

National Transportation Safety Board

Office of Aviation Safety

Washington, DC 20594



ERA23FA238

ENGINE EXAMINATION

June 15-16, 2023

A. ACCIDENT

Location: Rougemont, NC
Date: May 21, 2023
Time: 1115 EDT
1515 UTC
Airplane: Beech V-35, N272S

B. INVESTIGATIVE TEAM

Investigator In Charge Lynn Spencer
National Transportation Safety Board
Washington, DC

Party Member Ernest Hall
Textron Aviation
Wichita, KS

Party Member Phillip Grice
Continental Aerospace
Mobile, AL

C. SUMMARY

The engine examination occurred at Continental Aerospace in Mobile, Alabama on June 15-16, 2023. No maintenance logbooks were recovered; however, a phone conversation on June 16, 2023, with the mechanic who maintained the airplane until 2018 revealed that on May 25, 2018, an annual exam was performed. At that time, the engine had accrued TSMOH of 548.5 hrs, and the airframe had accrued 11,420.2 hrs. No total engine time was noted at that exam. Maintenance records had been requested from the mechanic who had more recently inspected the airplane; however, those records had not yet been received at the time of the examination.

The engine examination revealed engine damage consistent with oil depletion. Due to the postcrash fire, no source of oil leakage could be determined.

D. DETAILS OF THE ENGINE EXAMINATION

The airplane was equipped with a Continental IO-520-BA engine, SN 569077, and a 3-bladed MT Propeller, model MTV-9-D. The aircraft, propeller, and engine logbooks were not available during the onsite examination and were later determined to have been onboard the airplane during the accident flight and subsequently destroyed in the postcrash fire. As first viewed, the engine was still crated and sealed. The engine

was uncrated, and the exhaust tubes removed to facilitate the securing of the engine to the engine stand for examination. The entire engine exhibited thermal damage.

All accessories were thermally and heat damaged and removed. The drive coupling of the engine driven fuel pump remained intact. The fuel pump would not rotate by hand force. The starter adapter would not rotate by hand force. The oil pump was disassembled, and the shaft and gears were intact. The airframe throttle and mixture control cables remained attached to their respective attachment points on the throttle body. The propeller governor oil screen was clean and intact. The oil sump pan was disassembled, and examination revealed a significant amount of metal debris, some of which were identified as pieces of rod bearings, piston parts, and a connecting rod nut. Various installed seals, screws and nuts were unapproved parts. The pushrod housing seals for cylinder No. 4 were not approved parts and appeared to be field made. The lower crankcase splitline bolts were not approved parts and had spacers as they were too long, and the nuts were not approved parts. All but two of the six Seventh stud nuts were unapproved parts.

The cylinders were removed. Nos. 3 and 4 connecting rods were released from the crankshaft. Pistons of cylinder Nos. 3 and 4 were lodged inside their respective cylinders. All the pistons exhibited normal carbon deposits and no signs of detonation. Piston No. 4 had a fracture at the piston skirt, and examination of the piston face revealed impact gouging from exhaust and intake valve contact. All exhaust and intake valves appeared normal, although both No. 4 valves showed polishing at their edges consistent with piston contact. There was no evidence of detonation on the valves.

The camshaft was intact, and the lobes exhibited normal wear. The crankshaft was intact, and all main bearings exhibited no evidence of bearing movement or lock slot elongation. Scoring and darkening of the crankshaft main bearings were consistent with lubrication distress. The connecting rod bearings showed heat signatures and oil starvation in varying degrees. The No. 2 connecting rod bearing was partially extruded, smeared, scratched, and torn. The Nos. 3 and 4 connecting rod bearings and rod caps were released from the crankshaft and their remnants found within the engine casing and oil sump pan. The crankshaft counterweight pins were of the incorrect sizes.

The oil filter was opened, and the paper element was charred, with no metallic particles noted.

The engine damage was consistent with oil depletion. Due to the postcrash fire, no source of oil leakage could be determined.

E. PHOTOS OF THE ENGINE EXAMINATION



Photo 1- Crated engine before examination.



Photo 2 - Engine after uncrating.



Photo 3 - Engine ready for examination.



Photo 4 - Metal debris in impact damaged oil sump pan.



Photo 5 - Engine driven fuel pump and drive coupling.



Photo 6 - Starter adapter.



Photo 7 - Starter Adapter



Photo 8 - Oil pump



Photo 9 - Lower crankcase splitline bolts unapproved parts and spacers.



Photo 10 - Unapproved pushrod housing seals for cylinder No. 4



Photo 11 - Propeller governor.



Photo 12 - Disassembled thermally damaged oil filter.



Photo 13 - Spark plugs with no evidence of detonation.



Photo 14 - Cylinder Nos. 1,3, 5 with rocker arms and covers removed.

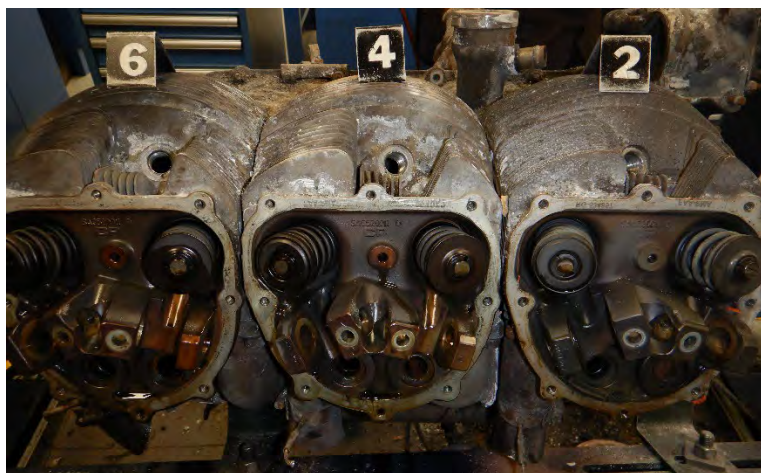


Photo 15 - Cylinder Nos. 2, 4 and 6 with rocker and covers removed.



Photo 16 - View of open crankcase and main bearings for cylinder Nos. 6,4 and 2 (left to right).



Photo 17 - View of open crankcase and main bearings for cylinder Nos. 5,3 and 1(left to right), note lifters that could not be removed.



Photo 18 - Intake and exhaust valve lifters (cylinders Nos. 1 and 3 lifters not removed).



Photo 19 - View of all removed cylinders and pistons.



Photo 20 - Cylinder No. 4 with piston and connecting rod (note fracture at the piston skirt).



Photo 21 - Cylinder No. 4 piston with valve strike marks (circled in yellow).



Photo 22 - Counterweights

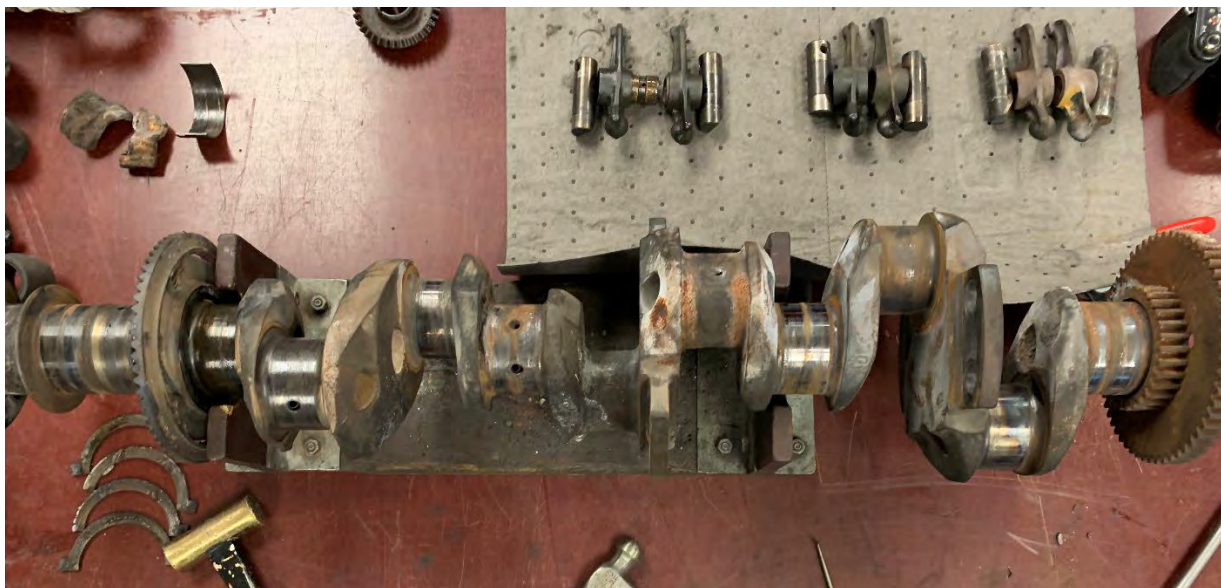


Photo 23 - Crankshaft (Note scoring and darkening of the crankshaft main bearings).

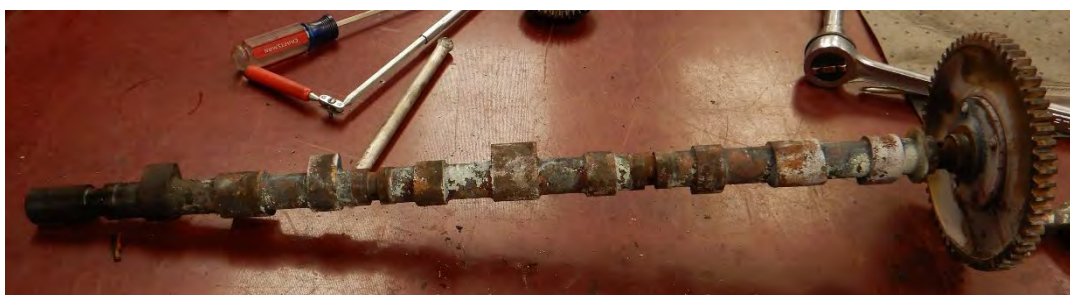


Photo 24 - Camshaft and camshaft gear with heat and thermal damage.