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Subject: NTSB investigation ERA20FA019, Mooney M20A, N8354E, Summit Point, West Virginia, October 24, 2019. Wreckage Examination

Examination of the accident site revealed that the airplane was partially consumed by a postimpact fire and the wreckage was spread over a 1.5-acre area of burned grass. All major components (or remnants of them) were present at the accident site. The debris path was 270 ft long and oriented on a heading of about 300° (true). The initial impact point was a 1.5 ft deep round crater with an 18 ft long impact mark radiating from the crater toward the left side of debris path. Small remnants of the left wing were found near the initial impact point. The left elevator tip weight was found about 5 ft along the debris path, 20 ft right of the path centerline. The propeller and hub were located about 40 ft along the path, on the centerline. Both propeller blades had a slight twist in them, one blade had some chordwise scratches on the front face at mid span, the other blade did not have any chordwise scratches. The spinner was crushed against the hub and was deformed in a twisted opposite the direction of propeller rotation.

Remnants of the right wing were found 130 ft along the path, about 30 ft right of centerline. The remnants were severely burned and primarily consisted of ash and wood fragments laid out in an outline of the wing and its structural components. The flap was separated and mostly consumed by fire. Most of the metal aileron control system push-pull tubes and bell crank remained in place from about near the wing root to the aileron horn. The right main landing gear was mostly intact and found in its retracted position.

Portions of the elevator, rudder and left and right aileron control tubes and linkages remained intact in the lower forward center section, each with fractures consistent with overload. Flight control continuity could not be confirmed forward of the rear seat.

All three aluminum fuel tanks were found separated from the airplane along the debris path. Two of the tanks were missing their filler necks which were found separately along the debris path with their fuel caps secure and seals in good condition. The cap and neck remained attached on the third tank, with the cap secure however the seal was partially consumed by fire and heat damaged.

The main wreckage was located 170 ft along the path on the centerline and was oriented on a heading of 281°. Only rear section of the airplane aft of the rear seat remained largely intact.

Burned remnants of the left wing, which consisted of the main landing gear, a portion of the wooden wing spar, and most of the aileron control system were found separated from each other near the right side of the main wreckage. The flight control tubes for the elevator, rudder, and trim system remained intact from the rear seat area to the control surface horns. Most of the airplane forward of the rear seat was consumed by fire or severely burned. The engine and forward section of the fuselage was found in place relative to the empennage but were inverted. The nose landing gear struts and axle were found in the retracted position; the tire and wheel were consumed by fire. Most of the cockpit panel and instruments were heat damaged and partially consumed by fire. Three steel weights, of the type used on farm tractors for counterbalance, were found near the remnants of the rear seat frame. Each weighed 44 pounds.

The engine came to rest inverted. All the exhaust tubes and most of the intake tubes were separated from each cylinder. The No. 3 bottom and Nos. 1 and 3 top ignition leads remained attached to their respective spark plugs, the remaining leads were broken in several places. The bottom spark plugs were removed and appeared "worn normal" when compared to the Champion check-a-plug chart. The No. 1 spark plug was dark/sooty in color. The No. 3 spark plug was oil soaked. The Nos. 2 and 4 spark plugs were dry and dark gray in color. A portion of the intake manifold and accessory gear cover were fracture separated from the engine, which exposed the accessory gears. The engine crankshaft was initially rotated by hand at the propeller flange using a lever and could be rotated about 10° in both directions. The accessory gears at the rear of the engine rotated slightly as the crankshaft was rotated. The propeller governor and oil pump were removed; both exhibited thermal damage and could not be rotated by hand. After their removal, the engine crankshaft rotated freely by hand, and thumb compression and suction were attained on all cylinders. Valve train continuity was confirmed for each cylinder as the crankshaft rotated. Both magnetos were removed and could not be rotated by hand. The left magneto case was largely intact with some melting near the ignition leads. The case of the right magneto was partially melted, which exposed the internal components. The engine driven fuel pump was partially melted and could not be functionally checked.

The carburetor was fracture separated from the engine at the intake manifold. The throttle, mixture and carburetor heat controls remained attached at their respective control arms. The fuel inlet fitting was fracture separated. Some charred debris was present in the carburetor bowl, but no liquid remained. Both metal floats had some inward crush damage. The float mechanism and fuel inlet needle valve operated normally when the inlet was pressurized with air and the floats were moved up and down manually.

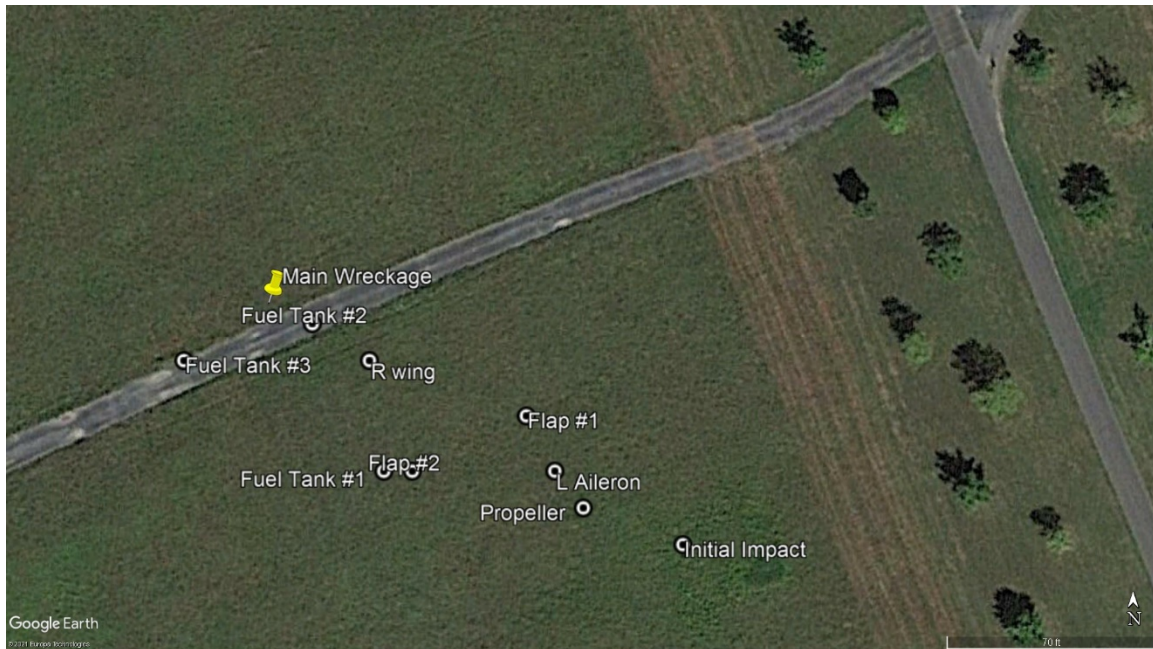


Figure 1 Wreckage Diagram

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