



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

July 25, 2019

EXAMINATION SUMMARY

ERA19FA188

A. ACCIDENT

Location: Castalia, North Carolina
Date: June 7, 2019
Time: 1333 EDT
Airplane: Piper PA 46-350P, N709CH

B. INVESTIGATION PARTICIPANTS

Ralph E. Hicks - IIC
Eastern Region Aviation (ERA)
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Marietta, Georgia

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Piper Aircraft, Inc.
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C. SUMMARY

On June 7, 2019, about 1333 eastern daylight time, a Piper PA 46-350P, N709CH, broke up in flight following an encounter with weather near Castalia, North Carolina. The private pilot, a pilot-rated passenger, and two other passengers were fatally injured. The airplane was destroyed. The airplane was registered to the pilot and was operated under the provisions of 14 *Code of Federal Regulations* Part 91 as a personal flight. Day, instrument meteorological conditions prevailed in the area, and an instrument flight rules flight plan was filed for the flight. The flight originated at Naples, Florida (APF) and was destined for Easton Airport (ESN), Easton, Maryland.

1.0 Wreckage Examination

The examination of the wreckage was performed at the accident site, Castalia, North Carolina, on June 8-9, 2019 and at the facilities of Atlanta Air Recovery, Griffin, Georgia, on July 24, 2019.

Fuselage

Observed on-scene, it appeared that the fuselage, including the inboard portions of each wing, descended on a near vertical trajectory through dense trees and impacted the ground inverted. The lower portion of the fuselage, from the aft side of the main wing spar to about Fuselage Station (FS) 240, had been cut away by first-responders. This included the flap drive motor and mechanism, the center portion of the flight control cables, the main cabin entry door, seats #3 and #4, the seat base for seats #5 and #6, and the floorboard. The entire fuselage exhibited crumpling throughout with the upper portion of the fuselage crushed downward reducing the cabin volume. The forward baggage door remained attached to its hinge and the emergency exit door was loose in its opening. The flap actuator jackscrew was exposed about .25" which corresponds to the flaps being in the retracted or "up" position.

Observed during the post-recovery examination of the wreckage, flight control cable continuity was confirmed from the cockpit to the control surfaces through recovery cuts and impact separations. The fuel selector handle was in the "LEFT" position and the fuel selector valve was in the "off" position. The fuel strainer was intact and a small amount of fuel was drained when the sump was actuated. The fuel strainer screen appeared to be free of debris.

Left Wing

Observed on-scene, the left wing was separated chordwise just outboard of the main landing gear trunnion rib assembly. The main landing gear remained attached to the inboard portion of the wing and was in the retracted position. The inboard portion of the wing remained attached to the fuselage. The outboard portion of the wing was found approximately 1.3 nm north-northeast from the fuselage. All fracture surfaces on the wing structure showed signatures consistent with overload. The aileron and flap were not attached to the wing and were not located. The aileron

cables remained attached to the aileron drive sector and were continuous to the overload separations at the fuselage. Both fuel caps remained intact in their respective openings.

Right Wing

Observed on-scene, the right wing was separated chordwise just outboard of the main landing gear trunnion fittings. The main landing gear remained attached to the inboard portion of the wing and was in the retracted position. The inboard portion of the wing remained attached to the fuselage. The outboard portion of the wing was found approximately 1.4 nm north-northeast from the fuselage. All fracture surfaces on the wing structure showed signatures consistent with overload. The leading edge, forward of the aileron, exhibited two areas of impact damage which tore the leading edge upwards and aft onto the upper surface of the wing. The aileron was not attached to the wing and was not located. The aileron cables remained attached to the aileron drive sector and were continuous to the overload separations at the fuselage. Approximately 2' of the inboard end of the flap remained attached to its hinge. The outer portion of the flap was separated from the wing and not located. Both fuel caps remained intact in their respective openings. The pitot mast remained intact. The radar pod was separated from the wing and located in the debris field about 0.9 nm NNE of the main wreckage. A 1.5 ft section of right aileron was found in a field about 860 ft SSW of the outboard section of the right wing.

Empennage

Observed on-scene, the vertical stabilizer and rudder were separated from the tailcone and not located. The horizontal stabilizer was separated from the tailcone and not located. A portion of the right outboard end of the elevator, about 2' long, was located in the debris field. The remainder of the elevator was not located. Observed during the post-recovery examination of the wreckage, the elevator cables remained attached to the quadrant in the tailcone. The elevator stops remained attached and were unremarkable. The elevator trim actuator screw was extended about .25" forward of the drum which corresponds to a full nose down trim setting.

In March, 2020, a resident found an approximately 6 ft-long section of elevator and an approximately 4 ft-long section of elevator trim tab on his property and provided the parts to the investigation team. The parts were found about 2.25 nm NNE of the main wreckage site.

Propeller

Observed on-scene, the four-blade, composite, MT propeller remained attached to the engine propeller flange. One of the propeller blades remained intact. Another blade was fractured chordwise about 8" from the hub with the outer portion of the blade not located. The next blade was fractured chordwise about 8" from the hub with the outer portion of the blade lying on the ground adjacent to the fracture. The next blade was beneath the spinner which was on the ground and was not observed until the recovery personnel lifted the wreckage. The blade was then observed to be fractured chordwise about 8" from the hub with the outer portion buried in the terrain.

Engine

The engine was attached to the inverted aircraft at the accident site. Three of the four propeller blades were fractured. Some of the airframe cowling was removed to access the engine. The engine data plate showed that the engine serial number was PCE-RR0259.

External Cases

Reduction Gearbox: The gearbox was in place the housing flange was fractured at the lifting bracket region.

Exhaust Duct: Both Piper exhaust stacks were distorted and the upper section of the P&WC duct was compressed from impact with the terrain.

Gas Generator Case: The case was bent and compressed. The case was compressed on the upper region between the mount and the exhaust duct flange from impact with the terrain.

Accessory Gearbox: The external scavenge pumps were impact separated from the gearbox mounting pad.

Power Control and Reversing Linkage: The reversing linkage was impact damaged and the wire rope was fractured adjacent to the front lifting bracket. The CAM box was impact fractured. The linkage between the CAM box and the fuel control was in place but was bent.

Pneumatic Lines

Compressor Discharge Air (P3): The section of the line from the gas generator case to the filter housing was in place. The line between the filter housing and the fuel control was sectioned during the engine removal process. Both ends of the sectioned line were attached to their respective fittings. The fuel control fitting was tight.

Power Turbine Control (Py): The line was fractured adjacent to the propeller governor. The line was bent at numerous locations but was complete from the fracture to the fuel control. The fuel control fitting was tight.

Chip Detectors and Filters

Reduction Gearbox Chip Detector: Some metal particulate was adhered to the magnetic poles but the poles were not bridged.

Fuel Filter: No contamination was observed in the filter. The filter cover was fuel wetted but no measurable amount of fuel was remaining the cover.

P-3 Filter: No contamination was observed in the filter.

Disassembly Observations

Compressor Section: The compressor was not disassembled for the purpose of this investigation. The compressor was not capable of manual rotation from the compressor turbine.

Compressor 1st Stage Blades: The blades were viewed through the inlet case struts. The visible blades did not display any damage.

Combustion Section: The gas generator case was cut adjacent to the “C” flange to facilitate the removal of the power section.

The combustion chamber liner was distorted from contact with the compressed regions of the gas generator case.

Turbine Section

Compressor Turbine Guide Vane Ring: The visible areas of the vane did not display any visible damage.

Compressor Turbine Shroud: No circumferential polished regions from blade rubs were evident on the shroud surface.

Compressor Turbine: The downstream side of the turbine exhibited some polished regions from contact with the upstream side of the power turbine vane baffle. The polished regions did not display any circumferential rubbing, indicating that the polished regions occurred from compressional/static damage during impact. The outside diameter of the bolt bore exhibited a static impact mark from contact with the center region of the power turbine vane baffle. The upstream side of the turbine was unremarkable except for some stains. The blade tips displayed some erosion. Rub marks were also evident on the tips from contact with their respective shroud. The static polished regions on the disc, indicates that the disk was not rotating during the impact sequence. This indicates that the rub marks on the blade tips most likely occurred during normal engine operation.

ITT Probes, Busbar, and Harness: The gas path sections of the probes were in their respective locations. A section of the busbars and their respective probe connection were bent.

Power Turbine Stator Housing: The housing was bent and distorted. The upper section of the power turbine containment ring was compressed.

Power Turbine Guide Vane Ring and Interstage Baffle: The upstream side of the vane was unremarkable. The upstream side of the baffle exhibited static imprints from contact with the downstream side of the compressor turbine disc. The center of the baffle was elongated from compressional bending/distortion loading the disc and/or baffle in opposite directions. The downstream side of the vane was unremarkable except for some static blade marks on the

outer rim. The baffle exhibited static impact marks from contact with the power turbine. The center cone of the baffle was distorted and it exhibited some circumferential rubs from the power turbine.

Power Turbine Shroud: The shroud was bent and distorted. The visible region of the knife edge seals were not damaged.

Power Turbine: Eleven of the turbine blades were fractured in the compressed region of the exhaust duct. The blade fracture surfaces displayed features consisted with overload. Several of the blade platforms were polished from contact with the baffle. The bolt bore exhibited a circumferential rub from contact with the center cone of the power turbine vane baffle.

Reduction Gearbox

Rear Housing: The housing was not removed for the purpose of this investigation. The upper section of the front mating flange was fractured at the lifting bracket.

Forward Housing: The housing was not removed for the purpose of this investigation. The upper section of the rear mating flange was fractured at the lifting bracket.

Propeller Shaft: The shaft was not removed for the purpose of this investigation. No damage was evident on the visible section shaft mating flange with the propeller.

Accessory Gearbox: The gearbox was not disassembled for the purpose of this investigation. The external scavenge pump was impact separated and the mounting boss was damaged.

Controls and Accessories Evaluation

Ignition System

Exciter Box: The box exhibited some external damage and was mounted to the airframe cowling.

Ignition Leads: The leads were in place and secured to the exciter box and their respective ignition plugs.

Ignition Plugs: The plugs were secured to their respective bosses in the gas generator case.

Fuel System

Fuel Heater: The mounting flange of the heater was impact fractured. The external case was bent.

Fuel Pump: The pump was mounted to its respective mounting pad on the accessory gearbox. The pump was removed and the input shaft was manually rotated and it rotated

freely. The pump was disassembled and no visible damage was evident to the bearing or shaft journals. The input shaft was unremarkable.

Fuel Control Unit: The unit was secured to its respective mounting pad on the fuel pump. The control was removed and was manually rotated with the phenolic shaft and the unit rotated freely.

Flow Divider: The divider was secured on its respective mounting pad on the inlet nozzle.

Fuel Nozzles: The nozzles were secured on their respective mounting pads on the gas generator case. Several of the fuel transfer tubes were bent and fractured.

Air System

Compressor Bleed Valve: The valve was mounted on its respective mounting pad on the gas generator case.

Oil System

Propeller Governor: The governor was mounted on its respective mounting pad on the reduction gearbox. The housing was impact fractured.

Overspeed Governor: The governor was mounted on its respective mounting pad on the reduction gearbox.

ADDITIONAL INFORMATION

Various bags and contents of the aircraft were weighed at the accident site. These weights, along with estimated occupant weights and a W&B sheet located in the aircraft records, were used to calculate the aircraft weight.

At departure from APF, it was estimated that the aircraft gross weight was about 5,070 lbs

At the time of the accident, it was estimated that the aircraft gross weight was about 4,488 lbs. The Maximum Gross Weight for the aircraft is 4,340 lbs (for takeoff).