NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety

Western Pacific Region

July 28, 2020

AIRPLANE AND ENGINE EXAMINATION

WPR19FA244

This document contains 13 embedded photos.

(10 Pages)

A. ACCIDENT

Location: McKenzie Bridge, Oregon

Date: August 27, 2019

Aircraft: Cessna 172

NTSB IIC: Stephen Stein

B. EXAMINATION PARTICIPANTS

Stephen Stein
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C. DETAILS OF THE INVESTIGATION

HISTORY OF FLIGHT

On August 27, 2019, about 1835 Pacific daylight time, a Cessna 172 airplane, N4108F, was destroyed during a go-around maneuver near McKenzie Bridge State Airport (00S), McKenzie Bridge, Oregon. The private pilot and passenger were fatally injured. The airplane was registered to a private individual and operated by LebanAir Aviation as a personal flight, conducted under the provision of Title *14 Code of Federal Regulations* Part 91. Visual meteorological conditions prevailed and a flight plan was not filed for the local flight, which departed Lebanon, Oregon about 1800.

The pilot departed with a friend who did not have any flight experience. Three witnesses who were supporting a fire detection detail at 00S at the time of the accident observed the accident airplane moments before impact. At the time of the accident, the witnesses were positioned beneath trees towards the end of the runway and had an unobstructed view of the center section of the runway. According to their recount, the airplane was about 5 ft above ground level (agl) flying east on runway 06 when it came into their visual range. The airplane appeared to be moving slowly as the wings rocked; however, the engine sounded smooth and continuous.

Seconds later the airplane began a shallow climb and disappeared from view as it reached an approximate altitude of about 20 ft agl.

The airplane came to rest inverted in a wooded area about 615 ft east of the departure end of runway 06. The initial impact point (IIP) was marked by an approximate 120 foot tall tree with a severed tree top. A section of the left wingtip was found about 40 feet southwest of the IIP and was comprised of an 8 inch long concaved shaped depression in the leading edge of the wingtip. An intermediate impact point was observed along the debris path and marked by several broken tree branches at the top of an approximate 120 foot tall tree about 75 feet southeast of the IIP. The main wreckage was located about 150 ft from the IIP and was mostly consumed by postcrash fire, but was comprised of all four corners of the airplane.

PERSONNEL INFORMATION

The pilot, age 23, held a temporary private pilot certificate with a rating for single-engine land. His most recent first-class medical certificate was issued on September 27, 2018, which did not include any medical restrictions. According to the pilot's logbook, he had amassed a total of 69.4 total flight hours as of August 24, 2019, which was the final entry in the record. The logbook showed that he had accumulated a total of about 31.6 flight hours in the 90 days that preceded the accident. All of the pilot's flight time was performed in the accident airplane make and model. The logbook showed that he started his most recent flight training on September 18, 2018 and flew regularly until November 2018 when his training ceased. According to his instructor, he

temporarily discontinued his training about this time for the winter months. His flight training resumed on April 21, 2019 until he passed his private pilot check ride on July 29, 2019.

AIRCRAFT INFORMATION

Federal Aviation Administration records showed that the airplane was manufactured in 1959 and was registered to the owner on August 10, 2017. The airplane was powered by a Continental Motors O-300-A, serial number 900151 OH, air cooled, 145 horsepower, reciprocating engine. Maintenance records showed that the airplane's most recent 100 hour inspection was completed on August 25, 2019 at a total time of 4,833 flight hours and a tachometer time of 2,530 flight hours. An annual inspection was performed on June 2, 2019 at an airframe total time of 4,739 total flight hours and a tachometer time of 2,435 flight hours. A 100 hour inspection of the engine was performed at the same time as the airframe inspection, about 1,037 hours since the engine's most recent major overhaul, which was completed on March 16, 1995. According to the logbook entry, the tachometer showed 1,493 flight hours at the time of the overhaul.

METEOROLOGICAL INFORMATION

The 1854 recorded weather observation at Mahlon Sweet Field Airport, Eugene Oregon included wind 330° at 10 knots, visibility 10 statute miles, clear sky, temperature 37° C, dew point 08° C, and an altimeter setting of 29.74 inches of mercury.

Local wind information was retrieved from a website operated by the University of Utah from a station located about 3 nm west of the accident site. The station's 1806 weather entry showed wind 2 mph with gusts to 8 mph from the northeast, temperature 98°, and dewpoint 41°.

An NTSB weather study showed a density altitude of 4,481 ft msl about the time of the accident.

AIRPORT INFORMATION

00S was located at an elevation of 1,620 ft above mean sea level and was equipped with one grass runway in a 06/24 configuration. The runway was 2,600 ft long and 90 ft wide. According to the Federal Aviation Administration Chart Supplement that was current at the time of the accident, departures from runway 06 were not recommended, which was also displayed on airport signage along the runway. The departure end of runway 06 was comprised of 134 foot-tall rising terrain and numerous trees (photograph 1).

WRECKAGE AND IMPACT INFORMATION

The airplane came to rest inverted in a wooded area about 615 ft east of the departure end of runway 06 and was oriented on a heading of 300° magnetic. The initial impact point (IIP) was marked by an approximate 120 foot tall tree with a severed tree top at a field elevation of 1,754 ft. A section of the left wingtip was found about 40 feet southwest of the IIP and was comprised of an 8 inch long concaved shaped depression in the leading edge of the wingtip (photograph 2). An intermediate impact point was observed along the debris path and marked by several broken tree branches at the top of an approximate 120 foot tall tree about 75 feet southeast of the IIP.

The main wreckage was located about 150 ft beyond the IIP and was mostly consumed by postcrash fire. All four corners of the airplane were accounted for at the accident site (photograph 3).

ADDITIONAL INFORMATION

Airframe Examination

The engine, fuselage and wings were mostly consumed by postcrash fire with the exception of the outboard wings, which exhibited extensive damage. The aft fuselage was intact, but thermally damaged and the empennage, which was comprised of the vertical stabilizer, elevator, and rudder, was intact. Flight control continuity was traced from the rudder, elevator, and aileron flight controls surfaces to the cockpit. Both ailerons exhibited a small range of movement when actuated by hand at the cables and the elevator and rudder displayed a full range of movement over their respective axes. The elevator trim actuator measured 1.2 inches, consistent with a neutral trim setting. The flap handle spring was separated from the flap handle and the ratcheting mechanism was also separated, which precluded a confirmation of the flap setting (photograph 4). Both flap cables remained attached to their respective bell cranks; the left wing flap remained attached to the bell crank through the push pull tube and the right wing flap push pull tube had separated from the right wing flap.

Most of the fuel system was not recovered and is presumed to have been destroyed by postcrash fire. The fuel selector valve was damaged by fire, but indicated that the detent was in the BOTH position. The valve was free of debris and moved normally between the BOTH, LEFT, RIGHT, and OFF detents. The fuel strainer screen was free of debris; the gascolator fuel bowl was not recovered.

The instruments were destroyed by postcrash fire.

The pilot, co-pilot, and rear seats were damaged by postcrash fire, which revealed the seat structures. Both the pilot and co-pilot seat belt buckles were clapsed, but the seat belts were not recovered.

The engine was inverted and the revealed extensive fire damage. Both the oil sump and accessory case were destroyed, which showed the camshaft, crankshaft, and most of the internal parts (photograph 5). The camshaft lobes and valve lifters were unremarkable and the engine did not show any evidence of catastrophic damage. Mechanical movement of the valvetrain and crankshaft could not be verified as the propeller was seized.

Engine Examination

An engine examination was performed at a later date in a secure facility.

Rotational continuity could not be achieved due to the state of the engine (photograph 6). The top portion of the engine case had sustained some thermal damage, and had sustained fire damage and some bulging near cylinders 5 and 6. Most of the cylinders remained intact with the

exception of the cylinder head to cylinder no. 2, which had partially separated. All of the intake tubes had melted away and the rocker arms were covered in brownish deposits, consistent with rust, and attributed to postaccident fire suppression activities. The engine accessories case, constructed from magnesium, was destroyed by postcrash fire.

The lower engine case was destroyed by fire, which revealed the crankshaft, connecting rods, and pistons. Several pistons remained within their respective cylinders attached to their connecting rods, which were secured to the crankshaft. Some pistons had melted away, but displayed molten remnants in the cylinders. The camshaft had separated from the engine and was thermally damaged with, but did not display any anomalous wear on any of its lobes with the exception of rust deposits attributed to fire suppression activities (photograph 7). With the exception of fire damage, the valve lifters appeared intact and did not display any unusual wear (photograph 8).

A borescope inspection of each cylinder revealed extensive fire damage to most of the cylinder walls and valves. Several valves also displayed rust deposits. None of the valves appeared broken and those with minimal fire damage did not display any anomalous signatures.

The engine was equipped with two exhausts; one for cylinder nos. 1, 3, and 5 and the other for cylinder nos. 2, 4, and 6. Both exhausts remained attached to their cylinders through the exhaust tubes. The outer shroud to both exhausts were removed and a visual inspection of the exhaust linings did not reveal any cracks or leaks (photographs 9 and 10).

The magnetos (photograph 11) and several accessories were destroyed by postcrash fire. The carburetor had separated from the airbox, and was not recovered, but is presumed to have melted during the postcrash fire. Most of the spark plugs were thermally damaged and the ignition harness was destroyed. Several top spark plugs and one bottom spark plug were removed from their ports. The remaining plugs were either seized to the engine case or inaccessible. The spark plug observations are captured in the table below. Most of the spark plug electrodes were normal in appearance.

Top/Bottom	Cyl. 1	Cyl. 3	Cyl. 5	Cyl. 2	Cyl. 4	Cyl. 6
Top	Soot covered	Some soot	Normal wear	Unremarkable	Unremarkable	Soot covered
Bottom				Normal wear		

The propeller was thermally damaged and remained attached the engine crankshaft. One propeller blade was unremarkable and the other propeller blade was separated near the blade root with a slight aft bend, but did not display any striations, nicks or gouges (photographs 12 and 13).

Photograph 1: Departure End of Runway 06

Photograph 2: Left Wingtip

Photograph 3: Main Wreckage

Photograph 4: Flap Handle

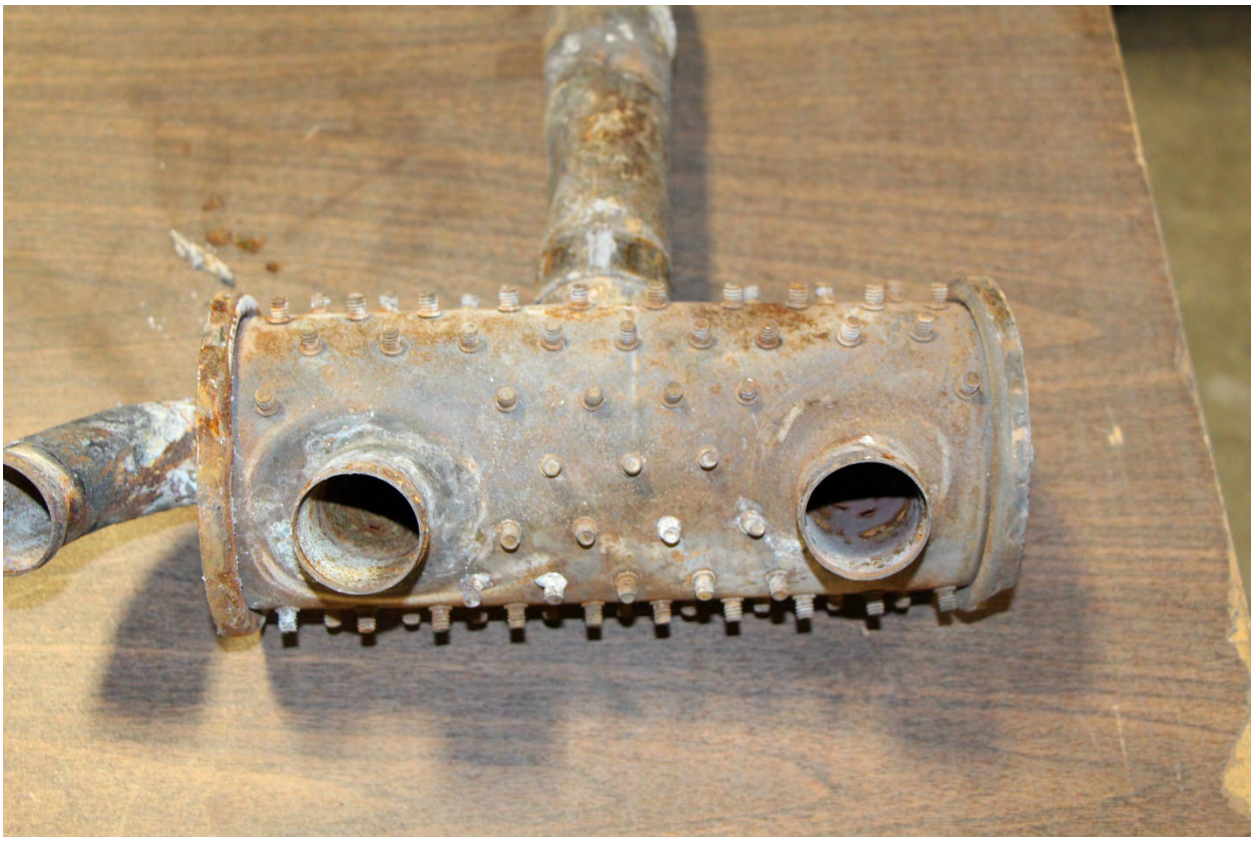
Photograph 5: Lower Half of Engine

Photograph 6: Engine Prior to Examination

Photograph 7: Camshaft

Photograph 8: Valve Lifters

Photograph 9: Exhaust Lining to Cylinder nos. 1, 3, 5



Photograph 10: Exhaust Lining to Cylinder nos. 2, 4, 6

Photograph 11: Magneto Remnants

Photograph 12: Propeller Blade

Photograph 13: Separated Blade