with several Federal Aviation Administration (FAA) inspectors from the Milwaukee Flight Standards District Office (FSDO). The Hartzell Propeller investigator participated virtually via FaceTime and email. An accident site survey was completed before the airplane wreckage was recovered to a secured hangar at the Watertown Municipal Airport (RYV), Watertown, Wisconsin. The wreckage was laid out and examined in the

hangar on June 15, 2023. After the completion of the NTSB wreckage examination, representatives with Wentworth Aviation loaded the wreckage for transport and long-term storage at their facility in Crystal, Minnesota.

AIRPLANE DESCRIPTION

The airplane was a 2003 Mooney M20R (Ovation), serial number (s/n) 29-0308, registration number N1025C. The 280 horsepower, fuel injected, normally aspirated, Continental IO-550-G engine, s/n 685074, provided thrust through a three-blade, constant speed, Hartzell PHC-J3YF-1RF/F7693DFB-2 propeller, s/n FP6425B. The low-wing airplane was of conventional aluminum construction with a retractable tricycle landing gear, wing flaps, and speed brakes. The airplane's maximum takeoff and landing weights were 3,368 lbs and 3,200 lbs, respectively.

The airplane was equipped with a 95-gallon capacity (89 gallons usable) fuel system, consisting of two 47.5-gallon main fuel tanks (44.5 gallons usable each) and a 20-gallon (19 gallons usable) auxiliary fuel system. The fuel selector valve positions include left main, right main, and off.

The airplane is equipped with dual flight controls and can be flown from either the pilot or co-pilot seat. Dual pairs of foot pedals control the rudder and nose wheel steering mechanisms. Push-pull tubes, rather than conventional cable/pulley systems, actuate all-metal flight control surfaces. The ailerons, elevators, and rudder link to the control wheel through push-pull tubes and bellcranks. A spring-loaded interconnect device indirectly joins aileron and rudder control system to assist in lateral stability during flight maneuvers. Longitudinal pitch trim is achieved through a trim control system that pivots the entire empennage around the tailcone attachment points. A variable down-spring located in the tailcone and a bobweight located forward the control column help create desirable stability characteristics.

MAINTENANCE SUMMARY

A search of the airplane wreckage and the pilot's hangar located at Watertown Municipal Airport (RYV), Watertown, Wisconsin, did not locate any maintenance logbooks. The airport manager reported that the airplane was not currently maintained at RYV and suggested that any recent work/inspections were completed at a maintenance shop located at Manitowish Waters Airport (D25), Manitowish Waters, Wisconsin. The pilot's son subsequently located the maintenance logbooks and provided excerpts for review.

The airplane's hour meter was destroyed during the accident, which prevented an accurate determination of the airplane's total service time at the time of the accident. However, according to provided maintenance documentation, the last annual inspection of the airplane was completed on May 12, 2023, at 1,410.1 total airframe

hours. At that inspection, the engine and propeller had accumulated 1,410.1 hours and 796.3 hours since new, respectively. The day before, likely in conjunction with the annual inspection, the airplane's static system, altimeter system, automatic pressure altitude reporting system, and transponder were tested. Based on the pilot's logbook and available ADS-B track data, following the annual inspection the airplane was flown about 6 hours before the accident. A review of the provided maintenance documentation revealed no unresolved discrepancies or maintenance actions.

ACCIDENT SITE DOCUMENTATION (JUNE 14, 2023)

The accident site was surveyed with a GPS before the wreckage was recovered. The initial impact point was a concrete curb and asphalt road in Brandt-Quirk Park, as shown in figure 1. The local police department used a total station to identify the initial impact point as 43.2082471° North Latitude, 88.7489094° West Longitude, and 857.7 ft msl. The Google Earth application indicated that the elevation of the initial impact location was 853 ft msl. The wreckage energy/debris path projected to the east. The initial impact included multiple propeller strike gouges and linear scratches in the asphalt road, as shown in figure 2. The main wreckage was in a wooded area situated along a creek about 260 ft from the initial impact point, as shown in figure 3. Additional debris, including but not limited to the engine and both main landing gear wheels/tires, were found in a grass soccer field east of the main wreckage. The furthest wreckage was recovered about 739 ft east of the initial impact point.

There were multiple areas of turf and tree foliage that exhibited evidence of fuel blight and/or fire. The local fire department reported several small fires after the accident. The upper engine cowl was found suspended in a tree and the propeller hub with two blades was found in a wooded area to the southeast of the initial impact point. Both fiberglass wingtips were found between the initial impact point and the west side of the creek. The entire right flap was found wrapped around a tree trunk in the wooded area on the west side of the creek. The right aileron separated from the wing and was found in two pieces along the debris path.

Most of the airplane wreckage was in a wooded area on the east side of the creek. The left wing separated from the fuselage near the wing root and was found relatively intact. The highly fragmented components of the cabin, cockpit, seats, aft fuselage, empennage, and right wing were found scattered throughout the wooded area on the east side of the creek.

The engine separated from the fuselage and was in a grass field about 333 ft east of the initial impact point. Both main landing gear wheels/tires/brake assemblies were also located in the grass field. The farthest component along the wreckage debris path was part of the engine starter motor assembly which was about 739 ft east of the initial impact point.



Figure 1. Initial impact location at concrete curb and asphalt road



Figure 2. Airplane impact with road and propeller slash marks



Figure 3. Airplane wreckage debris trajectory toward wooded area

WRECKAGE LAYOUT EXAMINATION (JUNE 15, 2023)

A wreckage layout confirmed that all major structural components were accounted for at the accident site, as shown in figure 4. The airframe, cabin, cockpit, and right wing fragmented during impact. The forward fuselage tubular structure was highly fragmented, as shown in figure 5. The ailerons, flaps, rudder, elevator, and speed brakes were identified. Flight control continuity could not be confirmed due to extensive impact-related damage. The recovered flight control push-pull tubes were highly segmented and exhibited overstress features that were consistent with impact-related damage. The left wing remained intact and relatively undamaged, as shown in figure 6. The left aileron remained attached to the left wing. The left flap was found in multiple pieces, but the entire span was identified. The right wing structure was highly fragmented, as shown in figure 7. The entire right flap separated from the right wing. The right aileron separated from the wing and was found in two pieces. Both horizontal stabilizers exhibited impact-related damage with leading edge crushing, as shown in figure 8. The left elevator remained attached to the left stabilizer. The right elevator separated from the right horizontal stabilizer and was found in two pieces. The vertical stabilizer and rudder were relatively undamaged. The rudder

remained attached to the vertical stabilizer. Multiple leaded tip weights were identified with the recovered wreckage. The landing gear linear actuator jackscrew was fully exposed, consistent with a retracted landing gear position at impact.



Figure 4. Airplane wreckage layout in a hangar

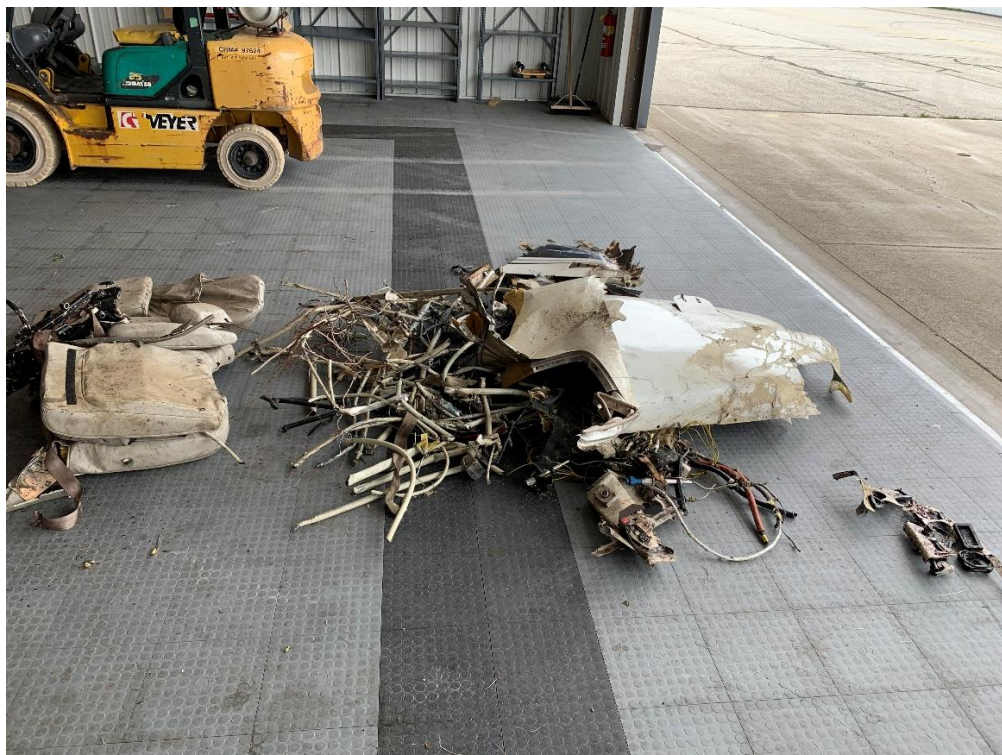


Figure 5. Forward fuselage of the airplane



Figure 6. Left wing



Figure 7. Right wing



Figure 8. Empennage

The engine exhibited extensive impact-related damage that prevented the crankshaft being rotated, as shown in figure 9 and figure 10. All four engine mounts exhibited impact related damage. The upper crankcase exhibited a large crack between cylinder Nos. 2 and 3. Three of the six cylinder heads separated during impact. The remaining three cylinder heads exhibited extensive impact-related damage. There were numerous cylinder head fragments recovered from the debris path. There were multiple intake and exhaust valves found separated from their respective cylinder heads. All six pistons remained in their respective cylinders. The propeller flange and crankshaft exhibited features consistent with an overload separation, as shown in figure 11. All engine accessories separated from the engine crankcase during impact. Portions of the left and right magnetos exhibited extensive impact-related damage and could not be tested. The engine-driven fuel pump and propeller governor exhibited impact-related damage and were not tested. The fuel manifold and injector lines separated from the top of the engine crankcase. The oil filter separated from the engine. The engine oil sump separated from the crankcase. The rear of the engine crankcase was missing, exposing the aft accessory gears. The intake, exhaust, and muffler separated from the engine and was fragmented and/or crushed.

The propeller hub with two blades separated from the engine crankshaft, as shown in figure 12. The remaining propeller blade separated from the hub and was found in two pieces. All three propeller blades exhibited extensive impact-related damage, including spanwise bending, blade fractures, blade twisting, chordwise scratching, and leading-edge damage.

The vacuum pump separated from the engine and exhibited impact-related damage, as shown in figure 13. The vacuum pump rotor/vanes were not recovered. A separated gyro housing was recovered and exhibited impact-related damage. The interior surface of the gyro housing exhibited rotational scoring, as shown in figure 14. The gyro rotor was not recovered.



Figure 9. Right side of engine



Figure 10. Left side of engine



Figure 11. Engine propeller flange and portion of crankshaft



Figure 12. Propeller

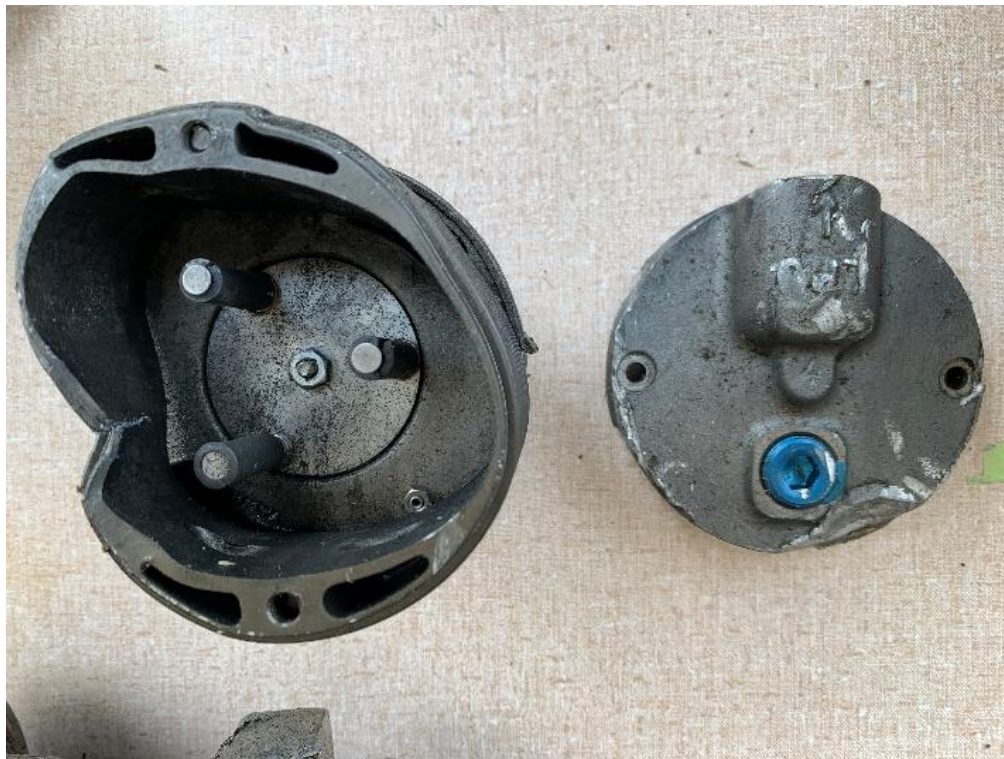


Figure 13. Vacuum pump



Figure 14. Gyro housing