



Airframe and Engine Examination

NTSB ACCIDENT NUMBER: ERA20LA273

August 5, 2020

AIRCRAFT REGISTRATION: N55GJ
OPERATOR: CFA Holdings, Inc.
ACCIDENT LOCATION: Knoxville, TN

Investigative Team:

NTSB IIC – Lynn Spencer (not on scene due to Covid travel restrictions)
FAA – Inspector Jim Ruckman (Party Coordinator), David L. Robinson, David Lewis,
Nashville FSDO
Airbus Technical Representative – Seth Buttner
Safran Helicopter Engines USA Technical Representative – Bryan Larimore

Additional On-Scene Contacts:

AMF Recovery

WRECKAGE AND IMPACT INFORMATION

The intended landing zone was lawn area near the shore of the pilot's private residents on the river in which it crashed, Tennessee River. The helicopter impacted the water and sank about 35 ft before coming to a rest on the bottom of the Tennessee River around GPS coordinates 35.945178°, -83.956504°. The fenestron was recovered floating nearby. The impact location was about 435 ft and 149° from the landing zone of the pilot's property. (Figure 2) The accident site elevation was about 980 ft mean sea level.

The helicopter was recovered from underwater and transferred to a parking lot next to the river. It was mostly intact. The left side windshield exhibited a large hole was broken out/door and window broken out; Damage to the helicopter was consistent with a low-energy impact. All rotor blades exhibited after body damage consistent with impact with water. The lift struts were fractured midspan. The tailboom was still attached, and the fenestron fractured just aft of the ring frame.

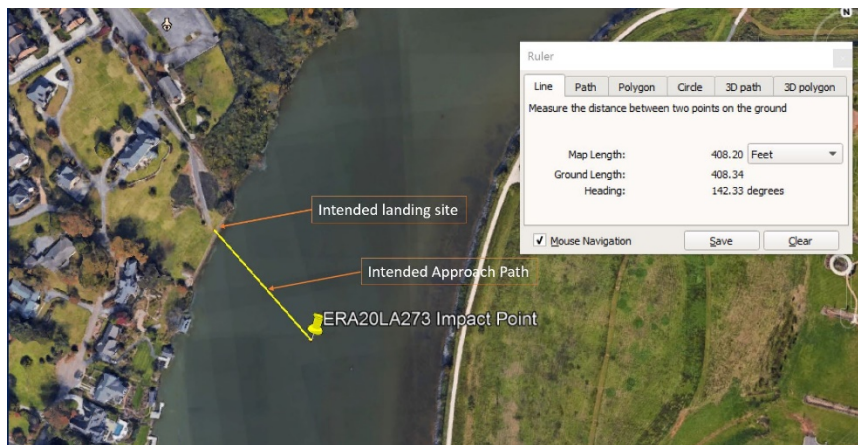


Figure 1: Approximate Accident Site and Distance to Landing Zone

AIRFRAME EXAMINATION

The wreckage was examined by the investigative team (FAA, Airbus, and Safran Engines), on Aug 5, 2020. All the doors, cowlings and interior remained attached. The left side windshield was broken and exhibited a large hole, and the left skylight window, left front door window, and the left rear slider-door window was also broken out. The top of the left front door and cabin canopy structure at that location exhibited damaged consistent with a rotor blade strike. Other damage to the helicopter was generally consistent with a low-energy impact, but minimal structural damage observed to the airframes contour design or landing gear system.

The tail boom was still attached; however, the Fenestron was separated, with the fracture just after of the ring frame. Some of the damage in the area of where it fractured appeared to have been from one of more of the main rotor blade tips. Otherwise, the appearance of the fracture at the Fenestron appeared to be from blunt impact and not that of fatigue. A few of the Fenestron blades were slightly bent consistent with aerodynamic contact with the water. The Fenestron gear box hub was not attached and not recovered.

All three rotor blades exhibited trailing edge impact fracture damage consistent with impact with water. Two of the three Starflex star arms were broken with diagonal brakeage across the arm web. Two of the four suspension bars were fractured and separated near mid-span with a buckling break.

The entire cabin interior remained intact and attached. Seat cushions and restraint systems were found intact at each seating location. Although wet, all of the 4-point, seat restraints appeared functioning and unremarkable, without signature of overload damage. The two right rear seats restraint system were still buckled, in a stowed position, as if there were not used. The others two rear seats on the left, and three seats in the front, were found on buckled. None of the seven seats exhibited any attenuation when checked. Each of the seven seats had a designated head set (Bose, noise abating type), plugged in its designated plug-in.

The left horizontal tail light (green), was equipped with an ADS-B antenna.

Flight control continuity was confirmed from each input device to the aerodynamic control surfaces; to the main rotor blades through the servos, and to the tail rotor Fenestron system. The push-pull control system was broken and separated where the flex-ball cable meets the Fenestron yaw control rod push-pull rod. The brake was consistent with the impact damaged and from over load signatures, earlier mentioned, where the Fenestron was separated from the tail boom.

There was no deformation to the fuel tank. After the aircraft was lifted out of the water the center fuel sump was depressed and approximately 15 gallons of water was drained and collected. The draining process was stopped, and visually, from the outside of the tank, it appeared that the tank was approximately half full of fluid. Total amount of fuel and water was going to be tallied by the recovery team later.

All the instruments in the cockpit were not reliable for reasonable information having been in the water. There was no cockpit image recorder.



Photo 1: Helicopter upon initial recovery



Photo 2: Helicopter upon recovery to shore



Photo 3: Main rotor blade damage



Photo 4: Fenestron Fracture Area



Photo 5: Cockpit Area



Photo 6: Tail Rotor Drive Shaft, forward splined fitting



Photo 7: Fenestron

ENGINE EXAMINATION

The engine remained attached in the engine bay and the front and rear engine supports were still intact.

All electrical, oil, and fuel connections appeared to be correctly attached and saftied. The DECU was removed from the aircraft and re-submerged in fresh water for shipment to the BEA.

The axial compressor exhibited FOD damage and the gas generator could be rotated by hand. The free turbine blades had shed consistent with overspeed protection. The flector group between the transmission shaft and helicopter transmission input was broken.

Correct freewheel operation was confirmed.

The EBCAU was removed and the emergency throttle was at approximately the 10 o'clock position consistent with the engine entering emergency mode sometime during the accident sequence.

Neither the oil or fuel filter bypass indicators were activated. The fuel filter was removed and examined. It was clean except for a few very small particles of foreign material. It was straw color to clear with an odor consistent with Jet-A fuel. There was a small amount of water in the bowl.

The module 5 reduction gearbox was removed to examine the slippage mark. The mark was displaced approximately 1 mm in the loosening direction consistent with the free turbine stoppage due to blade shedding and the inertia of the reduction gear train acting against the splined nut.

Several indications of power were present and no anomalies that would preclude normal operation were observed.

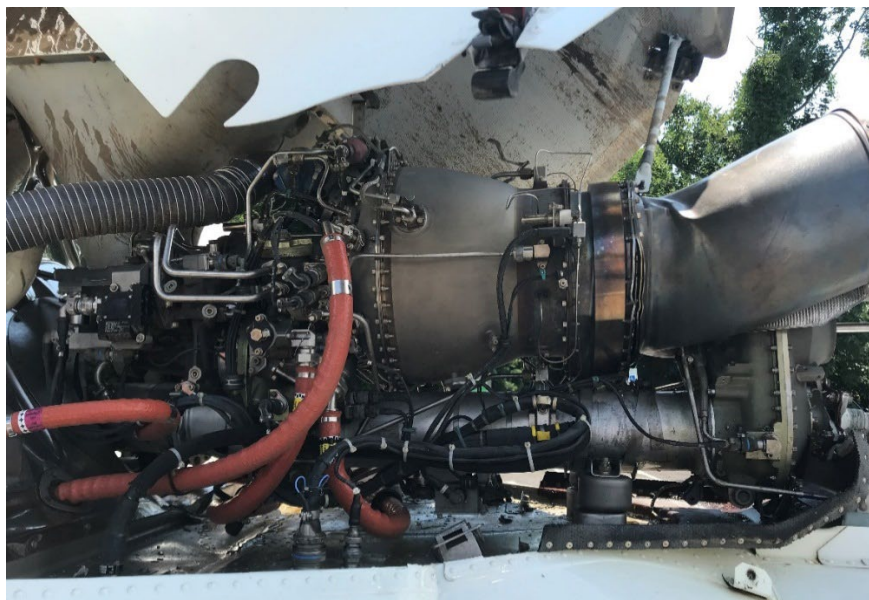


Photo 8: Engine



Photo 9: Oil Filter

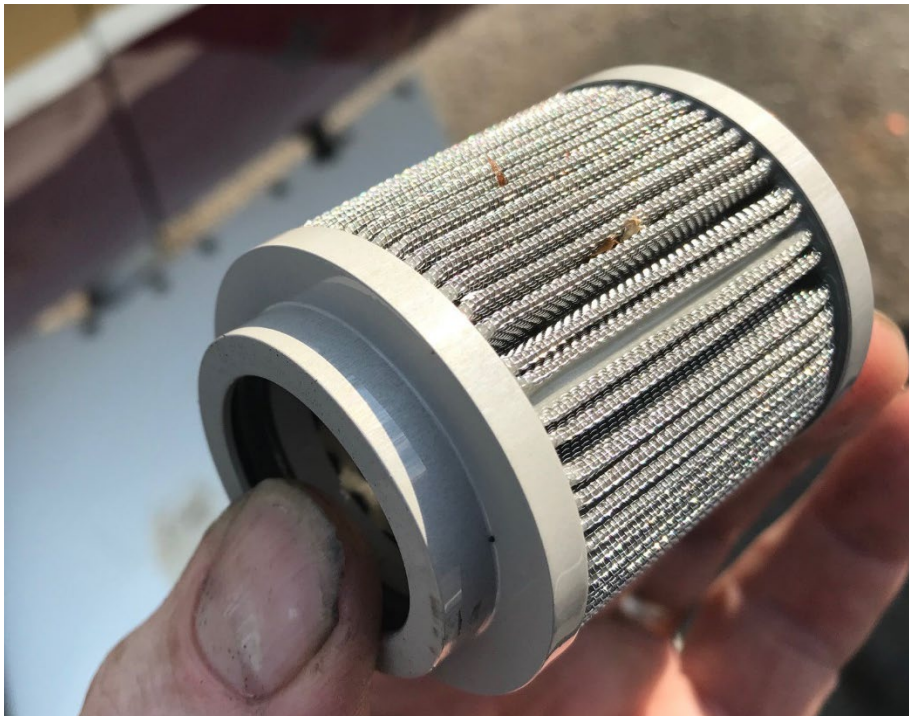


Photo 10: Fuel Filter



Photo 11: Fuel Filter Bowl



Photo 12: Tail Rotor Drive Coupling



Photo 13: Axial compressor FOD damage