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Office of Aviation Safety

Western Pacific Region

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AIRPLANE & ENGINE EXAMINATION

WPR18LA034

This document contains 14 embedded photos.

(14 Pages)

WPR18LA034

San Jose, California

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1500 PST

Cessna 172P – N52492

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HISTORY OF FLIGHT

On November 19, 2017, about 1500 Pacific standard time, a Cessna 172P airplane, N52492, was substantially damaged when it impacted a residence following a partial loss of engine power in San Jose, California. The private pilot received minor injuries and the passengers were seriously injured. The airplane was operated by Squadron 2 as a personal flight, conducted under the provision of *14 Code of Federal Regulations Part 91*. Visual meteorological conditions prevailed and a flight plan was not filed for the local flight, which had departed Reid Hillview Airport (RHV), San Jose, California shortly before the accident.

According to the pilot, she completed a preflight inspection and taxied to runway 31R for an engine run-up, which did not reveal any anomalies. The takeoff roll was normal and the airplane lifted off the ground at approximately 55 knots. As the airplane reached an indicated altitude of

about 50 feet, the pilot observed the vertical speed and rpm decrease simultaneously, while the engine began to run rough. Once the airplane was beyond the airport perimeter, the pilot started a shallow left turn, while simultaneously searching for a landing site as she had difficulty maintaining altitude. She continued the turn until she observed a grass field in front of her as the airplane was descending. Moments before impact she decreased the airplane's pitch attitude, but the airplane continued to descend until it impacted a residence.

A surveillance camera captured a portion of the airplane's initial climb and its subsequent descent. The recording showed the airplane maintain a low altitude and enter a shallow left turn and slight nose high attitude shortly after its departure from the runway. Seconds later, the airplane's bank angle increased in the turn as the airplane descended. In its final movements, the airplane's pitch attitude decreased and the airplane's wings leveled out and then the airplane disappeared behind trees.

A postaccident examination of the airplane by the Federal Aviation Administration revealed substantial damage to the wings, empennage and fuselage.

PERSONNEL INFORMATION

The pilot, age 30, held a private pilot certificate with a rating for single-engine land and instrument airplane. The pilot's most recent first class medical certificate was issued on August 5, 2017, which included the limitation, "much wear corrective lenses." According to the pilot, her flight time included 273 hours of total flight time in all aircraft of which 5 hours had been accumulated in the accident airplane make and model.

The pilot-rated passenger, age 33, held a private pilot certificate with a rating for single-engine land and instrument airplane. The pilot's most recent first class medical certificate was issued on July 13, 2017, which did not include any limitations. According to the pilot, his flight time included 233 hours of total flight time in all aircraft of which 9 hours had been accumulated in the accident airplane make and model.

AIRCRAFT INFORMATION

According to FAA records, the airplane was manufactured in 1981 and registered to L-Bird LLC on December 16, 2015. The airplane was powered by a Lycoming O-320-D2J, air cooled, 160 horsepower engine. Maintenance records indicated that the airplane's most recent 100 hour engine inspection was completed on November 4, 2017 at a total time of 14,748.3 flight hours and a tachometer time of 1,756.4 hours. At the time the engine had accrued a total of 2,151.5 flight hours since its most recent engine overhaul, which was accomplished on June 25, 2006. According to the airplane's tachometer, at the time of the accident, the tachometer displayed 1,779 hours total time in service.

METEOROLOGICAL INFORMATION

The 1455 recorded weather observation at RHV included wind 330° 6 knots, visibility 10 statute miles, broken clouds 10,000 ft, temperature 19° C, dew point 06 C, and an altimeter setting of 30.04 inches of mercury.

WRECKAGE AND IMPACT INFORMATION

The airplane came impacted a trailer and a several small trees before it collided with the front of a residence and came to rest in the front yard. All three landing gear had collapsed or separated from the fuselage, which was resting flush against the ground. The outboard portion of the left wing was separated and the right wing was partially separated about mid-span. The empennage displayed some buckling at the aft fuselage.

ADDITIONAL INFORMATION

Initial Observations

The airplane was recovered and to a secure facility in Pleasant Grove, California. A postaccident examination of the airplane and engine was completed on January 31st by representatives of Textron Aviation and Lycoming Engines under the supervision of the National Transportation Safety Board Investigator-in-Charge and two representatives of the Federal Aviation Administration.

The airplane was photographed in its post-recovery condition. The four door posts were cut by first responders and the roof of the cabin, along with the remaining inboard wing sections, were removed. The engine mounts were unremarkable and the engine case was intact.

Fuel System

Several ounces of fuel that resembled 100 low lead aviation grade gasoline was drained through the fuel strainer, but did not display any contamination or debris. The fuel selector moved normally through its detents from the LEFT, RIGHT, and BOTH positions. Air was blown through the fuel system from the door posts to the fuel selector valve, and no obstructions were observed.

Flight Control System

Flight control continuity was traced from the cockpit to the elevator, rudder, and ailerons. The left aileron cable and through cable were both fractured in tensile overload at the aileron-flap junction. Both the left and right aileron drive cables were cut by first responders and the elevator, rudder, and elevator trim cables were cut by recovery personal when the tail was removed. The wing flap actuator was not extended, consistent with a flap retracted position.

Cockpit Controls

Continuity of the mixture and throttle controls were confirmed from the cockpit to their respective arms on the fuel control unit. Full range of movement for the throttle, mixture control

and carburetor heat control could not be confirmed. The stall warning horn sounded normally when air was sucked through the horn.

Seat Belts

Confirmed shoulder harnesses were cut, but could not locate shoulder harness connector for right seat. Connector still attached to left lap belt. Rear seat lap belts were found unbuckled.

Engine Examination

The engine case and accessories were not damaged with the exception of the carburetor, which had broken off at the flange. The forward baffling showed normal wear and was removed from the engine case during disassembly. The propeller spinner was fractured and the extension was cracked.

Ignition System

Each of the engine's 8 Champion 40E spark plugs were removed and were gray in appearance, consistent with normal wear when compared to the Champion Aerospace Aviation Service Manual. A thumb compression test revealed intake and exhaust pressure for each cylinder. The left magneto, a Slick model 4371, serial number 02050059, and the right magneto, a Slick model 4371, serial number 02052067, remained attached to the engine accessory case. Each ignition harness lead displayed normal wear and exhibited spark when the propeller was rotated by hand.

Oil System

Disassembly of the oil filter screen did not reveal any debris. The oil suction screen contained some sealant, but was otherwise unremarkable and approximately 6 quarts of oil were drained from the oil sump, which was not damaged. The oil pump was not removed.

Exhaust

The muffler was crushed and the shroud was punctured.

Carburetor

The carburetor, a Marvel Shebler, model MA-4SPA, part number 10-5217, serial number MS870207 broke free from the flange, but the mixture and throttle controls remained attached. The carburetor fuel inlet screen was free of debris.

Vacuum Pump

The vacuum pump, a Tempest model AA3215CC dry air pump, serial number N39138, was not disassembled. The unit exhibited some restricted movement when rotated by hand, which was likely due to the vanes. A small amount of air was observed from the pump outlet port. The frangible coupling was intact.

Cylinders

Each of the four cylinders walls, valves, pistons and connecting rods displayed normal wear with the exception of the exhaust valves to cylinder nos. 1 and 2, which displayed carbon deposits that were affixed to each valve. Cylinder no. 2 was sealed with PRC along the circumference of the outside diameter of the cylinder at the crankcase. The push rods were straight and unremarkable.

Crankcase

The crankcase halves were unremarkable and the bearing races appeared normal. The accessory gear were coupled together and the teeth were normal in appearance.

Camshaft

Rocker arm movement for each cylinder exhaust valve was smooth and unremarkable. The intake valve movement for cylinder nos. 1 and 2 were normal, but the intake valves to cylinder nos. 3 and 4 did not make full travel. The camlobe that support the intake valves to cylinder nos. 3 and 4 was severely worn with extensive pitting. The respective lifter for both intake valves was extensively spalled. Additionally, the cam lobe that supports the intake valves for cylinder nos. 1 and 2 exhibited some wear and the lifters were spalled.

Propeller

The propeller remained attached to the propeller flange and the engine. One blade exhibited chordwise scratches, blade tip curling and the blade tip was separated. The other blade displayed a gouge and bending at the tip, which had separated.



Photograph 1: Airplane Fuselage & Wings Prior to Examination



Photograph 2: Airplane Wings and Aft Fuselages Prior to Examination



Photograph 3: View of Empennage



Photograph 4: View of engine without cowling



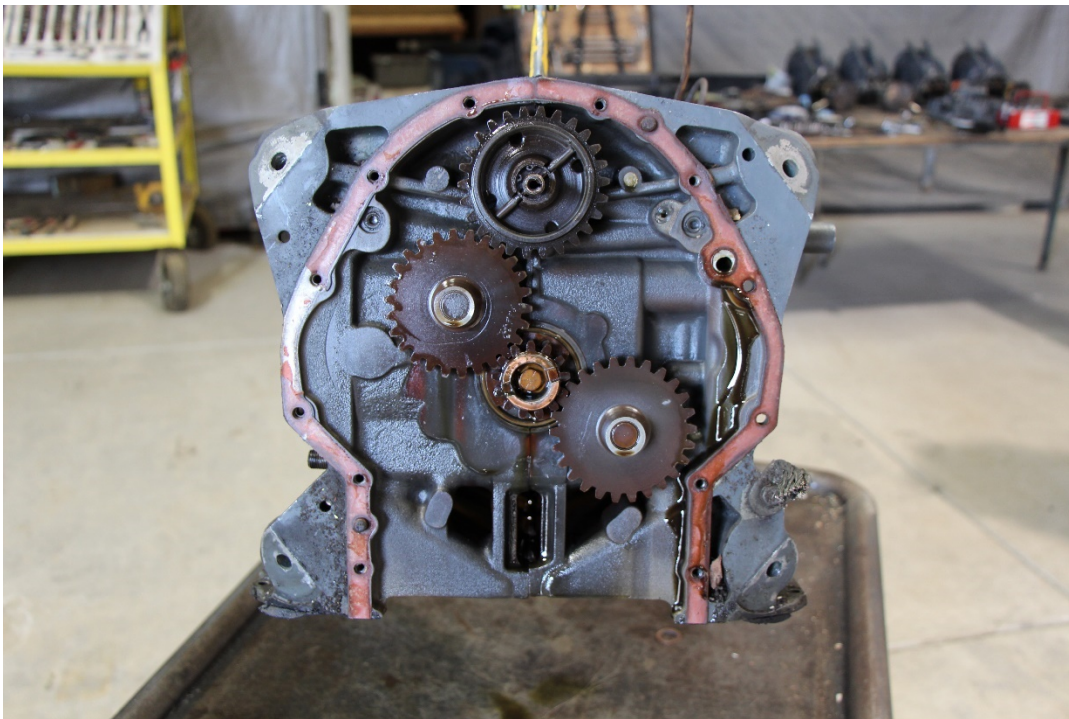
Photograph 5: Top and Bottom Ignition Leads for Cylinder Nos. 1 and 3



Photograph 6: Top and Bottom Ignition Leads for Cylinder Nos. 2 and 4



Photograph 7: Top and Bottom Spark Plugs for Cylinder Nos. 1-4



Photograph 8: Accessory Gears with Accessories Removed



Photograph 9: PRC on Cylinder No. 2



Photograph 10: View of Camshaft and Intake Valve Cam Lobe to Cylinder No. 3 and 4 (note pitting and wear)



Photograph 11: View of Intake Valve Cam Lobe to Cylinder No. 3 and 4 (note pitting and wear)



Photograph 12: View of Intake Valve Cam Lobe to Cylinder No. 3 and 4 (note some pitting and wear)



Photograph 13: View of Cam Lifter to Cylinder No. 4 Intake Valve (note spalling)



Photograph 14: View of Cam Lifter to Cylinder No. 3 Intake Valve (note spalling and wear)