



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety

AIRFRAME/ENGINE EXAMINATION **SUMMARY**

Accident case number: ERA19FA283

Location of exam: Florida Air Recovery, Jacksonville, FL.

Examination of the accident site revealed the airplane was at the base of a tree in a upright position. There were freshly cut branches at the wreckage site. All flight control surfaces were located at the accident site. The cockpit section of the airplane was crushed and a tree trunk extended from the bottom of the fuselage through the top of the right side of the cockpit. The fuselage exhibited crush damage to the aft pressure bulkhead. The empennage was broken away from the fuselage at the aft pressure bulkhead and remained partially attached by flight control cables. The vertical and horizontal stabilizers remained attached to the empennage. The vertical stabilizer was buckled and the rudder was attached at the lower attachment points. The rudder was broken in two parts, the lower section containing the rudder trim was buckled. The upper section of the rudder was also buckled and partially attached to the remainder of the rudder assembly.

The horizontal stabilizer remained attached to the empennage and was buckled. The elevators were buckled remained attached to the horizontal assembly. Flight control cable continuity was established from the control yoke, rudder pedals and the trim actuator, to the rudder, rudder trim tab, elevator assemblies.

An examination of the left wing assembly revealed that a post-crash fire destroyed the wing assembly outboard of the engine nacelles. The left engine and nacelle exhibited fire and impact damage, and the inboard section of the wing remained attached to the fuselage at the wing root. The left landing gear was found in the extended position and the flaps were retracted. The left main and auxiliary fuel tanks were destroyed by post-crash fire. Flight control cables were found within the left wing assembly and extended outboard to fire damaged wing area. Flight control continuity was established from the aileron, aileron trim tab cables, to the control yoke and trim actuator.

Examination of the right wing assembly revealed that a post-crash fire destroyed the wing assembly outboard of the engine nacelles. The right engine and nacelle exhibited fire and impact damage, and the inboard section of the wing remained attached to the fuselage at the wing root. The right landing gear was found in the extended position and the flaps were retracted. The right main and auxiliary fuel tanks were destroyed by post-crash fire. Flight control cables were found within the right wing assembly and extended outboard to fire damaged wing area. Flight control continuity was established from the aileron, cables to the control yoke.

Examination of the right engine revealed that the crankcase remained intact and displayed impact and thermal damage signatures. There were no holes in the case that would indicate a catastrophic internal engine failure. The propeller flange remained attached to the rest of the propeller flange; the flange displayed impact damage and was bent. The propeller shaft gear was partially visible after removing the alternator; the gear displayed normal operating signatures. The propeller shaft was rotated using a hand tool; continuity was established between the propeller shaft, reduction gear, quill shaft, crankshaft, camshaft, connecting rods, and associated components. All six cylinders remained attached to their cylinder bays and displayed varying amounts of impact and thermal damage.

The cylinders were inspected using a lighted borescope. The piston faces, cylinder bores and valve heads displayed normal operating and combustion signatures. While rotating the propeller shaft it was noted that all six cylinders displayed thumb compression and suction. During rotation it was noted that all the rocker arms and valves moved accordingly.

Examination of the right propeller assembly revealed the three blade, constant speed propeller remained partially attached to the propeller flange and displayed impact damage signatures. The propeller blade marked "A" displayed minor damage to the rubber boot. The propeller blade marked "B" displayed minor impact damage near the root of the blade. Propeller blade marked "C" displayed minor S-bending as well as significant aft bending deformation. During the on scene portion of the investigation several tree branches were found with clean approximate 45 degree angle cuts and appeared to have black paint transfer on the right side of the airplane. After the examination, the following conclusions were drawn, the propeller had damage resulting from the impact sequence. There were no indications of any type of propeller failure or malfunction prior to impact sequence. The propeller had indications consistent with low amounts of rotational energy absorption (low rotation at impact likely with little to no engine power) during the impact sequence. Exact engine power levels were not determined.

Examination of the left engine revealed that the crankcase remained intact and displayed impact and thermal damage signatures. There were no holes in the case that would indicate a catastrophic internal engine failure. The propeller flange remained attached to the rest of the propeller flange; the flange displayed impact damage and was bent. The propeller shaft gear was partially visible after removing the alternator; the gear displayed normal operating signatures. The propeller shaft was rotated using a hand tool; continuity was established between the propeller shaft, reduction gear, quill shaft, crankshaft, camshaft, connecting rods, and associated components. The crankshaft gear was visible after removing the starter adapter; the gear remained intact and was undamaged. All six cylinders remained attached to their cylinder bays and displayed varying amounts of impact and thermal damage. The cylinders were inspected using a lighted borescope; the piston faces, cylinder bores, and valve heads displayed normal operating and combustion signatures. While rotating the propeller shaft all cylinders displayed thumb compression and suction and all of the overhead valve components moved accordingly.

Examination of the left propeller assembly revealed the three blade, constant speed propeller remained partially attached to the propeller flange and displayed impact damage signatures. The propeller blade marked "A" displayed minor impact damage to the root and was not bent. The propeller blade marked "B" displayed S-bending, twisting, and aft bending deformation as well as significant polishing of the cambered side. The propeller blade marked "C" displayed aft bending deformation and leading edge polishing near the tip. During the on scene portion of the investigation several tree branches were found with clean approximate 45 degree angle cuts and appeared to have black paint transfer on the left side of the airplane. After the examination, the following conclusions were drawn, the propeller had damage

resulting from the impact sequence. There were no indications of any type of propeller failure or malfunction prior to impact sequence. The propeller had indications consistent with low amounts of rotational energy absorption (low rotation at impact likely with little to no engine power) during the impact sequence. Exact engine power levels were not determined.