

National Transportation Safety Board

Office of Aviation Safety

Washington, DC 20594



ERA24FA157

WRECKAGE EXAMINATION

April 3, 2024

A. ACCIDENT

Location: Fort Pierce, Florida
Date: March 30, 2024
Time: 1320 EDT
1720 UTC
Airplane: N595ND, Piper PA-44-180

B. WRECKAGE EXAMINATION

IIC	Leah D. Read, Sr. ASI NTSB Alton Bay, NH
Party Coordinator	James M. Holmes FAA/FSDO Orlando, FL
Party Coordinator	Kris Wetherell, Sr. ASI Piper Aircraft Company Vero Beach, FL
Party Coordinator	Russel Gait, Mgr. Lycoming Safety Textron Lycoming Williamsport, PA

C. SUMMARY

On March 30, 2024, about 1320 eastern daylight time, a twin-engine Piper PA-44-180, N595ND, sustained substantial damage when it was involved in an accident at the Treasure Coast International Airport (FPR), Fort Pierce, Florida. The flight instructor was fatally injured, and the private pilot was seriously injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 instructional flight.

D. WRECKAGE EXAMINATION

The airplane came to rest inverted on the airport ramp on a magnetic heading of 102 degrees. There was no postimpact fire. All major components of the airplane were located at the accident scene. The initial impact point was made by the right-wing tip, both propeller systems and the nose of the airplane. The left two-bladed propeller system separated from the airframe and came to rest where it impacted the

ground. Two defined slash marks were observed in the ground just forward of where the propeller came to rest. The slash marks were about 2 ft apart.

The main wreckage came to rest about 57 ft northeast from where the airplane first impacted the ground. Both wings, the right side of the forward fuselage/nose, and the fuselage were impact damaged. The right engine separated the airframe and came to rest inverted next to the right-wing tip. The left engine (minus the propeller system) remained in its respective engine nacelle. Both wing fuel tanks (bladders) were breached. The left engine's oil dipstick had separated from the engine and oil was noted on the ground. The right engine oil filler tube was impact damaged, and oil was noted spilled around the engine.

The landing gear was extended, and the flaps were in the fully retracted position. This position was verified at the flap torque tube and at the flap control rod on the left and right side of the fuselage.

The left wing remained attached to the airframe. The left flap and aileron remained attached at their respective hinges. The left aileron balance weight remained attached and secure to the outboard end of the surface. The left engine nacelle was deformed up and aft by impact forces. The left engine remained partially attached to the firewall. The outboard half of the wing was partially torn open and canted forward outboard of the engine nacelle. The left fuel bladder tank was breached and did not appear to contain any residual fuel. The left-wing tip separated from the wing. The outboard end of the metal portion of the wing was bent downward and aft. Both lift detectors remained intact and securely attached to the leading edge of the left wing.

The right wing remained attached to the airframe. The right aileron was partially separated from the wing, was buckled, and bent forward at the outboard end and was torn at mid-span. The right flap remained attached to the wing and was buckled just inboard of the engine nacelle. The right flap control rod was broken. The right engine nacelle was deformed upward and aft by impact forces. The right fuel bladder was breached and did not appear to contain any residual fuel. The outboard end of the right wing was crushed upward and aft during the initial ground impact. The right main landing gear was in an extended position.

On-site aileron continuity was confirmed from both aileron bellcranks to the mid-cabin. The left bellcrank was partially torn from the mounting structure inside the wing. Both aileron cables remained attached to the left aileron bellcrank. The right aileron bellcrank remained attached to the mounting location inside the right wing. Both aileron cables remained attached to the right aileron bellcrank. The aileron autopilot servo bridle cables remained attached to the aileron balance cable in the mid-cabin.

Aileron continuity was confirmed for the entire circuit. Some binding due to impact related deformation was noted on the right side. The aileron drive chain remained intact. The horizontal portion of the control tee bar was fractured near mid-span. The left side universal on the control shaft remained intact and attached.

Stabilator and rudder control cable continuity was confirmed from the respective control surfaces to the control column and rudder bar. Some binding was noted on the right side of both cables due to airframe deformation.

The rudder trim and stabilator trim control cables remained intact and attached to their respective trim actuators. The stabilator trim could be actuated from the control wheel successfully. The rudder trim control was damaged with the trim cable protruding from the wheel location. The rudder trim could be actuated from the trim wheel location.

The rudder and stabilator revealed no apparent damage and remained attached to the vertical stabilizer. The rudder trim surface remained attached to the rudder. The stabilator trim surface remained attached to the stabilator. At the on-site examination, flight control cable continuity was verified from the second-row seating location to the rudder, rudder trim, stabilator and stabilator trim. The rudder trim actuator was found in a position with the rod extended 1.1-inches on the forward end. This equated to a partial nose right trim condition. The stabilator trim actuator was found in a position with the rod extended 0.85-inches. This equated to a nearly full nose-up trim position.

The airplane was equipped with an Avidyne Entegra electronic flight display which included a primary flight display (PFD) and a multi-function display (MFD). The units were removed, and the compact flash (CF) card from the MFD was removed. The CF card along with the PFD were sent to the NTSB Recorders lab for download.

The fuel selectors were both in the "on" position. The "on" position was verified at the left and right fuel selector valves. The left and right electric fuel pump switches were broken from the mounting frame. Both fuel pump switches were in the on position. The left and right electric fuel pumps (located in the wings) were test run using a 12-volt battery. Both electric fuel pumps were successfully run (dry).

Some fuel was drained from the fuselage fuel drains from the left and right drains. This fuel was blue in color and absent of debris. The fuel was tested for the presence of water and no water was observed. Shop air was flowed from each wing root line from the tank to the fuel valve line through the corresponding valve and out of the engine feed line. Some residual fuel was noted coming out of the engine feed line during this testing. Shop air was flowed from both wing roots to the corresponding nacelle fuel tank. Shop air was flowed from both wing roots to the

engine fuel feed line at the firewall. No restrictions or debris were found in any of the fuel lines during this testing.

The throttle quadrant was damaged and deformed by impact. Both throttle control handles were found about 1.5 inches aft of full power. The propeller controls were both near full forward. The left mixture control handle was slightly aft of the full rich position. The right mixture control was bent and was in a position aft of the left mixture control. Both carburetor heat handles sustained some impact deformation but were in the near closed (off) position.

The throttle, propeller and mixture control cables were functionally tested. Movement was obtained from the throttle quadrant to both wing roots, and from both wing roots to forward of the firewall on both sides. The right engine controls had been separated from the carburetor and propeller governor during the impact sequence. Both carburetor heat handles were impact damaged and appeared to be in the near-closed position.

Hourmeter 0126.4. Maintenance hour meter 3,468.7 hours.

Both front pilot seats remained attached to the mounting rails. The left and right lap belts remained securely attached to the floor anchors. The left and right pilot lap belts remained buckled. The left lap belt had been cut by emergency personnel on the outboard side. The left shoulder harness remained clasped to the lap belt and had been cut by emergency personnel. The left shoulder harness inertia reel functioned correctly when tested by hand. The right lap belt had been cut by emergency personnel on the outboard side. The right shoulder harness was not clasped to the lap belt. The right shoulder harness inertia reel functioned correctly when tested by hand.

The left engine was rotated via the vacuum pump spline. As the engine was rotated, compression and valve train continuity were established on all four cylinders. Both magnetos were removed and rotated via a drill. Spark was produced to each ignition tower. The air filter was absent of debris. The spark plugs appeared gray in color consistent with normal wear per the Champion Check-A-Plug chart.

The carburetor was removed from the engine. The throttle lever was found in the full power position and the mixture control lever was in the full rich position. Fuel was found in the carburetor bowl. The fuel was tested for the presence of water, and none was observed. The fuel screen was absent of debris.

The engine driven fuel pump was removed and disassembled. Some fuel was found in the pump and tested negative for water. Some fuel was found in the line from the engine driven pump to the carburetor. The internal diaphragm was intact.

The oil suction screen was clean, and oil filter element was absent of metallic debris.

No mechanical deficiencies or malfunctions were observed with the left engine that would have precluded normal operation at the time of impact.

The right engine rotated manually via the propeller. When rotated, compression, and valve train continuity were established to each cylinder except the No. 1 cylinder. The number one cylinder displayed impact damage on the forward edge and some bending of the pushrods. Continuity to the accessory section was also observed. Both magnetos were removed and rotated via a drill. Spark was produced to each ignition tower. The air filter was absent of debris. The spark plugs appeared inconsistent in coloration. The No. 2 top and Bottom No. 4 plugs were gray in color and consistent with normal wear per the Champion Check-A-Plug chart. However, the other plugs had varying degrees of discoloration no consistent with normal wear. The No. 1 bottom plug electrodes had no gap on one side and the No. 3 bottom plug had two excessively tight gaps to the electrode.

The carburetor was secured to the engine's induction plenum, the upper right attaching nut was finger tight. The airframe's induction system was secured to the inlet of the carburetor. The mixture control arm was secured to the mixture control lever via castle nut and cotter pin. The mixture control lever was secured to the mixture control arm via castle nut and cotter pin. As first viewed the mixture was halfway between full rich and idle cut-off. The throttle control arm was secured to the throttle control arm lever via castle nut and cotter pin. The serrated interface between the throttle arm and throttle arm lever was not securely mated and the throttle arm lever could be fully rotated without moving the throttle arm. The teeth on the throttle arm side appeared to be rounded and worn down.

The throttle plate was in the fully closed position, the throttle control assembly was impact damaged. Fuel was noted in the inlet to carburetor line, and fuel was found in the bowl. The fuel was tested for water and no water was detected. The fuel inlet screen was removed and examined; no contamination was noted.

The carburetor was retained by the NTSB for further examination of the throttle lever arm assembly.

The engine driven fuel pump was removed and contained some fuel. The fuel was tested for water, and none was detected. The line leading out of the fuel pump to the carburetor contained some fuel. The internal diaphragm of the right engine driven pump was intact.

The oil suction screen was clean, and oil filter element was absent of metallic debris.

A review of the maintenance records revealed that the last annual inspection conducted on the airplane and both engines was completed the day before the accident on March 29, 2024. At that time, the airframe total time in service was 6,980.8 hours. Total time since overhaul for both engines was 196.4 hours.

Submitted by:

Leah D. Read
Sr. ASI, ERA