

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

SUMMARY OF AIRCRAFT EXAMINATIONS

-- CEN21A075 --

OVERVIEW

On December 6, 2020, representatives from the FAA completed an initial on-site documentation of the accident scene. On May 11, 2021, a wreckage examination was completed by representatives from the FAA, Piper Aircraft, and Lycoming Engines. No preimpact anomalies were noted that would have precluded normal operation of the airplane.

HISTORY OF FLIGHT

On December 6, 2020, about 0625 central standard time, a Piper PA32 airplane, N8178Y, was destroyed when it was involved in an accident near Windom Municipal Airport (MWM), Windom, Minnesota. The private pilot was fatally injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

ACCIDENT SITE INFORMATION

The airplane impacted a plowed field on an easterly heading about 2.5 miles from the end of Runway 35 and slightly west of the extended runway centerline. The initial impact point included portions of the right-wing position light and the debris path was about 220 ft long. The airplane was highly fragmented.



Figure 1. Wreckage at Accident Site

Fuselage

The fuselage was impact damaged and fragmented. Remnants of the firewall and forward baggage compartment remained attached to the engine mount and were separated from the remainder of the fuselage. The cabin top from the windshield aft to the tailcone was torn away from the lower fuselage and exhibited crumpling throughout. The instrument panel was destroyed with only small pieces identified among the debris.

Various instruments, gauges, and avionics were recovered and all were separated from their respective mounts in the instrument panel. The control columns were fractured and separated from the tee-bar and from the instrument panel. The aileron chain segment was separated from the sprockets on the tee-bar. One end of the chain was separated with a portion remaining attached to the aileron cable going to the right wing. The other end of the chain remained attached to the left aileron cable, but the cable was cut a few inches from the chain segment. The rudder pedal assembly was separated from the fuselage.

Both rudder cables remained attached to the rudder pedal assembly with the cables sections exhibiting cuts consistent with recovery processes approximately 12" from the rudder torque tubes. The stabilator control cables remained attached to the lower tee-bar. The flap selector handle was impact damaged but the cable remained attached. The flap ratchet bracket was impact damaged and the flap selector position was not determined.

The fuel selector handle and torque tube were impact damaged and the position of the selector handle could not be determined. The push-rod from the fuel selector torque tube to the fuel selector valve was fractured. The fuel selector valve was impact damaged the selector arm was bent upwards. The fuel selector valve appeared to be in the "left" position. The fuel selector valve was able to rotate to the other positions and the detents were observed. The fuel strainer bowl was removed from the bottom of the valve assembly.

The fuel strainer screens appeared free from blockage. No fuel was observed in the fuel valve or strainer assembly. The stabilator flight control cables exhibited additional recovery cuts near the aft baggage compartment, but then continued to the stabilator balance tube in the tailcone and remained attached to their respective attach points. The rudder cables were continuous through the cabin to the tailcone and exhibited "broomstrawed" separations about 18" from the rudder horn. The remaining segments remained attached to the rudder horn.

Three gyro instruments were located in the debris. An electric turn coordinator, a directional gyro, and an attitude indicator. A fourth gyro, separated from the instrument, was also found in the debris. The gyros were disassembled and examined for evidence of rotation at impact. One of the gyros could not be separated from its housing. The other three gyros were visually examined and all three exhibited rotational scoring on the gyro mass and adjacent housing.

Left Wing

The left wing was separated from the fuselage with a fracture of the main wing spar at the wing root. The spar exhibited impact damage near the tip and aft bending along its entire span so that the tip was about bent aft about 70°. The leading edge was separated from the wing forward of the main wing spar.

The fuel tanks were fragmented and no fuel was observed in the wing. The pitot mast remained attached to the wing with the structure around the pitot mast exhibiting crushing and crumpling. The lift detector was separated from its mount in the leading edge. The flap remained attached to the wing and exhibited impact damage.

The flap position could not be determined. The aileron remained attached to the wing and also exhibited impact damage. The aileron bellcrank was separated from its mount. The aileron and balance cable remained attached to their respective aileron bellcrank arms. The aileron and balance cable had pulled the bellcrank inboard through the wing to the wheel well. The aileron bellcrank stops appeared intact and unremarkable. The main landing gear remained attached to the wing and appeared to be in the extended position.

Right Wing

The right wing was separated from the fuselage with a fracture through the main wing spar at the wing root. The main spar was further fractured in two more places along its span. The wing was further separated chordwise around Wing Station (WS) 75 and again around WS 150. The leading edge was separated forward of the main spar. The fuel tanks were fragmented and no fuel was observed in the wing. The flap was separated from the wing and exhibited impact damage. The aileron was separated from the wing and further separated chordwise about 2/3 span. The aileron bellcrank was separated from its mount. Both arms were broken from the bellcrank. One arm remained attached to the aileron cable. The other arm was not observed. The bellcrank stops were intact and unremarkable.

Empennage

Observed during the post-recovery examination of the wreckage, the empennage was separated from the aft fuselage. The stabilator exhibited impact damage to the leading edges on both sides as well as bending and crumpling throughout. The stabilator trim tab remained attached by its hinges. The stabilator trim screw was extended above the drum about 1-3/4" (approximately 16 threads exposed) which corresponds to a full aircraft nose up trim setting. The vertical stabilizer was separated from the aft fuselage. The rudder remained attached to the vertical stabilizer by its hinges.

Engine

The crankshaft would not rotate as a result of severe fractures of the crankcase both externally and internally. Four of the twelve engine push rods were severely impact damage and were cut to further facilitate possible engine rotation. A large portion of the crankcase was missing from the

top front of the engine around the propeller governor area, accompanied by several large cracks and exposing the cam shaft. A large hole in the crankcase was found on top of the engine between the numbers 1 and 2 cylinders, further exposing the camshaft and tappets. The visible cam lobes and tappets appeared mechanically undamaged. A crack propagated from the bottom left of the case in the front to the top front of the case around the number 2 cylinder. The crankcase was severely fractured around front of the number 1 cylinder. The crankcase had a hole in the front bottom of the engine. The oil sump was impact separated from this area exposing the sump baffle, which also was impact damaged.

The valve springs, valves, and rocker arms on all 6 cylinders appeared to be mechanically undamaged. The accessory housing for the engine was removed also and photographed to facilitate engine rotation. The oil pump rotated freely and did not bind. The accessory gears and crankshaft gears did not show any signs of damage.

The fuel injector unit remained attached to the engine air box, however, the airbox and injector were impact separated from the engine. The injector was removed for further examination. Evidence of impact damage was found on the mounting flange surface and to the idle mixture set screw. The throttle plate was capable of opening and closing when actuated by hand. The mixture control level was actuated. The fuel injector inlet screen was found clean with no obstructions. The diaphragms of the unit were found to be in good condition. A small amount of liquid that smelled of fuel was found inside of the unit. It was tested with a water finding paste and the test was negative for water.

Propeller

The three-blade Hartzell propeller remained attached to the crankshaft propeller flange. The hub was fractured although all three blades remained captured in the hub. All of the blades were bent aft near the hub and exhibited various amounts of twisting and bending along their spans. One blade exhibited a forward bent, greater than 90°, about mid span.