



NATIONAL TRANSPORTATION SAFETY BOARD
Office of Aviation Safety

WRECKAGE EXAMINATION SUMMARY

July 9 - 10, 2020

A. ACCIDENT ERA20LA212

Location: Selma, Alabama
Date: June 10, 2020
Time: 1631 CDT
Operator: Private
Aircraft: Piper PA-32RT-300T
Registration: N543GS

B. PARTICIPANTS:

Federal Oversight: John Spears
Federal Aviation Administration
Atlanta, Georgia

Participant: Damian Galbraith
Piper Aircraft
Vero Beach, Florida

Participant: Mike Childers
Lycoming Engines
Williamsport, Pennsylvania

C. SUMMARY

On June 10, 2020, about 1630 central daylight time, a Piper PA-32RT-300T, N543GS, was destroyed when it was involved in an accident near Selma, Alabama. The commercial pilot and pilot-rated passenger were fatally injured. The airplane was operated as a Title 14 Code of Federal Regulations Part 91 business flight.

D. DETAILS OF THE INVESTIGATION

1.0 Accident Site

According to an FAA inspector, the airplane impacted a field and all components of the airplane were within the vicinity of the main wreckage. The initial impact crater was about 4.5 ft deep and the debris field was about 225 ft long by 120 ft wide oriented on a 125° heading.



Figure 1 – Overview of Accident Site

2.0 Airframe Examination

The airplane was recovered to a salvage facility in and examined on July 8-9, 2020. The airframe was serial number 32R-7887124, manufactured in 1978, with a tachometer time of 732.7 hours. The most recent annual inspection was completed on March 29, 2020, at a tachometer time of 723.4 hours. At that time, the oil was changed, and the oil filter was replaced.

2.1 Fuselage

The fuselage was largely fragmented. The cargo door and forward cabin door were impact damaged and separated from the fuselage. The aft cabin door was fragmented and the forward baggage door was not observed within the recovered wreckage; the fuselage was destroyed in this area. The 6 seats were separated from their attaching points and their frames were

fragmented. The instrument panel was destroyed. Insulation located underneath the glareshield exhibited thermal damage. In addition, wiring located behind the instrument panel was thermally damaged. The magneto switch was on the “off” position with the key fractured. The nose gear was separated and its actuator was retracted indicative of the gear in the “up” position. The flap torque tube was deformed, fractured, and partially separated from its mounts. The flap control lever was fractured and was observed in the “flaps up” position. The fuel selector was impact damaged and separated from its supporting structure. The fuel selector was noted in the “left” fuel tank position with its gascolator bowl and filter destroyed. The electric fuel pump was impact damaged.

Flight control continuity was established from the flight controls to their respective flight control surfaces through multiple overload breaks. The T-bar was fragmented and the control wheel shafts were separated. The control wheel horns were fractured from the control wheel and one horn was not located within the recovered wreckage. The engine control quadrant was impact damaged with the levers in the forward position. The ELT was not observed within the recovered wreckage; however, a fractured piece of the ELT’s battery was observed. The induction air filter assembly was not observed within the recovered wreckage. The engine cowlings were fragmented and fire damage was observed to the aft area of the upper cowl sections. The left louver exhibit thermal discoloration, the firewall exhibited thermal damage, and the heat control box was crushed.

2.2 Empennage

The vertical stabilizer was impact damaged but remained attached to its mounts. The stabilator attach point to the vertical was separated. The left and right stabilator sections were fragmented and deformed aft. The stabilator balance weight remained attached to its mast which was partially separated from the stabilator. The stabilator control tube remained attached to the sector but was pulled from the upper attach fitting. The stabilator control cables remained attached to the sector and were continuous to the T-bar. The stabilator cable were cut by recovery during the off-site examination. The stabilator trim tab was deformed aft and partially separated from its mounts. The trim’s control rod remained attached to its respective attaching points and the trim barrel exposed no shaft extension from the forward end of the assembly which is indicative of a “full nose down” trim; however, the trim cables were separated and the trim barrel was separated from its mount.

The rudder remained attached to its hinges and was separated into two sections. The rudder control cables remained attached to their respective attaching points and were continuous to the fragmented rudder pedal assembly.

2.3 Left Wing

The left wing was separated at the root and was mostly fragmented. The wing’s aft attach point remained attached to the fuselage and was pulled from the wing structure. The lift detector was separated and destroyed. The pitot mast was partially separated from the wing and its static port was clear of obstruction. The pitot port was obstructed with an organic material consistent with soil at the accident location when compared to the FAA on site photographs. The main gear was impact damaged and its actuator was retracted indicative of the gear in the “up” position. The fuel tanks and wingtip were destroyed from impact forces.

The impact damaged aileron was separated from the wing and its balance weight was separated and not located within the recovered wreckage. The aileron bellcrank was separated from its supporting structure and its control cables remained attached but were separated at the wing root area. The separated cable ends exhibited a splayed, broomstrawed appearance consistent with tension overload separation. The flap was impact damaged and separated from the wing and its control rod was fractured from its attach points.

2.4 Right Wing

The right wing was separated at the wing root and was largely fragmented. The landing gear was separated from the wing and its actuator was retracted indicative of the gear in the “up” position. The fuel tanks were destroyed from impact forces. The aileron was impact damaged and separated from the wing; its balance weight was separated and was not located within the recovered wreckage. The aileron bellcrank was separated from its supporting structure. One control cable remained attached and was separated at the wing root area while the other control cable was pulled from its bellcrank attach point was also separated at the wing root area. The separated cable ends exhibited a splayed, broomstrawed appearance consistent with tension overload separation. The wingtip was fragmented and separated from the wing. The flap was impact damaged and separated from the wing with its control rod fractured from the flap.

2.5 Other

The airplane was equipped with an Electronics International MUX-8A engine monitor. A device that was similar to the design that was impact damaged was retained to be sent to the NTSB Recorders Laboratory.

3.0 Engine Examination

Lycoming TIO-540-S1AD

Serial Number: L-5528-61A

Rated power: 300 hp

The engine was impact separated from the fragmented engine mount and located in the crater on the initial impact.



Figure 2. View of engine after mounts removed.

3.1 Exhaust System

The exhaust system remained attached to its respective attaching points but was impact damaged and a small section of the right exhaust pipe was not located within the recovered wreckage.

3.2 Induction system

The induction air filter assembly was not observed within the recovered wreckage.

3.3 Magnetos

The dual magneto was thermally damaged, and it was not able to be tested.



Figure 3. Dual magneto.

3.4 Ignition system

The top spark plugs were removed and examined. The Nos. 3, 4, 5, and 6 top spark plugs exhibited dark grey, worn, normal electrodes when compared to the Champion Check-A-Plug Chart. The remaining spark plugs were impact damaged.

3.5 Fuel System

The fuel pump was examined, disassembled, and no anomalies were noted.



Figure 4. Disassembled fuel pump.

The fuel servo was impact separated and located with the main wreckage. The butterfly was separated from the assembly but remained attached through the throttle body arm. The fuel servo was disassembled, the gasket was not damaged, and no anomalies were noted.



Figure 5. Disassembled fuel servo.

The fuel screen was examined and free of debris.



Figure 6. Fuel Screen.

3.6 Lubrication System

The oil sump was removed from the engine and contained oil, metallic particles, small carbon chips, and organic debris.



Figure 7. View of oil sump.

The oil screen was examined and it was obstructed by debris similar to carbon. The debris obstructed and filled about 2/3-5/8 of the oil screen. The debris was retained for further examination.



Figure 8. View of oil suction screen.

The oil filter was removed from the engine. It had a date of March 27, 2020, written on it. It was opened and a small amount of carbon chips and metallic debris was noted on the filter.



Figure 9. View of disassembled oil filter.

The oil pump was removed from the accessory section of the engine and examined. The pump body exhibited scoring.



Figure 10. View of disassembled oil pump.

The oil cooler was impact separated from the engine and located along the debris path.



Figure 11. View of oil cooler as found.

The oil dip stick and oil filler neck were located among the wreckage.



Figure 12. View of dip stick and filler neck.

3.7 Cylinders

Cylinder Nos. 1-4 were removed from the engine with minor difficulty. The No. 5 cylinder skirt was damaged and was difficult to remove from the engine.



Figure 13. View of cylinders after removed from the engine.

Cylinder No. 1 was impact damaged. The rocker box cover was removed and no anomalies were noted with the rocker arms or valves. Corrosion was noted on the interior of the cylinder. The valves were seated with no anomalies noted.

Cylinder No. 3 was impact damaged. The rocker box cover was removed and no anomalies were noted with the rocker arms or valves. The interior of the cylinder exhibited normal wear. The valves were seated and no anomalies were noted.

Cylinder No. 5 was impact damaged. The rocker box cover was removed and no anomalies were noted with the rocker arms or valves. The piston could not be removed from the cylinder. The connecting rod remained attached to the piston.

Cylinder No. 2 was impact damaged. The rocker box cover was removed and no anomalies were noted with the rocker arms or valves. The interior of the cylinder exhibited normal wear. The valves were seated and no anomalies were noted.

Cylinder No. 4 was impact damaged. The rocker box cover was removed and no anomalies were noted with the rocker arms or valves. The interior of the cylinder exhibited normal wear and oil was present. The valves were seated and no anomalies were noted.

Cylinder No. 6 was impact damaged and exhibited thermal damage. The rocker box cover was removed and no anomalies were noted with the rocker arms or valves. The piston could not be removed from the cylinder. The connecting rod remained attached to the piston.

3.8 Crankcase

The crankcase was examined and a hole was located in the top of the case in the vicinity of the No. 6 cylinder. The forward section of the 2-4-6 section side of the crankcase was impact damaged. The 1-3-5 side exhibited impact damage on the interior. No other anomalies were noted.



Figure 14. View of crankcase halves.

3.9 Camshaft and Lobes

The camshaft was fractured into two sections above the No. 6 crankshaft journal. The section of the camshaft near the aft portion of the engine exhibited thermal discoloration. The camshaft lobes exhibited normal wear. The No. 6 lifters were impact separated and one lifter was not located. No anomalies were noted with the camshaft gears and all gear teeth remained intact. No anomalies were noted with the camshaft.



Figure 15. View of camshaft after removed from engine.

3.10 Crankshaft and Bearings

The crankshaft was removed from the crankcase and examined. It remained in one piece but exhibited thermal discoloration on the aft section of the crankshaft.



Figure 16. View of crankshaft, crankshaft bearings, and connecting rods.

The No. 1 crankshaft journal did not exhibit any anomalies. The No. 1 crankshaft journal bearings were examined and did not exhibit any anomalies.

The No. 2 crankshaft journal exhibited a small amount of thermal discoloration. The No. 2 journal bearings exhibited fretting.

The No. 3 crankshaft journal exhibited rotational scoring and thermal discoloration. The No. 3 crankshaft journal bearing exhibited smearing and rotational scoring.

The No. 4 crankshaft journal exhibited a small amount of thermal discoloration. The No. 4 crankshaft journal bearing exhibited fretting.

The crankshaft gear and bolt remained secured to the crankshaft.

3.11 Connecting Rods

The Nos. 1 through 4 connecting rods remained attached to the crankshaft. Nos. 5 and 6 connecting rods remained attached to the piston, which was lodged inside the cylinder.

The No. 1 connecting rod exhibited thermal discoloration on the crankshaft side of the connecting rod. The No. 1 connecting rod bearing exhibited scoring and smearing.

The No. 2 connecting rod exhibited thermal discoloration on the crankshaft side of the connecting rod. The No. 2 connecting rod bearing exhibited scoring and smearing.



Figure 17. View of Nos. 1 and 2 connecting rods and bearings.

The No. 3 connecting rod exhibited thermal discoloration on about half of the connecting rod on the side of the crankshaft. The No. 3 connecting rod bearing exhibited thermal damage and smearing.

The No. 4 connecting rod exhibited thermal discoloration on about half of the connecting rod on the side of the crankshaft. The No. 4 connecting rod bearing exhibited thermal damage and smearing.



Figure 18. Nos. 3 and 4 connecting rods and bearings.

The No. 5 connecting rod was detached from the crankshaft journal. In addition, the journal exhibited extensive thermal discoloration and rotational scoring.

The No. 6 connecting rod was detached from the crankshaft journal and small pieces of the No. 6 connecting rod and bearing were located. The rest of the connecting rod was not located. The No. 6 rod journal exhibited severe thermal discoloration.



Figure 19. Nos 5 and 6 section of connecting rod.

3.12 Accessory Gears

The accessory section of the engine was examined and no anomalies were noted. All gear teeth remained intact and no anomalies were noted.



Figure 20. View of Accessory Section Gears.

3.13 Starter

The starter was impact separated and located with the wreckage.



Figure 21. View of starter.

3.14 Alternator

The alternator was impact separated and located with the wreckage.



Figure 22. View of alternator.

3.15 Vacuum Pump/System

The vacuum pump was examined and disassembled. The rotor and vanes remained intact.

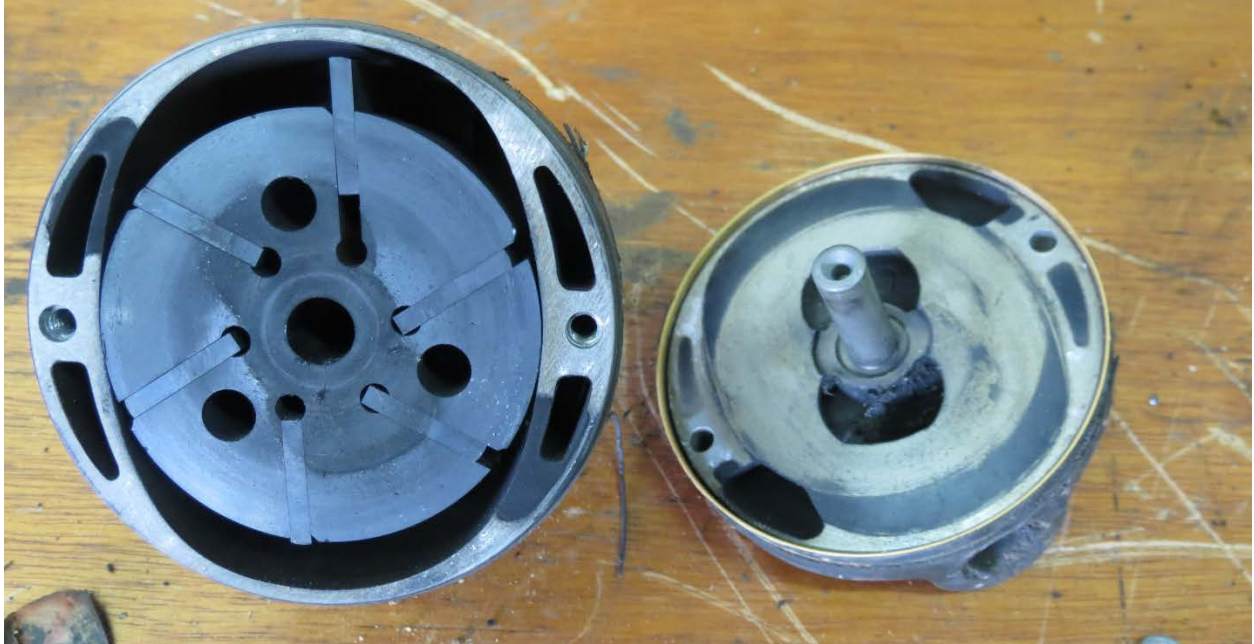


Figure 23. View of interior of vacuum pump.

3.16 Turbo

The turbocharger was impact damaged and broken in half. The compression wheel was impact damaged. The manifold pressure relief valve was impact separated and partially crushed.



Figure 24. View of disassembled turbo and impeller.

4.0 Propeller Examination

Hartzell HC-E2YR-1BF

The propeller was a two bladed constant speed propeller. The propeller governor was impact separated and recovered with the wreckage.

4.1 Hub

The propeller hub was impact damaged during the accident sequence.

4.2 Blade A

Blade A was examined and exhibited a small amount of bending. There were no chordwise scratch markings on the blade.



Figure 25. View of Blade A Back.



Figure 26. View of side of Blade A. Note bending.

4.3 Blade B

Blade B was examined and was bent aft about 30°. A gouge was cut into the blade by personnel during the recovery. The tip exhibited a slight bend. The blade back did not exhibit any chordwise scratches.



Figure 27. View of Blade B back.



Figure 28. View of side of Blade B.