

Airframe and Engine examination summary
Cirrus SR20, N135CD

Fuselage

The fuselage was destroyed by impact forces. Small pieces of the flight controls, engine controls and instrument panel instruments were discovered within the debris field. The position of the flight controls, engine controls and instrument data could not be recovered. Both landing gear assemblies were found within the debris field and was impact damage.

Left Wing and Right Wing

Both wings were destroyed by impact forces. Fragments of the of the ailerons and flaps were discovered in the debris field. Push pull tube fragments were located within the debris field.

Empennage

The empennage was destroyed by impact forces. Fragments of the vertical and horizontal stabilizers was discovered in the debris field. The pitch trim motor was found in the debris field and impact damaged.

Cirrus airframe Parachute System (CAPS)

The CAPS rocket motor was found expended. The incremental bridle was partially unzipped and the parachute remained packed.

Engine

The engine sustained impact damage and was located in a crater at the base of a tree. The fuel system components, magnetos and accessories were separated from the engine and impact damaged. The left side engine cylinders were partially separated from the crankcase. The impact damage precluded functional testing of the engine.

The three-bladed, variable-pitch propeller was separated from the crankshaft, but remained attached to the propeller flange. The propeller hub remained intact; however, the piston was separated from the hub. All three blades remained attached to the hub but all were rotated within their collars, indicative of pitch change link fractures. The blades displayed areas that were twisted toward low pitch, leading edge gouges, chord-wise paint erosion, and s-bending. A 14-inch diameter tulip poplar tree displayed angled cuts consistent with propeller strikes.

The engine was removed from the impact crater and examined. The three cylinders on the left side of the engine were displaced aft with the leading edge of the barrels pulled free from the crankcase. The #5 and #6 cylinder heads were fractured and separated from their barrels. The #5 and #6 pistons were visible and neither displayed pre-accident anomalies. An intake and exhaust valve, along with their associated valve springs and valve keys were found (presumably from the #6 cylinder).

The entire camshaft was observed through the fractured oil sump and accessory case. No pre-accident anomalies were noted with any of the lifters or cam lobes. All six connecting rods were observed

through the bottom side of the case halves. All of the connecting rods remained intact and none displayed evidence of lubrication distress or discoloration.

The engine-driven fuel pump was fractured and separated from the engine. All fittings and lines were separated from the recovered portion. The pump portion was not observed or recovered. The inlet swirl chamber, vapor return, aneroid bellows, and mixture control lever/shaft remained with the recovered portion. The mixture lever, which was bent and twisted, remained secured to the shaft. The lever was manually manipulated and the mixture control shaft made a coinciding movement with no slipping noted. No pre-accident anomalies were noted with the recovered portions. A portion of the throttle body was recovered and the throttle valve and cam remained attached to the shaft. The metering unit housing and fittings were separated from the throttle body. The fuel manifold valve was separated from the topside of the engine and most of the lines and fittings were separated from the housing. The cap was removed and the spring remained intact. The diaphragm was torn in an area that coincided with the damaged housing but was otherwise intact. The plunger remained attached to the diaphragm with no pre-accident anomalies noted. Mud and organic debris was embedded into the separated fittings and the screen was deformed. Residual fuel was observed at the base of the fuel manifold housing.

The magnetos were separated from the engine and the housings and some of the internal components were fractured. The ignition harness was fragmented. Functional testing of the magnetos was not possible.

Only distorted remnants of the exhaust risers remained with the engine. The exhaust manifolds/tailpipes were separated from the engine and were flattened. Fractured remnants of the induction system were noted throughout the debris field. The throttle body was separated from the engine and the throttle valve was observed in the fully open position.

The magnetos were separated from the engine and the ignition harness was fragmented. The magnetos could not be functionally tested. The sparkplugs were fractured, separated, and/or impacted with mud.

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The oil sump was fractured and partially separated from the bottom side of the engine. The oil pump remained secured to the backside of the engine. The oil cooler was displaced aft and distorted. Examination of the components did not display any signs of lubrication distress or thermal discoloration.

The three cylinders on the left side of the engine were displaced aft with the leading edge of the barrels pulled free from the crankcase. All of the cylinders displayed cooling fin separation and deformation damage. The No. 5 and No. 6 cylinder heads were fractured and separated from the barrel. The No. 5 and No. 6 pistons were visible and neither displayed pre-accident anomalies. An intake and exhaust valve, along with their associated valve springs and valve keys were found (presumably from the No. 6 cylinder).

Though the crankshaft was not observed in its entirety, the connecting rods remained attached to their respective journals with no signs of thermal discoloration or lubrication distress noted. The propeller flange was separated from the crankshaft and remained attached to the propeller hub. The crankshaft gear was partially observed through the fractured accessory case.

The camshaft and lifters were observed through the fractured oil sump. There were no signs of operational distress or thermal discoloration noted with any of the components. The alternator and two vacuum pumps were separated from the engine. All accessories sustained substantial impact-related deformation damage. The vacuum pumps were disassembled and the rotors and vanes sustained fracture damage.

Propeller

The propeller governor was separated from the engine and the remains were located within the debris field. The three-bladed, variable-pitch propeller was separated from the crankshaft, but remained attached to the propeller flange. The propeller hub remained intact; however, the piston was separated from the hub. All three blades remained attached to the hub but all were rotated within their collars, indicative of pitch change link fractures. The blades displayed areas that were twisted toward low pitch, leading edge gouges, chord-wise paint erosion, and s-bending. A 14-inch diameter tree displayed angled cuts consistent with propeller strikes.