NATIONAL TRANSPORTATIONS SAFETY BOARD
Office of Aviation Safety
Washington, DC 20594

SUMMARY OF AIRCRAFT EXAMINATION

-- CEN20LA201 --

A. ACCIDENT

Location: Carlinville, Illinois
Date: May 31, 2020
Time: 1546 central daylight time
Aircraft: Piper PA-28-235 (s/n 28-10571), N8991W

B. PARTICIPANTS

Timothy Sorensen
Senior Aviation Accident Investigator
National Transportation Safety Board
Denver, Colorado

Damian Galbraith
Air Safety Investigator
Piper Aircraft Company
Vero Beach, Florida

J. Mike Childers
Air Safety Investigator
Lycoming Engines
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C. ACCIDENT SUMMARY

On May 31, 2020, at 1546 central daylight time, a Piper PA-28-235 airplane, N8991W, was destroyed when it impacted terrain near Carlinville, Illinois. The pilot and three passengers were fatally injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

E. DETAILS OF AIRCRAFT EXAMINATIONS

An initial airframe examination was conducted at the accident site on June 1, 2020, by Federal Aviation Administration inspectors with support from a technical representative of Piper Aircraft.[1] The airplane was recovered to AMF Aviation, Springfield, Tennessee. Follow-up airframe and engine examinations were conducted at AMF Aviation on June 8, 2021, and June 9, 2021, respectively. The examinations were conducted by the NTSB

[1] The NTSB did not respond to the accident site due to COVID-19 travel restrictions in effect at the time.

E. DETAILS OF AIRCRAFT EXAMINATIONS *(continued)*

investigator-in-charge and representatives of Piper Aircraft and Lycoming Engines as parties to the investigation.

F. DESCRIPTION OF ACCIDENT SITE

The accident site was located on a livestock ranch/agricultural farm about 3 miles south-southwest of Carlinville. The airplane wreckage was located in an open field adjacent to a storage building and a pond. Several aircraft components were located on and inside the storage building. The debris path was about 400 feet long and oriented on an approximate 035° heading. The fuselage was located adjacent to a small pond. The engine and propeller assemblies were located with the fuselage.

The wreckage distribution appeared consistent with a low-level, in-flight break up. The wings had separated from the airframe. The outboard portion of the left wing and the left-wing tip were located near the storage building. The inboard portion of the left wing impacted the storage building roof and was located on the floor within the building. The right wing was similarly separated into outboard, inboard, and wing tip sections. All of them came to rest on the ground near the storage building. The ailerons, including the counterweights, were separated and located within the debris path. The left flap remained attached to the wing; the right flap was separated and located within the debris path.

The stabilator was separated from the airframe and into left and right sections. The left section came to rest on the storage building roof; the right section came to rest on the ground adjacent to the building. The vertical stabilizer was separated near the root and located within the debris path. The rudder had separated from the vertical stabilizer; it remained with the fuselage.

G. SUMMARY OF AIRCRAFT EXAMINATION[2]

Airframe – Piper PA-28-235 (s/n 28-10571)

The fuselage was fragmented, and the cabin was compromised. The cabin and baggage doors were deformed and separated. The pilot, copilot, and rear bench seats were separated and exhibited aft deformation. The instrument panel was fragmented. The nose landing gear was separated from the engine mount consistent with impact forces.

The fuel selector was separated from the supporting structure and located between the right main and right tip tank positions at the time of the exam. The gascolator was fractured and no fuel was present in the bowl. The filter was intact and clear of debris. A liquid consistent in odor to that of aviation gasoline was observed within the two electric fuel pumps. The filters were intact and clear of debris. The engine primer assembly was damaged.

The pilot and copilot control wheel horns were separated. The flight control T-bar was damaged consistent with impact forces. The aileron control chain was fractured and dislocated from the control wheel sprockets. The aileron control cables remained attached to the control chain. The flap control lever was observed in the “flaps up/0°” position.

[2] Directions related to accident site placement and component damage/deformation are with respect to an intact airframe unless otherwise noted.

G. SUMMARY OF AIRCRAFT EXAMINATION *(continued)*

The stall warning light was damaged, and the bulb was destroyed. The ELT was damaged and separated from its mount.

The left wing was separated from the fuselage at the root. It was further separated into two sections. The inboard section was about 9 feet long and the outboard section was about 4 feet long. The wing forward attach point was separated from the fuselage structure; the attachment itself appeared to be intact. The aft attach point remained intact and was attached to an 18-inch section of fuselage structure. The main spar upper attachment bolts remained secured to the fuselage carry-through spar. The mating section of the carry-through spar was fractured and separated from the remainder of the carry through spar assembly. The lower main spar attach point was separated at the outboard attachments. The wing spars exhibited upward deformation adjacent to the facture surfaces. The fracture surfaces exhibited a dull, grainy appearance consistent with overload separation.

The lift detector was separated from the wing and the vane moved freely. The pitot mast remained attached to the wing, and the pitot and static ports appeared clear of obstruction. The main landing gear remained attached. It was damaged and partially collapsed consistent with impact forces. The left-wing main fuel tank was deformed consistent with impact and internal hydraulic forces. It was breeched at the inboard leading edge. The fuel tank contained about 5 gallons of clear liquid with an odor similar to aviation fuel. The wingtip fuel tank was separated and fragmented. The fuel caps of the main and tip tanks were securely installed and secure.

The left flap remained attached at the two inboard hinges; the outboard hinge was fractured. The flap control rod remained attached to a separated section of the fuselage mounted flap torque tube; it was separated from the flap. The aileron was separated from the wing and fractured into two sections. The aileron balance weight was separated from the control surface and recovered at the accident site. The aileron control rod remained attached to the bellcrank and was separated from the aileron. The bellcrank assembly was deformed consistent with impact forces. The aileron control cables remained attached to the bellcrank assembly. The control cables were separated at the wing root and frayed consistent with overload separation. The aileron limit stops were intact; no evidence of repeated contact was observed.

The right wing was separated from the fuselage at the root. It was further separated into two sections. The inboard section was about 9 feet long and the outboard section was about 4 feet long. The forward attachment was separated. The adjacent airframe structure was deformed outboard consistent with an outboard force from the fuselage attach point. The aft attachment hardware was separated and not located within the recovered wreckage. The lower main spar was separated at the outboard attachment bolts. A 30-inch section of upper main spar and the mating section of the fuselage carry-through spar were separated from their corresponding spar assemblies. The spar sections remained attached to each other at the wing root splice; the attachment bolts appeared intact and secure. The wing spars exhibited upward deformation adjacent to the facture surfaces. The fracture surfaces exhibited a dull, grainy appearance consistent with overload separation. The outboard fracture surface of the upper spar exhibited red paint transfer consistent with impact to a farm tractor. The right main landing gear attachment was separated from the wing and retained by the brake line. The right-wing main fuel tank

G. SUMMARY OF AIRCRAFT EXAMINATION *(continued)*

was breeched at the outboard seam and exhibited hydraulic deformation. The wingtip fuel tank was separated and fragmented. The tanks fuel caps were installed and secure.

Two 5-inch sections of right aileron remained attached to the inboard and outboard hinges. The aileron balance weight was separated and located within the debris field. However, the remaining portion of the aileron was not observed within the recovered wreckage. The aileron control rod remained attached to the bellcrank, which was deformed, and the inboard section of aileron. There was no evidence of repeated contact observed to the aileron limit stops. The aileron control cables remained attached to the bellcrank; they were separated at the wing root. The cable displayed was frayed consistent with tension overload separation. The flap was separated from the wing and further into 2 sections. The flap control rod remained attached to the flap and to a separated section of the fuselage mounted flap torque tube.

The vertical stabilizer was separated from the aft fuselage. However, the aft spar was separated from the remainder of the stabilizer structure. The spar remained attached to the fuselage at the lower end and the rudder at each hinge point. The vertical stabilizer, and rudder were deformed consistent with impact forces. The rudder travel limit stops were intact, and no evidence of repeated contact was observed. The rudder control cables remained attached to the bellcrank. They were continuous to the cockpit area.[3]

The stabilator was separated with exception of the center spar section which remained attached to the aft fuselage hinge points. The left and right halves of the stabilator were separated near the centerline. The balance weight and mast remained attached to the center spar section. The limit stops were intact, and no evidence of repeated contact was observed. The stabilator control cables remained attached to the mast attachments and were continuous to the cockpit area.[4] The stabilator trim tab remained attached except for about 26” of right inboard portion which was separated. The control rod was separated from the trim tab and from the trim barrel assembly. The trim barrel was dislocated from the mounting assembly. About 5 threads from the top of the jackscrew barrel were exposed consistent with a “neutral” trim setting.

Engine – Lycoming O-540-B4B5 (s/n L-8130-40)
Propeller – McCauley IP235PFA-8069 (s/n P2201)
The engine remained attached to the engine mount; however, the engine mount was fragmented. The crank case was fractured consistent with impact forces. Each cylinder remained secured to the crankcase. The pushrods were bent and partially separated from their respective attaching points. The exhaust system was deformed but remained attached to the engine. The crankshaft could not be rotated by hand via the propeller flange. Borescope examination did not reveal any anomalies with respect to the crankshaft, camshaft, or bearings. The oil sump was fractured, and residual oil remained within the sump.

The magnetos were separated from the respective attachments. Teardown examinations of both magnetos were unremarkable. The engine driven fuel pump remained attached to its mounts. Teardown examination revealed minor debris within the pump cavity; the

[3] The rudder cables were cut to facilitate recovery.
[4] The stabilator cables were cut to facilitate recovery.

G. SUMMARY OF AIRCRAFT EXAMINATION *(concluded)*

pump components were otherwise unremarkable. The carburetor housing was fractured. The upper portion remained secured to the engine. The butterfly valve was intact. The lower portion remained attached to the air intake. The throttle and mixture control cables remained attached to the throttle and mixture arms, respectively. The engine driven vacuum pump was separated and was not located within the recovered wreckage.

The two-bladed fixed pitched propeller remained attached to the engine. The propeller spinner was fragmented. One propeller blade was bent aft about 45° with no leading-edge damage observed. The other propeller blade exhibited S-type bending with no leading-edge damage noted.

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