

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

SUMMARY OF AIRCRAFT EXAMINATIONS

-- CEN19FA238 --

On July 29, 2019, the NTSB, FAA, Piper and Lycoming completed an initial on-site documentation of the accident scene. On July 30-31, 2019 a wreckage examination was completed at Air Salvage of Dallas with NTSB, FAA, Piper, Lycoming and USAG.

HISTORY OF FLIGHT

On July 28, 2019, about 1609 central daylight time, a Piper PA-34 airplane, N456AG, impacted terrain near Gainesville Municipal Airport (GLE), Gainesville, Texas. The airplane was owned and operated by US Aviation Group, LLC. The flight instructor and student pilot were fatally injured, and the airplane was destroyed by post-crash fire. The airplane was operated under 14 *Code of Federal Regulations* Part 141 as an instructional flight. Day visual meteorological conditions prevailed, and no flight plan was filed for the flight that originated at Denton Enterprise Airport (DTO), Denton, Texas about 1439.



Figure 1: Airplane Wreckage

AIRCRAFT INFORMATION

The 1973- model-year, 3-seat, dual-engine airplane was powered by two Lycoming Engine IO-360-C1E6 fuel-injected reciprocating engines, serial numbers L-10789-51A and L256-67A. Each engine had a controllable pitch Hartzell propeller, serial numbers HC-C2YK-2CGUF and HC-C2YK-2CLEUF. The total airframe time of the airplane was 3,345.3 hours according to a maintenance entry in the airframe logbook on July 27, 2019.

WRECKAGE AND IMPACT INFORMATION

The main wreckage came to rest at N 33°39'36.06", W -97°11'39.24" in a mowed field. The initial point of impact was N 33°39'34.80", W -97°11'40.32". The airplane came to rest at a magnetic heading of 052° at an elevation of 860 feet.

Airframe

The airplane impacted the ground with the left wing-low attitude, hitting the nose and nose landing gear next as the fuselage continued to slide until coming to rest in an upright position. The fuselage was consumed by fire from the forward bulkhead to the aft tailcone. The nose landing gear and fragments of the nose baggage cone were observed in the debris field. The main wreckage included both engines, wings, fuselage and tail sections.

Fuselage

The forward cabin door was impact damaged, broken, separated from the fuselage and partially consumed by fire. The aft cabin door was impact and fire damaged and separated from the fuselage. The aft cargo door was impact and fire damaged and separated from the fuselage.

Seat frames for seats #1 and #2 remained attached to their respective seat rails. The seat belt webbing for all seats was consumed by fire and the buckles were not observed in the wreckage. A third seat frame was observed outside the main wreckage and its installed location could not be determined. Remnants of a granular substance were observed in two separate piles. One pile was located in the approximate location for seat #4 the other pile was located in the tailcone forward of the stabilator balance tube.

Flight control cable continuity was confirmed from the cockpit to each of the control surfaces. The flight control cables were captured in metal slag from the between the cockpit seats forward to the tee-bar. The cable stabilator cable ends remained attached to the bottom of the tee-bar. The rudder cables remained attached to the rudder torque tubes. The aileron cables remained attached to the forward chain segment. The flap selector handle was observed in the stowed position. The cockpit engine controls were consumed by fire and their respective positions could not be determined. The avionics, cockpit switches, and controls were either fire damaged or consumed so that no usable information could be obtained. The fuel selector levers were consumed by fire.

Left Wing

During the on-scene examination of the wreckage, the remnants of the left-wing main spar was continuous to the fuselage. The left wing was separated chordwise outboard of the outboard fuel tank. The outer portion of the wing was located on the opposite side of the fuselage near the right-wing tip. The left wing was fire damaged throughout. The flap was consumed by fire with remaining debris located aft of the wing consistent with the flap having remained attached. Flap position could not be determined. The aileron was also consumed by fire with the remaining debris indicating that the aileron had remained attached to the inboard portion of the wing and the outboard end of the aileron had been folded under the wing. The fuel filler cap remained installed in the fuel filler opening. The engine truss mount was separated from the wing. The engine and firewall remained attached to the truss mount. The fuel selector valve was located in the wreckage and the pushrod remained attached to the valve. The main landing gear appeared to be in the retracted position and exhibited impact and fire damage. The landing gear trunnion fittings were fractured.

Observed during the post-recovery examination of the wreckage, both lift detectors remained installed in their respective mounts and exhibited thermal damage and sooting. The pitot mast was not observed.

The fuel selector valve was observed in the “on” position. The valve was able to pass air under low pressure in the “on” position. The valve could not be rotated by hand.

Right Wing

During the on-scene examination of the wreckage, the right wing main spar was continuous to the fuselage. The right wing was fire damaged throughout. The inboard portion of the flap was consumed by fire, the outer portion of the flap remained attached to its hinges. Flap position could not be determined. The aileron remained attached to its hinges. The fuel filler cap remained installed in the fuel filler opening. The engine truss mount was separated from the wing. The engine and firewall remained attached to the truss mount. The fuel selector valve was located in the wreckage and the pushrod remained attached to the valve. The main landing gear appeared to be in the extended position and exhibited impact and fire damage.

Observed during the post-recovery examination of the wreckage, the fuel selector valve was observed in the “on” position. The valve was able to pass air under low pressure in the “on” position. The valve was rotated to the “cross-feed” position and was able to pass air under low pressure.

Empennage

During the on-scene examination of the wreckage, the empennage was upright and exhibited fire damage throughout. There were about 7 threads exposed on stabilator trim jackscrew aft of the trim drum. This corresponds to a partial nose up trim setting.

Observed during the post-recovery examination of the wreckage, the rudder trim jackscrew was extended about 0.75” forward of the trim drum which corresponds to a partial trim tab deflection to the right.

Left Propeller

Observed during the post-recovery examination of the wreckage, the two-bladed Hartzell propeller remained attached to the engine crankshaft propeller flange. Both blades remained captured in the hub and appeared to be in a low pitch setting. The blades were marked “A” and “B” for identification purposes. Blade “A” appeared straight with thermal signatures on the outer 12” of the span resulting in discoloration. The counterweight remained attached. No scoring was observed on the blade faces. Blade “B” exhibited aft bending along the span. The outer 6”-8” of the blade tip was missing consistent with being consumed by the post-impact fire. No scoring was observed on the blade faces. The counterweight remained attached. The propeller spinner remained attached and exhibited crushing and tearing throughout. The propeller piston dome was fracture separated from the hub. The piston rod was bent toward blade “B”. The propeller governor displayed no damage and the propeller governor gasket screen was observed clear of any contaminants.

Right Propeller

Observed during the post-recovery examination of the wreckage, the two-bladed Hartzell propeller remained attached to the engine crankshaft propeller flange. Both blades remained captured in the hub and appeared to be in an intermediate pitch setting. The blades were marked “A” and “B” for identification purposes. Blade “A” exhibited bending towards the cambered face about mid span. The leading edge exhibited polishing and chordwise scoring on both faces. The counterweight remained attached. Blade “B” exhibited twisting and aft bending about mid span and leading-edge polishing. Chordwise scoring was observed on both faces. The counterweight remained attached. The propeller spinner remained attached and exhibited crushing and scratches consistent with rotation at the time of impact. The propeller governor displayed no damage and the propeller governor gasket screen was observed clear of any contaminants.

Engines

The two Lycoming Model IO-360-C1E6 engines were rated at a maximum horsepower of 200 at 2700 RPM. It is a Four-cylinder air cooled, fuel injected, normally aspirated, internal combustion engine, utilizing down exhaust. It drives a two-bladed constant speed aluminum propeller. These engines had been installed on the accident airplane on July 12, 2019.

Left Engine

The left engine, propeller, engine mount, and fire wall were impact displaced from the aircraft during the impact sequence.

All valve covers were removed, both magnetos were removed, the complete fuel injection system was removed, the exhaust system was removed, the propeller governor was removed, and the vacuum pump was removed.

An attempt was made to rotate the propeller by hand, only approximately 30 percent rotation could be attained.

Due to the existing damage to the propeller and the crankshaft, the propeller bolts could not be removed. The propeller and propeller flange of the crankshaft were cut off with a hot saw.

Another attempt was made to rotate the engine crankshaft using a turning tool inserted into the vacuum pump pad. This attempt also only achieved an approximate 30 percent of rotation.

All cylinders were examined using a lighted bore scope, no defects were noted.

When the crankshaft was rotated it was noted that all pistons were moving, and all rocker arms were moving. All the accessory gears at the back of the engine were observed rotating. This confirmed crankshaft, camshaft and valve train continuity.

The exhaust system was examined, and no internal defects were observed.

The complete fuel system was removed from the engine. It was noted that the fuel injector was impact displaced from the intake plenum. The fuel injector was fire damaged, unit was disassembled, and it was noted that the diaphragms were burned away. The flow divider was disassembled, and it was observed intact, and no defects were noted. The inlet fuel screen was removed and examined; no contaminants were observed. All fuel injector nozzles were removed and examined. It was noted that the cylinder number two injector was plugged with an unknown substance. The diaphragm fuel pump was actuated by hand and it furnished suction and compression. All fluid carrying lines were fire destroyed. No fuel was observed during the examination.

Both magnetos were secure on their mounts, they were removed and examined. The magnetos when rotated by hand would not furnish spark. Both magnetos sustained fire damage. They were both dismantled as far as was possible. The interior of both magnetos was observed fire damaged. The right magneto data plate was fire damaged beyond the ability to read. The ignition harness was fire destroyed.

The vacuum pump was secure on its mount, it was removed and was observed fire destroyed.

The alternator and engine starter were not removed or tested.

No engine oil was observed in the engine oil sump. The oil suction screen was removed and examined; it displayed no contaminants. The oil filter was removed, and the element was fire destroyed. Oil was observed leaking from the rocker covers during the examination.

Right Engine

The right engine, propeller, engine mount, and fire wall were impact displaced from the aircraft during the impact sequence.

All valve covers were removed, both magnetos were removed, the complete fuel injection system was removed, the propeller governor was removed, and the vacuum pump was removed.

Due to the existing damage to the propeller and the crankshaft, the propeller bolts could not be removed. The propeller and propeller flange of the crankshaft were cut off with a hot saw.

When the crankshaft was rotated it was noted that all pistons were moving, and all rocker arms were moving. All the accessory gears at the back of the engine were observed rotating. This confirmed crankshaft, camshaft and valve train continuity.

The complete fuel system was removed from the engine. It was noted that the fuel injector was impact displaced from the intake plenum; It was recovered, and no defects were noted. The flow divider was disassembled, and it was observed intact, and no defects were noted. The inlet fuel screen was removed and examined; no contaminants were observed. All fuel injector nozzles were removed and examined. They were all clear of obstruction. The diaphragm fuel pump was actuated by hand and it furnished suction and compression. All fluid carrying lines were fire destroyed. No fuel was observed during the examination.

Both magnetos were secure on their mounts, they were removed and examined. The magnetos when rotated by hand would not furnish spark. Both magnetos sustained fire damage. They were both dismantled as far as was possible. The interior of both magnetos was observed fire damaged. The ignition harness was fire destroyed.

The top spark plugs were observed with a low service life and normal combustion. The bottom spark plugs were not removed.

The vacuum pump was secure on its mount. It was removed and the shaft was rotated by hand, it furnished thumb suction and compression. The data plate was fire damaged and unreadable.

The alternator and engine starter were not removed or tested.

An un-measured amount of engine oil was observed in the oil sump. The oil suction screen was removed and examined; it displayed no contaminants.