



# **WRECKAGE EXAMINATION**

NTSB ACCIDENT NUMBER: ERA20FA031

AIRCRAFT REGISTRATION: N714LK

OPERATOR: Individual

ACCIDENT LOCATION: New Bedford, MA

EXAMINATION DATE: November 5, 2019

## **Investigative Team:**

NTSB IIC – Lynn Spencer

FAA Coordinator – Richard D Fulton, Boston FSDO

Textron Aviation – Henry Soderlund

Continental Aerospace Technologies – Mike Council

## **WRECKAGE AND IMPACT INFORMATION**

The airplane descended into a large tree before impacting terrain in a cemetery about 3.5 nautical miles south (164°) of the EWB airport. The wreckage path was oriented on a true heading of 220°. The left wing was located about 10 ft from the tree, followed by the tail and engine at 30 ft, the right wing at 40 ft, the carburetor at 87 ft, the fuel tank at 122 ft, and the main wheels and directional gyro at 240 ft. The nose wheel was located 30 ft at 330° from the tree. The accident site elevation was about 83 ft mean sea level. The left wing, with the strut attached, was the closest piece to the tree. The empennage, engine, right wing (with cabin overhead attached), and cabin floor were near each other but were separate pieces. Both wings exhibited leading edge damage similar to impact with large tree branches.

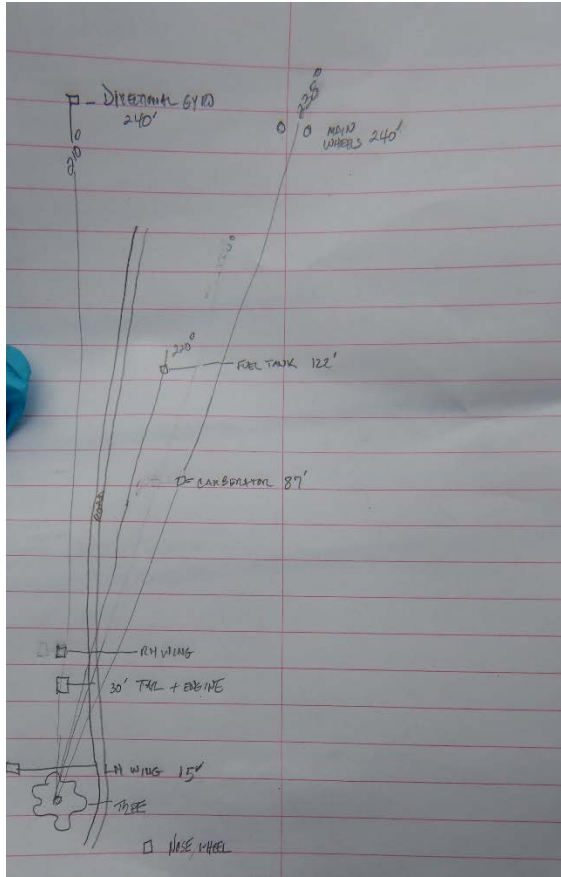


Figure 1: Wreckage Diagram



Photo 1: Main wreckage and tree damage





Photo 2: Wreckage from above



Photo 3: Wreckage from above

## **AIRFRAME EXAMINATION**

All the flight control cables were connected at the associated cockpit and control surfaces. The observed cable separations exhibited evidence of tension overload. The rudder horn had separated from the rudder. The left rudder horn attach point was pulled into the empennage and was separated aft of the rudder stop block. The elevator bellcrank to control Y tube was bent and fractured aft of the control yoke attach point and forward of the forward bellcrank attach point. None of the fracture surfaces exhibited evidence of fatigue or corrosion when examined on site.

The fuel strainer was separated from the firewall and the fuel strainer bowl was not observed in the wreckage. The fuel selector handle was separated from its mounting structure. The fuel strainer screen was clean.

The cabin heat knob was in the outward and ON position.

Both seats were found outside of the aircraft during the onsite examination. Zip-ties were observed installed on the shoulder harness attachment studs on each lap belt. Seat feet, backs, bases, and rails were not intact. Pilot's 3-point seatbelt was intact.

The airspeed indicator and vertical speed indicator were missing their needles. The heading indicator gyroscope rotor had separated from its housing. Altimeter setting indicated 30.38 and altimeter indicated 945 ft.

One magneto was fractured into multiple pieces. The other magneto was rotated by hand and produced spark on the three intact leads.

Both carburetor floats exhibited hydraulic deformation.

The right muffler separated from the airplane and was found crushed and compacted. The shroud (which provides heated air to the carburetor heat control) was intact around the muffler.

The front of the left muffler was partially separated. The cylinder 4 exhaust tube flange was cracked at the front of the muffler. The aft end cap of the left muffler was found separated from the muffler. The end cap had a hole in center of it and exhibited pin holes in the middle. The muffler metal was corroded and thin. The cabin heat shroud was removed from the muffler and pin holes were observed on the sides of the muffler.

The tachometer indicated 5064.6 hrs. Tachometer indicated 50 rpm. Throttle and mixture were full forward, carburetor heat was off. Primer was locked.

The engine was partially attached to the airframe, and the propeller was attached to the engine.

A tree branch, approximately five inches in diameter, exhibited evidence of being cut by a propeller blade. Both propeller blades were bent aft and were wavy with polishing on the cambered side of the blade.





*Photo 4: Muffler assembly*



*Photo 5: Muffler corrosion after muffler shroud removed*



*Photo 6: Muffler end plate showing corrosion*



*Photo 7: Tree damage consistent with propeller strike*





*Photo 8: Propeller*



*Photo 9: Tree limb damage consistent with propeller strike*

## **ENGINE EXAMINATION**

The engine data plate was missing but was recovered from the wreckage. An impact damaged McCauley two-blade fix pitched propeller remained attached to the engine crankshaft propeller flange. The propeller exhibited chordwise twisting and bending along the length of both blades with paint transfer and leading-edge gouging.

The engine crankcase oil sump was impact destroyed. The left and right magnetos separated. One magneto was discovered nearby in the wreckage, but positive right or left orientation could not be determined. Broken pieces of the second magneto was discovered nearby also. The mostly intact magneto was functionally tested using an electric drill motor to rotate the magneto drive. Spark was produced at the three remaining ignition leads when the magneto was manually rotated. The impulse coupling was dirt contaminated and did not disengage normally.

The engine was turned right-side up. The top sparkplug for cylinder one was missing. Cylinder 2 and 3 top sparkplugs separated leaving only the lower shell in the cylinder head threaded boss. The top sparkplug remained installed in cylinder 4. Additional damaged sparkplugs were recovered in the wreckage, but positive orientation could not be determined.

The sparkplugs which were intact exhibited light combustion deposits and were worn-out-normal when compared to a Champion Sparkplug "Check-A-Plug" chart. The ignition harness separated, and fragments remained attached.

The damaged propeller was removed. The engine was manually rotated, and thumb compression was achieved in all four cylinders. Crankshaft continuity was confirmed from the front to the rear of the engine.

Accessory gears were visible on the rear of the engine and rotation was confirmed when the engine was manually rotated. An electronic borescope inspection was performed. All piston domes exhibited normal combustion deposits but were intact. All intake and exhaust valves were intact and appeared to be in good condition with normal combustion signatures.

Rocker covers on cylinders one and three were undamaged, but rocker covers on cylinders 2 and 4 were impact damaged. Cooling fins on all cylinders were impact damaged. All four cylinder bases were painted orange to signify that the cylinders had been channel chrome plated at overhaul.

The right exhaust muffler from cylinders one and three separated and was discovered approximately 50 feet forward in the debris field. The grass and tree leaves under the separated muffler was scorched indicating that the muffler was hot when it came to rest after impact. The left muffler remained partially attached to cylinders two and four. The muffler outer casing was impact crushed exposing the end plate which exhibited an erosion hole with several other small pin holes visible. The heat shroud was removed, and additional evidence of internal deterioration was present.

The carburetor was recovered and examined. The fuel-finger screen was removed, and no contamination was discovered. The carburetor bowl assembly screws were removed. The floats exhibited hydraulic deformation damage to both floats. The floats were made of brass (not the plastic variety) and the fuel needle valve moved normally when the floats were raised/lowered. The accelerator pump was intact but there was no fuel in the float bowl. The throttle control arm remained attached with the proper attachment hardware. The control arm was bent due to impact forces and the control cable rod-end remained attached after the control cable separated.

The inspection of this engine did not reveal any pre-impact anomalies that would have prevented its ability to produce rated horsepower.





*Photo 10: Propeller and engine*