

National Transportation Safety Board

Office of Aviation Safety

Washington, DC 20594



ERA22FA095

WRECKAGE EXAM

December 30, 2021

A. ACCIDENT

Location: Jacksonville, Florida
Date: December 26, 2021
Time: 1104 eastern standard time

Airplane: Mooney M20J, N3707H

B. WRECKAGE EXAM

IIC Doug Brazy
NTSB
Washington, DC

Party Coordinator Mike Childers
Lycoming
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C. DETAILS OF THE EXAMINATION

1.0 Airframe Examination

The fuselage section from just forward of the horizontal stabilizer to the engine cowling was largely consumed by fire. Both wings remained largely intact, although both sustained leading edge crush damage and significant fire damage from the root area to about the outboard edge of the flaps.



Figure 1 - Airplane - View from Front



Figure 2 - Airplane - View from Left



Figure 3 - Airplane - View from Rear



Figure 4 - Airplane - View from Right

Both flaps were partially separated from their hinge points, and the inboard ends of both flaps were partially melted.



Figure 5 - Flaps (Left) and (Right)

The flap actuator jackscrew was extended $1 \frac{9}{16}$ inches, with 9-10 exposed threads. According to the airplane manufacturer, this is consistent with the flaps at or near the takeoff setting of 15° .



Figure 6 - Flap Actuator Jackscrew

Both ailerons remained attached, and flight control continuity was confirmed from the left aileron to the left wing root area. The right aileron bellcrank was impact-damaged and impinged against the wing spar. The push-pull tube between the bell crank and the aileron horn was fractured near the control horn.

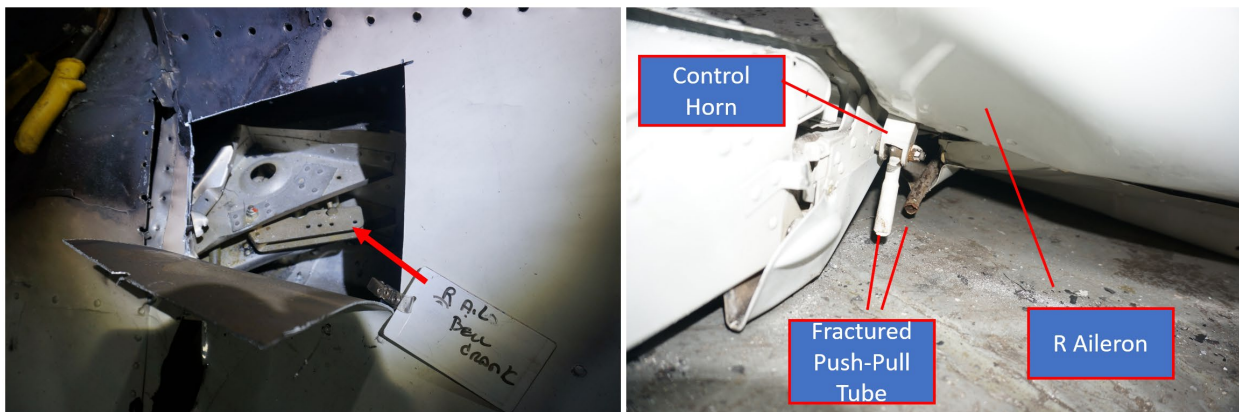


Figure 7 - Right Aileron Bell Crank (Left) and Fractured Push-Pull Tube (Right)

The right speedbrake assembly was found loose inside the right wing.



Figure 8 - Right Speedbrake Assembly

One of the 12 bolts upper mounting bolts remained in its hole. The lower mounting bracket remained in place in the wing, the two rivets that attach the bottom of the speedbrake to the lower bracket were fractured.



Figure 9 - Right Speedbrake Mounting Bolt

Some metal remnants were found in the mounting bolt threads, and the threads in the corresponding hole in the speedbrake assembly were damaged.

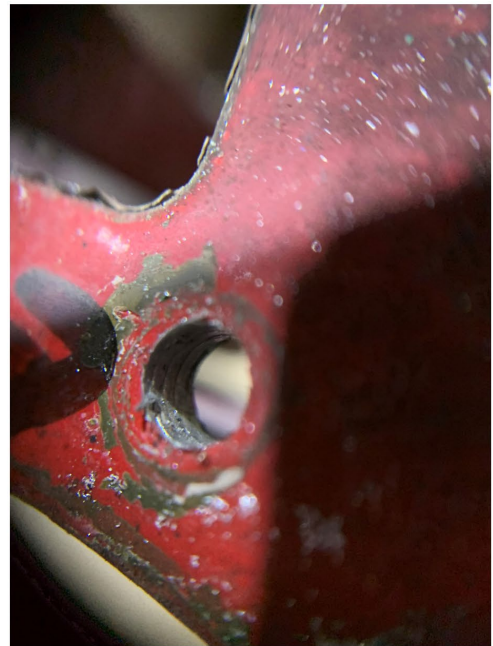


Figure 10 Right Speedbrake Mounting Bolt (Left) and Corresponding Hole in Speedbrake Assembly (Right)

When manually opened, the right speedbrake panels rubbed together slightly, in the position shown. When fully extended and released, the spring mechanism fully retracted the panels.



Figure 11 - Right Speedbrake Positioned Where Panels Rubbed Each Other, When Manually Extended

The left speedbrake remained in place, with all 12 upper mounting bolts in place. The lower mounting bracket remained in place in the wing, the two rivets that attach the bottom of the speedbrake to the lower bracket were fractured.



Figure 12 - Left Speedbrake

When manually opened, the left speedbrake panels opened smoothly. When fully extended and released, the spring mechanism fully retracted the panels.

The electric actuator for each speedbrake were thermally damaged and could not be tested.

Continuity was established from the elevator and rudder control surfaces to the area of the rear seats. The pitch trim torque tube was fracture-separated at its attachment bolt just forward of the gearbox. The torque tube was manually rotated 7.5 full turns before the pitch trim reached the full airplane nose up stop. According to the airplane manufacturer, this was consistent with an as-found pitch trim position at or near the "takeoff" setting.

The baggage door piano hinge remained mostly intact and remained partially attached to its mount. About 2" of aluminum structure remained on either side of the hinge along most of its length. The forward ends of the aluminum sections were partially melted. The remainder of the door structure was not located in the wreckage, and may have been consumed by the post accident fire.



Figure 13 - Baggage Door Hinge

The baggage door latching mechanism was found largely intact, fire damaged, with none of the door structure attached. The lock cylinder and exterior latch handle were not found, however silver/grey molten metal remained on the center section of the assembly. Both engagement rods remained intact and attached to the assembly.

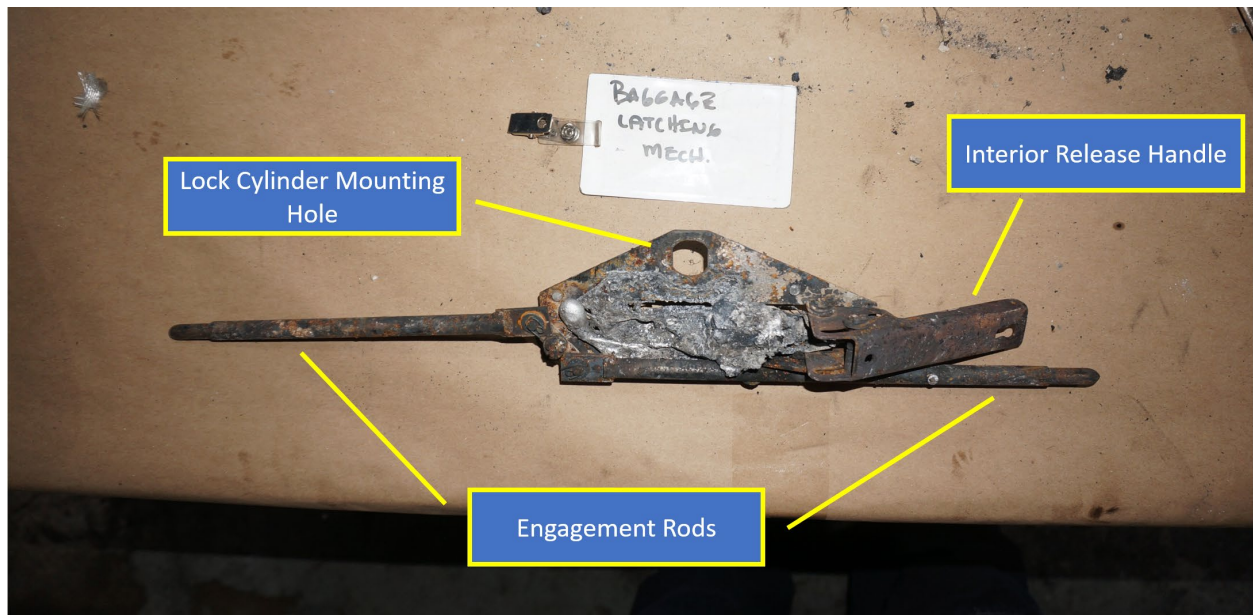


Figure 14 - Baggage Door Latching Mechanism - Interior Side



Figure 15 - Baggage Door Latching Mechanism - Exterior Side

2.0 Engine Examination

The engine was an Avco Lycoming model IO-360-A3B6D, s/n L-20711-51A. The exhaust and intake tubing sections were partially crushed. The oil sump was fractured and partially burned.



Figure 16 - Engine Top



Figure 17 - Engine Bottom

The propeller hub remained attached to the engine crankshaft flange with the hub and spinner partially buried in soft, sandy soil. One propeller blade, labeled "A", remained attached to the hub, above ground and undamaged, except for loose snap rings and shims in the hub. The other blade was separated from the hub and buried in the impact crater. It was bent slightly forward and exhibited abrasion of the paint along the length of the leading edge.



Figure 18 - Propeller Blade "A"



Figure 19 - Propeller Blade "B"

The propeller governor was separated from engine and fire damaged. The control arm assembly was separated from the governor and not found. The oil filter screen was absent of debris.



Figure 20 - Propeller Governor

Radial score marks consistent with starter ring gear rotation, were present on the forward section of starter drive housing.

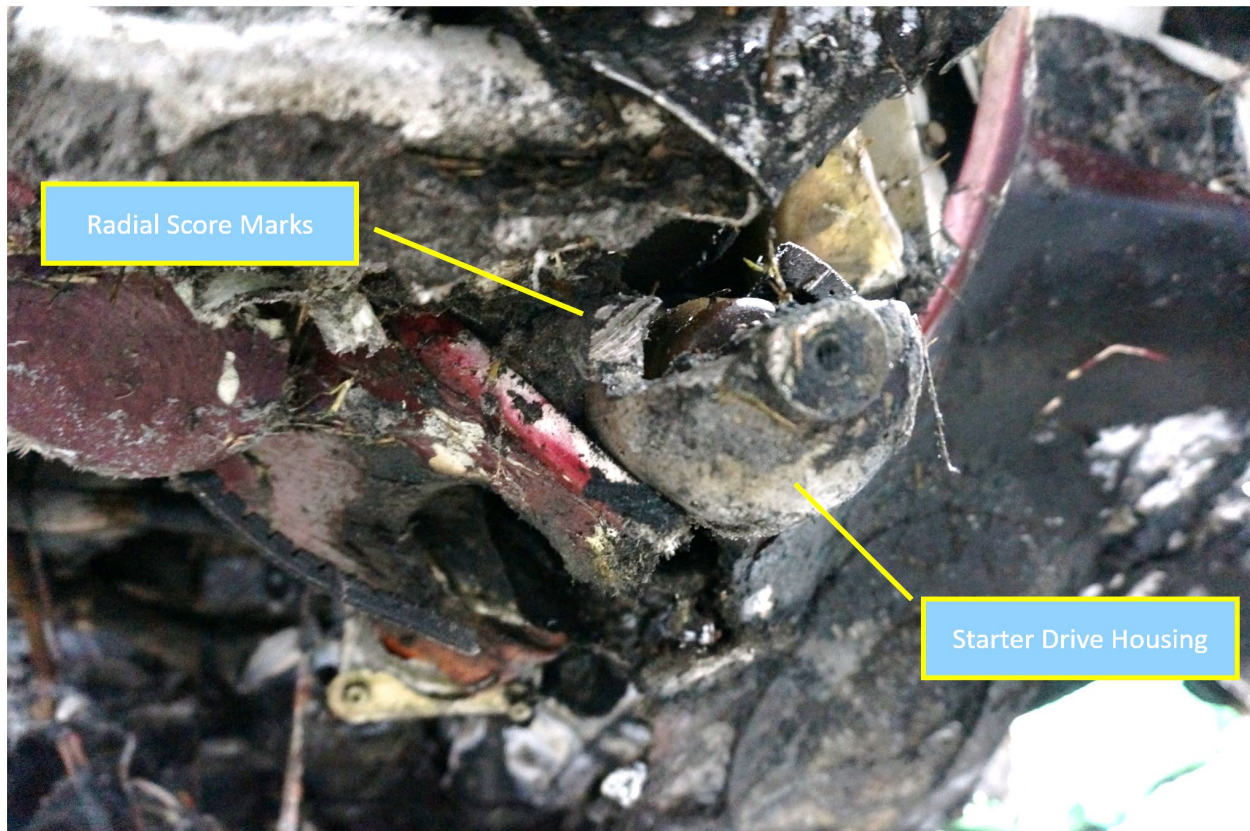


Figure 21 - Starter Drive Housing with Radial Score Marks

The crankshaft was rotated by hand at the propeller hub. The engine rotated smoothly with no binding. Valvetrain and crankshaft continuity to the accessory section were confirmed, and each cylinder produced thumb compression and suction.

The oil suction screen was absent of debris. The oil filter was fire damaged, the internal filter element was charred, with no metallic debris present.

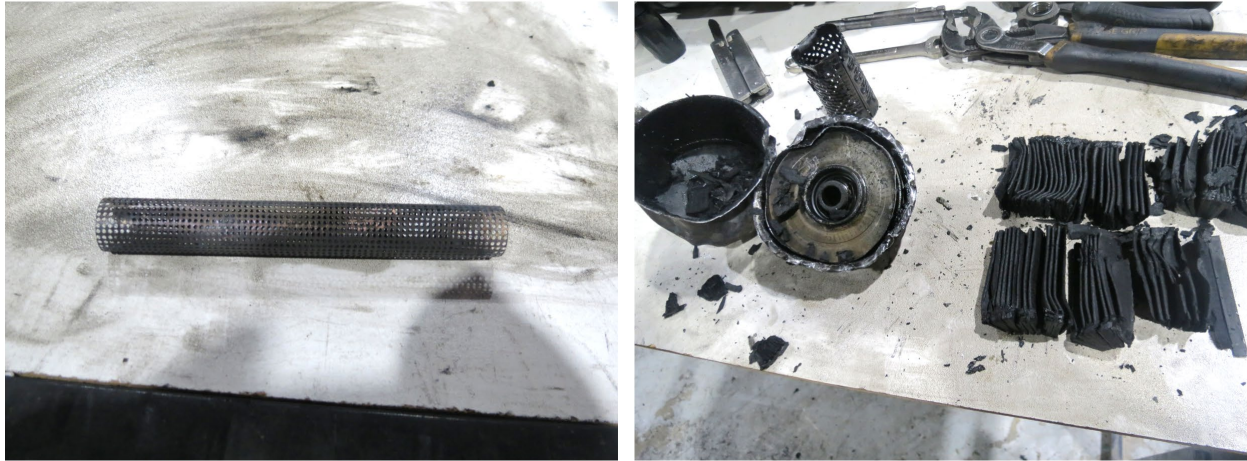


Figure 22 - Oil Suction Screen (Left) and Oil Filter (Right)

The Nos. 1 2 3 bottom spark plugs were fractured/impact damaged. All electrodes on all plugs were light grey in color and appeared worn normal when compared to a Champion check-a-plug chart.



Figure 23 - Spark Plugs

The single drive dual magneto found separated from the engine and fire damaged, which precluded testing.



Figure 24 - Dual Magneto

The engine driven fuel pump was separated from the engine and partially melted, precluding testing. The eccentric inside the engine moved the pump's actuator rod when the crankshaft was rotated.



Figure 25 Engine Driven Fuel Pump

The fuel flow divider was undamaged, the diaphragm was intact, damp and smelled of aviation fuel.



Figure 26 - Fuel Flow Divider - Intact (Left) Partially Disassembled (Right)

All four fuel injector nozzles were removed and found unobstructed. The nuts that secure the fuel injector upper deck pressure shrouds were found installed backward (the flange was up instead of down) on all four cylinders.



Figure 27 - Fuel Injector Nozzles

Fuel injection servo was separated from the engine, fire and impact damaged, and fractured across the throttle bore. Throttle cable remained attached to the servo throttle arm which was about 3/16 inch from the throttle stop (about 1/8 to 1/4 of throttle travel from full idle).

The mixture cable remained attached to the servo mixture arm, the arm was separated from the servo. The fuel inlet screen removed and was absent of debris. The servo regulator section partially disassembled, the diaphragms were fire/heat damaged.



Figure 28 - Fuel Servo - Intact (Top Left) Partially Disassembled (Top Right) Fuel Inlet Screen (Bottom)

The turbocharger inlet and exhaust tubing and the fixed exhaust bypass were impact damaged and partially crushed. The inlet and exhaust tubing was removed, and the compressor shaft rotated freely by hand, no damage noted to compressor wheel blades or the exhaust/turbine wheel blades.



Figure 29 -Turbocharger Assembly

Submitted by:

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