National Transportation Safety Board
Office of Aviation Safety
Washington, DC 20594

WPR22FA004

ACCIDENT SITE, AIRFRAME, AND ENGINE EXAMINATION

November 18, 2021

A. ACCIDENT

Location: Santee, California
Date: October 11, 2021
Time: 1214 Pacific daylight time
Airplane: N7022G, Cessna 340A

B. ACCIDENT SITE, AIRFRAME, AND ENGINE EXAMINATION

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C. DETAILS OF THE EXAMINATION

1.0 Accident Site

Examination of the accident site revealed that the airplane impacted a residential street on a heading of about 113° magnetic heading. The debris path, which consisted of various airplane, vehicle, and residential structure debris was about 475 ft long and 400 ft wide, oriented on a heading of about 132°. Numerous residential structures exhibited impact related damage and or fire damage.

Figure 1: Annotations of wreckage locations. Aerial photo provided by San Diego County Sheriff.

The first identified point of contact (FIPC) was a gouge in the asphalt road about 10 inches long and 5 inches wide. Scrape marks extended from about 18 ft from the FIPC to a second gouge in the asphalt, which was about 2 ft wide and 3 ft long, along with a damaged vehicle. Adjacent to the second scrape mark and vehicle, was an additional gouge in the asphalt, about 2 ft long and 4 inches wide. Additional scrape marks extended 28 ft to a large impact crater within the asphalt, which was about 4 ft wide, 3 ft long, and about 6 inches deep, and contained a portion of propeller blade. Additional scratch marks extended another 12 ft to portions of red lens, consistent with the left wing navigation lens.

Figure 2: Initial impact area.

The left and right propeller assemblies were located about 110 and 115 ft from the FIPC. The main wreckage, which consisted of both wings, fuselage structure, and empennage was located about 166 ft from the FIPC. The left elevator was located about 233 ft from the FIPC.

One engine was located about 199 ft from the FIPC and a second engine was about 250 ft from the FIPC. Portions of wing structure were located about 355 ft from the FIPC. Additional light debris consisting of a vacuum pump and metal fragments were located about 475 ft from the FIPC.

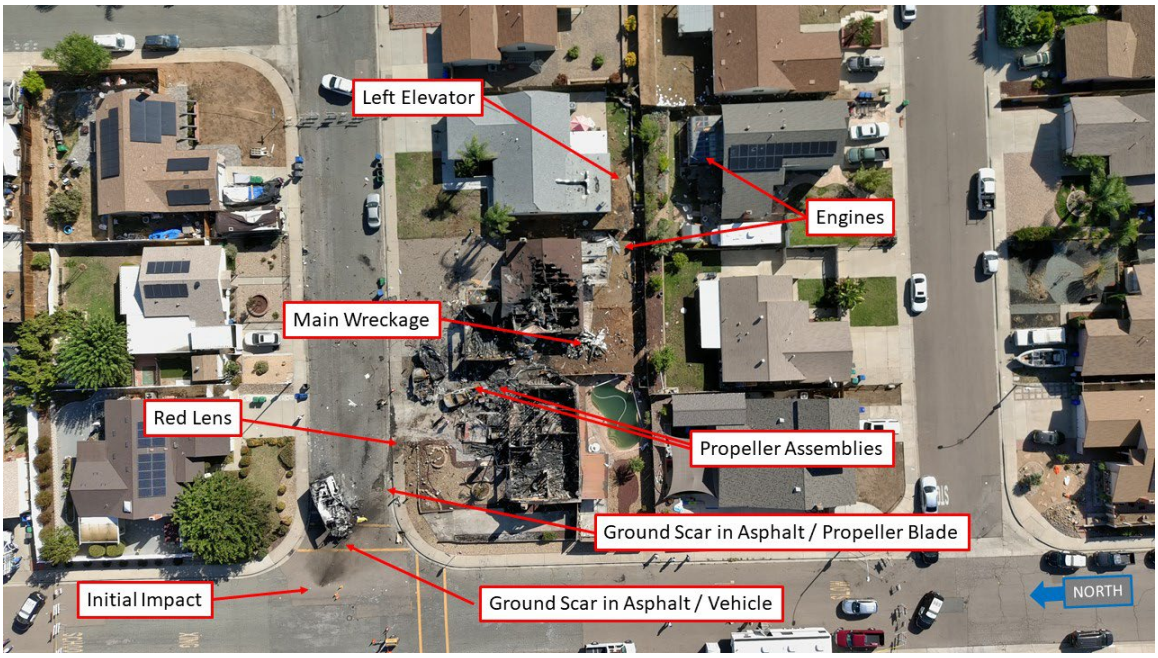

Figure 3: Annotations of wreckage locations. Aerial photo provided by San Diego County Sheriff.

Examination of the main wreckage revealed that the fuselage and wings were located within the main wreckage and exhibited extensive fire damage and fragmentation throughout. Both engines were separated from their respective mounts. The empennage exhibited extensive crushing throughout. The left horizontal stabilizer was impact damaged and the left elevator was separated and located adjacent to the main wreckage within the debris path. The right horizontal stabilizer was impact damaged and was torn open from the leading edge aft about 30 to 40 inches from the outboard tip. The right elevator was separated. The outboard approximate 50 inches of the right elevator was located within the debris area. however, the inboard portion of the right elevator and trim tab were not located. The vertical stabilizer and rudder remained attached to the empennage structure and exhibited impact damage.

All major structural components of the airplane were located within the debris path with the exception of the inboard portion of the right elevator.

Control continuity was established from the elevator bellcrank to the cockpit control bellcrank. One control cable exhibited signatures consistent with overload separation. Rudder control continuity was established from the rudder bellcrank to the rudder pedals. One control cable exhibited signatures consistent with overload separation. Aileron control continuity on both wings was established from the aileron bellcrank inboard with overload separations in the cables. Continuity from the aileron cable separations inboard to the control column was not able to be obtained at the accident site due to impact damage. Multiple flap hinges and flap surfaces

were observed throughout the debris path. All 3 main landing gear were observed, separated from the airframe. Gear position could not be determined.

Elevator and rudder trim actuators were located and measured, with both found in the neutral position. No aileron trim actuators were located.

Figure 4: Main wreckage area.

Figure 5: Main wreckage area.

Both propeller assemblies were separated from the engines and exhibited varying degrees of propeller blade separation. Fragments of the propeller blades were located throughout the wreckage debris path. All recovered fragments exhibited chordwise striations, gouges, and polishing along the cambered side of the blade.

Figure 6: Propeller assembly.

Figure 7: Propeller assembly.

Figure 8: Recovered propeller blade fragment.

Both engines were heavily impact damaged, with engine accessories separated, and varying degrees of cylinder damage. Both engine crankcases exhibited impact damage to the forward area of the crankcase, exposing internal engine components. The engine turbo chargers were fragmented into multiple sections and located throughout the wreckage debris area.

Figure 9: Engine.

Figure 10: Engine

2.0 Recovered Airframe Examination

Examination of the recovered wreckage revealed that all major structural components were recovered. Remains of all primary flight controls were also located within the recovered debris. Primary flight control cables were located within the recovered wreckage. Segments of cable chains were located. All separations within the cables were consistent with tension overload.

The pitch, roll, yaw damper, and pitch trim servos were located within the recovered wreckage. The servos were retained for the possibility of further examination.

One of the fuel selector valve handles was recovered. The fuel selector valve itself was fragmented and a position could not be obtained.

Various avionics debris was located within the recovered wreckage. The recovered items exhibited significant fire or impact related damage, which precluded functional testing.

Remains of both engines were located within the recovered wreckage.

3.0 Recovered Engines Examination

Right Engine:
Continental TSIO-520-NB
S/N: 290896-R

The engine was separated from the engine mounts. All engine accessories were separated. The accessory case was impact damaged with a large portion separated, which exposed the crankshaft and camshaft gears. The oil sump was impact damage and mostly separated from the engine.

The number 1 cylinder as partially separated from the crankcase (forward side). The upper portion of the cylinder, including the rocker box/rocker arms. Both valves remained attached to the cylinder. The upper and lower spark plug remained attached to the cylinder. The cylinder was examined internally using a lighted borescope. The piston exhibited a normal amount of combustion deposits. The exhaust and intake valves were slightly displaced from their seats.

The number 2 cylinder remained attached to the crankcase and exhibited varying degrees of impact damage to the pushrod tubes and rocker box cover. The intake and exhaust rocker arms remained attached to the cylinder. The valves and springs appeared to be free of damage and intact. The upper and lower spark plug remained attached to the cylinder. The cylinder was examined internally using a lighted borescope. The piston and exhaust/intake valves exhibited normal operational signatures.

The number 3 cylinder head were separated, and the piston remained within the cylinder barrel. The piston face exhibited normal operating signatures. Varying degrees of impact damage was observed on the cylinder barrel.

The number 4 cylinder remained attached to the crankcase and exhibited varying degrees of impact damage to the pushrod tubes and rocker box cover. The intake and exhaust rocker arms remained attached to the cylinder. The valves and springs appeared to be free of damage and intact. The upper and lower spark plug remained attached to the cylinder. The cylinder was examined internally using a lighted borescope. The piston and exhaust/intake valves exhibited normal operational signatures.

The number 5 cylinder heads were separated, and the pistons remained within the cylinder barrels. The piston face exhibited normal operating signatures. Varying degrees of impact damage was observed on the cylinder barrel.

The number 6 cylinder was separated from the crankcase and was thermally damaged. Portions of the crankcase remained attached to the cylinder. The cylinder head exhibited varying degrees of impact damage. The bottom spark plug was separated. The upper spark plug remained installed. The intake and exhaust rocker arms were separated. The intake and exhaust valve springs were intact, however, impact damaged. The upper portion of the piston remained within the cylinder barrel. The lower portion of the piston, including the piston pin was separated and not located.

Holes were drilled into the upper part of the crankcase over the number 1, 3, 2, and 4 cylinders. The inside of the crankcase was examined internally using a lighted borescope. The number 1, 2, 3, 4, 5, and 6 connecting rods remained attached to the crankshaft. The number 1, 2, 3, 4, and 5 pistons remained attached to the connecting rods. No mechanical damage was observed throughout the internal areas of the engine. The piston face exhibited normal operating signatures.

The crankshaft was bent toward the 2-4-6 side of the engine forward of the number 6 connecting rod journal. 45° cracks were observed in the area of the bend. The number 6 connecting rod was bent slightly forward along the I-beam near the rod yoke.

The top 1, 2, and 3 spark plugs were removed and exhibited worn-normal signatures. Light grey deposits were observed within the electrode area.

The fuel pump was found within the recovered wreckage debris. The drive shaft coupling was not located. The fuel pump was disassembled, and all internal components were intact.

The oil pump was located within the recovered debris. The oil pump was disassembled, and all internal components were present. The gears were oil coated, and the internal cavity exhibited no signs of hard particle passage.

Left Engine:
Continental TSIO-520-NB
S/N: 290255-R

The engine was separated from the engine mounts. All engine accessories were separated except for the oil pump, oil filter adapter, starter adapter, and fuel pump.

The number 1 cylinder head were separated, and the piston remained within the cylinder barrel. The piston face exhibited normal operating signatures. Varying degrees of impact damage was observed on the cylinder barrel.

The number 2 cylinder remained attached to the crankcase and exhibited varying degrees of impact damage to the pushrod tubes and rocker box cover. The intake and exhaust rocker arms remained attached to the cylinder. The valves and springs appeared to be free of damage and intact. The upper and lower spark plug remained attached to the cylinder. The cylinder was examined internally using a lighted borescope. The piston exhibited normal operational signatures.

The number 3 cylinder head were separated, and the piston remained within the cylinder barrel. The piston face exhibited normal operating signatures. Varying degrees of impact damage was observed on the cylinder barrel.

The number 4 cylinder remained attached to the crankcase and exhibited varying degrees of impact damage to the pushrod tubes and rocker box cover. The intake and exhaust rocker arms separated. The exhaust valve was separated and not located. The intake valve and springs appeared to be free of damage and intact. The upper spark plug remained attached to the cylinder. The cylinder was examined internally using a lighted borescope. The piston and intake valves exhibited normal operational signatures.

The number 5 cylinder heads were separated, and the pistons remained within the cylinder barrels. The piston face exhibited normal operating signatures. Varying degrees of impact damage was observed on the cylinder barrel.

The number 6 cylinder was separated from the crankcase and was thermally damaged. Portions of the crankcase remained attached to the cylinder. The cylinder head exhibited varying degrees of impact damage. The bottom spark plug was separated. The upper spark plug remained installed. The intake and exhaust rocker arms were separated. The intake and exhaust valve springs were intact, however, impact damaged. The piston remained attached to the connecting rod and exhibited a normal amount of combustion deposits along with impact damage.

Holes were drilled into the upper part of the crankcase over the number 1, 3, 2, and 4 cylinders. The inside of the crankcase was examined internally using a lighted

borescope. The number 1, 2, 3, 4, 5, and 6 connecting rods remained attached to the crankshaft. The number 1, 2, 3, 4, and 5 pistons remained attached to the connecting rods. No mechanical damage was observed throughout the internal areas of the engine. The piston faces exhibited normal operating signatures.

The crankshaft was bent upward and toward the 2-4-6 side of the engine forward main journal. 45° cracks were observed in the area of the bend. The number 6 connecting rod was bent forward and appeared slightly twisted.

The fuel pump remained attached to the accessory case. 3 of the 4 fuel lines remained attached to the pump. The adjustment portion of the fuel pump was impact damaged and separated. The fuel pump drive shaft was intact and undamaged. The pump was disassembled, and all internal components were intact and undamaged.

The oil pump was removed from the engine. The internal gears were oil coated, and no evidence of any hard particle passage was observed within the oil pump cavity.

The starter adapter was impact damaged and the drive shaft rotated freely by hand. The starter was separated from the starter adapter.

A vacuum pump was recovered within the recovered debris. The pump was disassembled, and the rotor and vanes were impact damaged.

The turbochargers for both engines were located within the recovered debris. Both turbochargers exhibited varying degrees of impact damage. The turbine and induction sections were separated one from another. Various portions of exhaust were located within the debris and was impact damaged.

4.0 Propeller Examination

The propeller assemblies were located within the recovered debris. One propeller assembly had the remains of one blade still connected to the hub and exhibited bending opposite direction of rotation with blade separation about mid span. The remaining 2 blades were separated at the hub. The second propeller assembly had 2 blades that remained attached to the propeller hub. One propeller blade was bent opposite direction of rotation and curled almost 360°. The propeller blade tip was separated. The remaining propeller blade that was attached to the propeller hub was impact damaged and separated about mid blade. Propeller blade fragments were located throughout the recovered wreckage and exhibited various degrees of chordwise scratching, blade twisting, and curling along with leading edge and trailing edge gouges.

Submitted by:

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