



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety

February 15-16, 2020

AIRFRAME AND ENGINE EXAMINATION

ERA20FA101

This document contains 13 embedded photos.

(12 Pages)

1.0 EXAMINATION PARTICIPANTS:

Lynn Spencer
Air Safety Investigator
National Transportation Safety Board
Ashburn, VA

J. Mike Childers
Senior Air Safety Investigator
Lycoming Engines
Williamsport, PA

2.0 SUMMARY

Examination of N1149T was conducted on February 15-16, 2020, at Florida Air Recovery, Jacksonville, Florida. Examination of the airframe revealed substantial damage but no mechanical preimpact anomalies. Examination of the engine revealed no preimpact anomalies. Propeller damage was consistent with the engine producing power at the time of the accident.

3.0 DETAILS OF THE EXAMINATION

3.1 Airframe Examination

There was no evidence of fire on any portion of the airplane.

Examination of the left wing revealed that the flap was attached only at the most inboard attach point and was displaced in a positive direction. The left aileron was impact fractured and detached from the wing at all but the innermost attachment point. The entire left wing leading edge was impact crushed aft and upward. No fuel remained in the tank, and the tank was impact ruptured. The inboard panel of the left upper wing surface was torn away where the landing gear, seated in its well, was partially driven through the upper wing surface.

Examination of the right wing revealed the flap and aileron remained connected at all hinge points. The leading edge exhibited full span aft crushing. The outboard several feet of the wing were displaced in a positive direction. The right main landing gear remained in its well. The fuel cap was in-place. No fuel remained in the tank.

The empennage was fractured in multiple areas with wrinkling noted on the left and right sides. The empennage aft of the right wing displayed crushing from impact with a fence, upon which the wreckage came to rest. The forward most 18 in of the vertical fin fairing rivets were pulled out. The tail section was mostly undamaged.

The fuselage forward of the pilot seats was destroyed.

The propeller spinner was crushed, and propeller hub was impact fragmented. The propeller hub mounting flange remained attached to the engine crankshaft flange. The remainder of the hub was impact separated and fragmented. One propeller blade was separated from the hub. That blade exhibited leading edge gouges, chordwise scoring and twisting along the longitudinal axis. The other blade exhibited leading and trailing edge gouges and chord-wise scoring.

Aileron flight control continuity was confirmed from the left aileron attach point to the cockpit area, and from the right aileron control surface to the cockpit area, although the aileron tubes were bent in several areas, and deformation near the cockpit area was extensive. Elevator control continuity was confirmed from the control surface to a cut made in the tube assembly at the forward empennage area during recovery, and from the cut to the cockpit area. Rudder control continuity was confirmed from the flight control surface to a fracture just aft of the aft spar, and from the fracture to the cockpit area. The fracture surface exhibited evidence of overload failure with no evidence of pre-existing cracks. Examination of the pitch trim flight control system revealed 7 threads were extended from the jackscrew actuator near the aft empennage, and the pitch control tube was fractured just aft of the aft spar. The fracture surface exhibited evidence of overload failure at a connection point in the tube assembly. Examination of flap actuator threads revealed flaps were set to 10°.

Examination of the airframe fuel system revealed that fuel strainer fuel hoses remained attached to the fuel strainer. The fuel selector was on the left tank position and it was internally free of obstructions. Fuel was noted in the fuel hose from the fuel selector to the fuel strainer, and in the selector valve when the fuel hose from the right tank was removed.

3.2 Airframe Examination Photos



Photo 1: Airplane from right



Photo 2: Right Wing



Photo 3: Left Wing and Detached Flap



Photo 4: Flap Actuator Threads



Photo 5: Landing Gear Selector Position



Photo 6: Elevator Trim Actuator



Photo 7: Fuel Selector



Photo 8: Tachometer

3.3 Engine Examination

The firewall, wiring and instruments were removed from the engine and the engine was partially disassembled to facilitate the examination. The engine and its accessories were examined. The external engine exam revealed that the exhaust muffler and exhaust pipes were crushed. The

intake pipes were impact damaged. The No. 2 cylinder head was impact damage in the area of the intake valve.

The engine was rotated using a tool inserted in the vacuum pump drive pad. Continuity of the crankshaft to the rear gears and to the valve train was confirmed. Compression and suction were observed from all four cylinders. The interiors of the cylinders were examined using a lighted borescope with no anomalies noted. The No. 2 top spark plug was impact damaged and oily. The Nos. 1 and 2 bottom spark plug electrodes were undamaged but oily. The remaining spark plug electrodes exhibited gray coloration and worn normal condition.

The left magneto was impact damaged and partially separated from the engine. The right magneto remained attached to the engine. Both magnetos were rotated by hand and produced spark from all ignition towers.

The fuel injector servo remained attached to the engine. The airbox and alternate air valve were crushed. The servo fuel regulator section was impact damaged and some of the regulator attaching screws bent. The regulator cover brass plug was secure. The throttle control cable remained attached to the servo throttle control arm and the arm was positioned to the full throttle position. The cockpit throttle control knob was fully forward. The mixture control cable remained attached to the servo mixture control arm. The position of the arm was not determined. The cockpit mixture control arm was fully forward.

The fuel injector servo was partially disassembled. A few drops of liquid with an odor consistent with aviation gasoline when the fuel servo hoses were removed. No damage was noted to the regulator section rubber diaphragms or other internal components. The servo fuel inlet screen was absent of debris. The fuel flow divider remained attached to the engine and no damage was noted. It was removed and partially disassembled. No damage was noted to the rubber diaphragms and no internal debris was observed. Fuel was observed in the hose from the servo to the flow divider. The fuel injector nozzles remained attached to the engine. The nozzles were removed and observed unobstructed.

The engine driven fuel pump was impact fragmented and partially separated from the engine. About 2 tablespoons of fuel drained from the pump when the hoses were removed. The airframe fuel strainer fuel lines remained attached to the strainer. The strainer was partially disassembled and a small amount of debris noted in the bottom of the strainer bowl. No liquid was observed in the bowl.

The oil suction screen and the oil filter media were absent of metallic debris.

3.4 Engine Examination Photos



Photo 9: Engine Prior to Teardown



Photo 10: Spark plugs



Photo 11: Propeller



Photo 12: Cylinder Nos. 1 and 3 (Photo Courtesy of Lycoming Engine)



Photo 13: Cylinder Nos. 2 and 4 (Photo Courtesy of Lycoming Engine)