



Airframe and Engine Examination Report

NTSB ACCIDENT NUMBER: **ERA21FA133**

AIRCRAFT REGISTRATION: N10KV

AIRCRAFT TYPE: PA-32RT-300T

ACCIDENT LOCATION: Vinemont, Alabama

Investigative Team:

NTSB Investigator-in-Charge (IIC): Millicent Hill, Aviation Accident Investigator
FAA Coordinator: Ken Lancaster, Aviation Safety Inspector (Birmingham, AL FSDO)

Piper Aircraft: John Hirsh (Air Safety Investigator)

Lycoming Engines: Ryan Enders (Air Safety Investigator)

HISTORY OF FLIGHT

On February 20, 2021, about 1748 central standard time, a Piper PA-32RT-300T, N10KV, was destroyed when it was involved in an accident near the Cullman Regional Airport (CMD), Vinemont, Alabama. The pilot and copilot were fatally injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

AIRCRAFT INFORMATION

According to the airplane and engine logbooks, the airplane received regular maintenance including annual inspections and AD compliance until 2016 when it was purchased by the copilot. In January 2019 the airplane was deemed unairworthy, a 9-page discrepancy list was provided detailing the reasons it was unairworthy. The logbook entry that declares the airplane unairworthy had been torn out of the logbook and found in a side pouch of the bag containing the maintenance records. The first completed annual inspection since 2016 was completed January 2021, the airplane had accumulated about 85 flight hours during that time. Also found were work orders for a propeller overhaul following a ground strike, there were no entries in the propeller logbook regarding the ground strike and subsequent overhaul. There was no logbook entry of compliance with AD 2004-10-14, which requires an inspection of the crankshaft gear and replacement of the gear retaining bolt and lockplate following a propeller ground strike.

WRECKAGE AND IMPACT INFORMATION

There was a 350 ft debris path from the first observed tree strike to main wreckage, which was on a magnetic heading of 130°, at an elevation of 930 ft. About 2,000 ft from main wreckage to the threshold of runway 2.

The aircraft came to rest inverted extensive postimpact fire consumed the cockpit, instrument panel, and fuselage. There was fire damage to both wings, engine, and empennage. The aileron balance cable was fractured at the centerline turnbuckle. The left wing control cables remained attached to the bellcrank. The push rod remained connected, the aileron was torn. Aileron cables continuous from forward cockpit chain to bellcranks; there were two separations, one at the balance cable turnbuckle forward cockpit chain. The right wing aileron cables were connected and continuous. The flap torque tube was separated, the chain was fractured, the manual flap cable from the selector to torque tube remained connected. The flap selector handle was observed in the first detent position consistent with a 10° flap setting. The rudder was connected and continuous from the pedal torque tube to the rudder. The stabilator cables were connected and continuous from the bottom of the T-bar in the cockpit to the stabilator. Flight control cable continuity was confirmed from the cockpit controls to the respective control surfaces for the stabilator and rudder. The ELT sustained extensive fire damage.

The fuel selector was found in the OFF position. The wing fuel caps were secured in place.

The blades of the three-bladed propeller remained attached and the propeller hub was securely mounted to the crankshaft propeller flange. Two of the blades had slight aft bending about midspan, the other blade was curled aft at the tip. The engine came to rest on its right side and sustained fire damage.

ENGINE EXAM

- The vacuum pump remained attached to the accessory housing and was thermally damaged.
- The propeller governor remained attached, it was removed and rotated freely. Propeller governor oil screen for was free of debris.
- The No. 3 top plug was oil soaked. Due to engine position postaccident the bottom spark plugs were oil soaked. According to the Champion Spark Aviation Check-A-Plug chart AV-27, the spark plug electrodes displayed coloration consistent with normal operation.
- The cylinders were borescoped. There was oil pooled in the Nos. 1, 3, 5 cylinders.
- The turbo remained mounted to the engine, the blades rotated freely.
- After partially rotating the engine, a broken crankshaft gear tooth was found between the camshaft and accessory drive gear, lodged in the accessory drive gear. Removing the broken gear tooth and debris allowed the engine to be rotated a full 360°. The coloration of the fracture face is consistent with a break during the attempted engine rotation, and was not present during the postcrash fire.
- Thumb compression was obtained on all cylinders, valve movement was confirmed.
- The fuel injectors were oil soaked and unobstructed. The engine driven fuel pump was thermally damaged, it would not rotate due to thermal damage.
- The throttle cable and mixture cable ends remained attached. The fuel injector remained attached to the engine and was thermally damaged. The fuel injector inlet screen was free of debris.
- The ignition harness remained attached to their respective spark plugs and was thermally damaged.
- The dual magneto was destroyed by fire.
- The oil filter was removed and opened, the filter sustained thermal damage and disintegrated. There was heavy carbon build up in the oil suction screen.
- The vacuum pump, magneto, propeller governor, turbo, were missing data plates/part numbers/serial numbers.
- The fractured gear tooth and crankshaft gear fragments were sent to the NTSB Materials Laboratory for examination.



Figure 1: View of the engine and propeller before examination.



Figure 2: View of the back of the engine before examination.

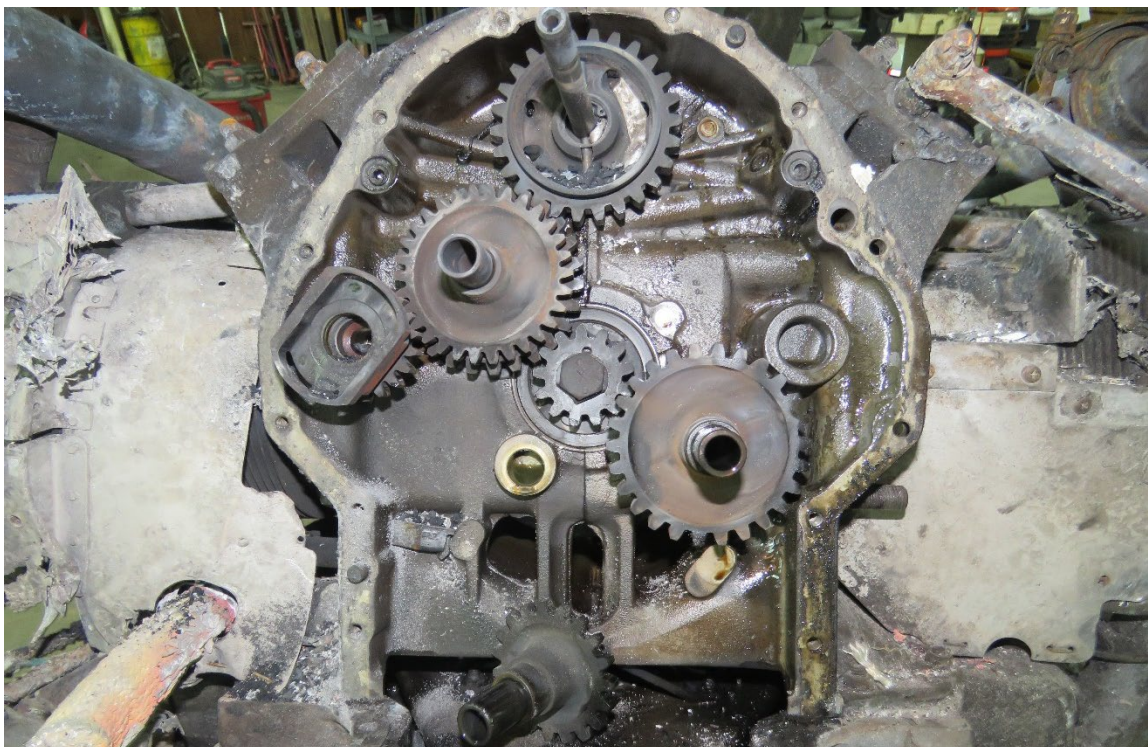


Figure 3: View of the accessory case, with crankshaft gear tooth fracture.

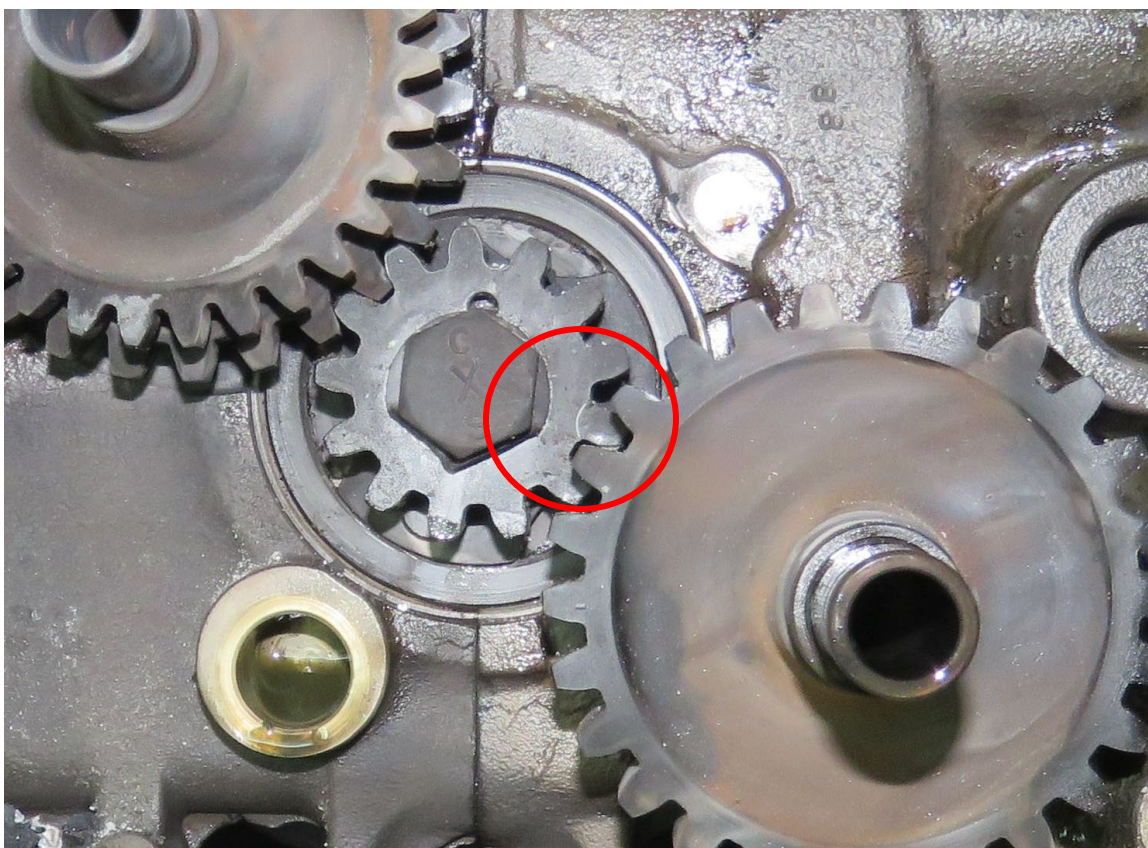


Figure 4: Closer view of the fractured crankshaft gear tooth.