



MEMORANDUM FOR RECORD

Todd Gunther
Air Safety Investigator
Eastern Region

Date: November 20, 2020
Subject: N9421P Wreckage Examination
NTSB Case Number: ERA21LA197

On August 26, 2020, an examination of the wreckage was conducted with the parties to the investigation at Atlanta Air Recovery, in Griffin, Georgia. The following information was obtained during that examination.

Examination of the helicopter indicated that the helicopter was intact prior to the impact with the trees and ground. The airframe and flight critical components were accounted for.

All four landing gear dampers were accounted for as well as the landing gear skids. The frame assembly was separated into multiple individual pieces. No evidence of failure was evident on all four of the cluster fittings. Both lower mast attach members were still attached to the mast and the airframe. The center mast attach fitting was separated at the mast attachment after retrieval from the wreckage site. The floor was separated from the cabin seat deck. The vertical fin was crushed, and the horizontal fin was separated from the helicopter. The leading edge of the horizontal fin had dents consistent with striking foliage.

The left-hand seat belt system was still in place inside the helicopter while the right-hand seat belt system was broken at its attach points. Both seat assemblies and interior components were accounted for. The instrument panel was intact but crushed in the back. The right-hand control stick was broken at the fitting. The left-hand control stick was not broken at the fitting. Both collective sticks were installed and accounted for.

The cyclic control was connected from both left and right sides to the swashplate assembly but was not connected fore and aft due to an impact fractured casting. The rod end was still attached to the casting.

The collective controls also appeared to have been connected prior to impact as the attachment bolts and hardware were still in place. The primary collective casting was broken. The throttle cable appeared to be connected prior to impact as well, as all the connecting hardware and portions of the cable were still attached to the carburetor.

The fuel shutoff was inoperable due to a severe bend in the cable but was connected to the fuel shutoff valve. The mixture control was operable but not attached to the carburetor. The mixture control was in the full rich position and the fuel shutoff valve was in the open position.

The tail rotor drive shaft was sheared at the opening of the tail boom adjacent to the belt drive system. The driveshaft showed no twisting tendencies but did have creases in the driveshaft consistent with the helicopter falling through tree branches, and debris landing on the tail boom. The attachment of the tail rotor driveshaft at the tail rotor gearbox was secure, the teeth of the tail rotor drive gear were intact, and the tail rotor gearbox chip detector was free of debris. There were no signs of impact on the leading edges of the tail rotor blades, and they had remained attached to the tail rotor drive assembly.

The pitch control (PC) links for the tail rotor drive assembly were both intact and the swashplate assembly for the tail rotor drive operated freely. One PC link was bent and the other appeared undamaged. The rotating bearing for the tail rotor drive spun freely.

The main belt drive assembly had all 8 belts attached to the H-Frame pulley system. After removing the drive belts, and the H Frame assembly from the wreckage, it was confirmed that the upper pulley was installed with no anomalies and the sprag clutch was operable. The drive pulley and idler pulley showed no abnormal signs of operation, and the belt actuator was intact.

After removal of the blue and red main rotor blades from the main rotor's hub (the yellow blade had been previously removed for transport), examination revealed that the retainer (P/N 269A1329) showed signs of the pitch bearing assemblies and the blades being pulled up consistent with the main rotor falling through foliage. The blue and red pitch links were separated at the pitch bearing assemblies. The yellow pitch link remained attached, although the rod end at the pitch bearing attachment was bent at an approximate 90° angle, which was consistent with the helicopter falling through foliage with low or no rotation of the main rotor hub.

All three main rotor blades had little or no damage to the leading edges. Most of the damage to the blades were on the bottom sides of the blades and the rear seams of the blades were separated and blown out at various positions.

The lower coupling driveshaft appeared in good condition with no noted anomalies. Both ends of the driveshaft were well lubricated. Three of the blades on the fan which was attached to the engine flywheel were broken. No indication of flywheel rotation during impact was observed, and the inside of the scroll did not display any rotational marks or scoring from the flywheel assembly.

The control tubes from the lower transmission housing to the swashplate assembly were intact. The control tube from the anti-torque pedals to the bellcrank was sheared and was separated from the bellcrank. The cables for the anti-torque system were separated and displayed evidence of tensile overload at the separations. The collective control was attached to the bellcrank, and the bellcrank displayed impact damage. The cyclic assembly was operational for the left and right inputs, but the forward and aft movement was restricted by a bellcrank that was impact damaged.

The fuel tank was impact damaged, with the upper and lower fittings for the fuel quantity and low fuel sensor separated from the tank. The fuel lines were present.

Examination of the fuel sensor revealed the presence of corrosion on the fasteners, and corrosion on the FULL, EMPTY, and LOW ADJUST, screws used to calibrate the unit. The aluminum probe shaft was missing. The side wires (apart from the ends, which were broken and corroded where they came out of the assembly) were missing. The fuel line to the fuel pump was separated from the fitting.

Examination of the fuel strainer revealed debris inside the strainer. However, the screen was clear of obstructions. The aluminum tube was severed from the assembly. The supply hose was pulled away from the fitting but was still attached to the lower fuel tank adapter plate.

The fuel cap would attach to the fuel tank but was heavily rusted and there was little or no positive friction to ensure the cap would remain in place.

Examination of the engine revealed that the engine had remained partially attached to the airframe through the tubular engine mounts. The intake and exhaust tubes were partially crushed. The oil sump was fragmented and separated from the engine.

Both magnetos were separated from the engine and were found dangling from the ignition harness. The left magneto mounting flange was fractured. The magneto was rotated by hand and produced spark from all four ignition towers. The right magneto mounting flange was also fractured. The magneto was rotated by hand and did not produce spark from any ignition tower. The magneto was partially disassembled, and water was observed in the magneto. The magneto also displayed evidence of impact damage internally, as the gear brush was bent inward and not making contact, one of the coil wedges was loose, and the coil was loose in the frame.

The ignition harness was impact damaged, The No.2, No.3, and No.4 top spark plugs, and the No.2 and No.4 bottom spark plugs exhibited gray coloration and worn normal condition. The No.1 top spark plugs were impact separated.

The carburetor was fractured across the throttle bore, impact separated from the engine and fragmented. The brass floats were intact, and no damage was noted. The carburetor fuel inlet screen was free of debris. The throttle and mixture control cables were separated from the carburetor.

The engine crankshaft was rotated by turning the cooling fan and continuity of the crankshaft to the rear gears was confirmed. Compression and suction were observed from the No.1, No.2 and No.4 cylinders. The No.1 and No.3 cylinders displayed impact damage. Only faint compression and suction was observed from the No.3 cylinder. The No.1 and No.3 cylinders were removed. No damage other than impact damage was noted to the cylinders, pistons, or

valves, and the No.1 and No.3 connecting rods were free to rotate on the crankshaft. Continuity of the camshaft to the valvetrain was confirmed.

Oil was observed in the engine, and the oil suction screen and oil filter media were absent of metallic debris.