

National Transportation Safety Board

Office of Aviation Safety

Washington, DC 20594



CEN23LA062

ENGINE EXAMINATION SUMMARY

November 14, 2023

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A. ACCIDENT

Location: Addison, Texas
Date: December 12, 2022
Time: 2005 central standard time
Aircraft: Mooney M20K, N231GZ

B. EXAMINATION SUMMARY

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C. ACCIDENT SUMMARY

On December 12, 2022, about 2005 central standard time, a Mooney Aircraft M20K airplane, N231GZ, was substantially damage when it was involved in an accident near Carrollton, Texas. The pilot and passenger were seriously injured. The airplane was operated as a Title 14 Code of Federal Regulations Part 91 personal flight.

An engine teardown examination was conducted on November 14th at Continental facilities (Mobile, Alabama) under direct oversight of NTSB investigators.

D. EXAMINATION SUMMARY

1.0 Engine Examination¹

Continental TSIO-520-NB17 (s/n 822302-R)

The engine exhibited soot deposits consistent with a post-impact fire but appeared otherwise intact. Crankshaft rotation was restricted. The cylinders appeared to be intact. The cylinder barrels were smooth with exception of the upper portion which exhibited some corrosion. The pistons were intact and contained moderate combustion deposits. Each piston face exhibited crescent shaped impressions consistent with contact to an open intake and exhaust valve. The piston rings were installed and exhibited some corrosion. The lower ring common to the #4 piston was fractured when removed from the cylinder.²

The valve covers were intact and retained by two screws.³ The rocker arms and springs were intact. The valves displayed contact marks at the perimeter consistent with contact to the pistons; they were otherwise intact.

The crankshaft appeared undamaged, and the counterweights were intact. Each connecting rod was intact and secured to the crankshaft. The main journal bearings were in place and exhibited normal wear signatures. However, the #2 journal bearing (left side) was displaced forward. It appeared operational and no damage consistent with contact to the crankshaft was observed. The idler gear appeared intact.

The camshaft was intact and appeared undamaged. The camshaft gear was secured to the camshaft with safety wire properly installed. About 12 teeth on the camshaft gear were separated or damaged. Six gear teeth were recovered from the oil sump.⁴ The camshaft gear displayed part number 655516 Rev. A. The gear teeth measured about 0.440".⁵

The spark plugs were secure and appeared undamaged. Several lower plugs were oil wetted and several exhibited minor corrosion deposits. The magnetos were securely attached to the engine and appeared intact. Each magneto provided a spark at each lead when installed on a test bench. The ignition harness was sooted but appeared undamaged. Each lead remained secured to the corresponding magneto and spark plug.

¹ Directions related to accident site placement and component damage/deformation are with respect to an intact airframe unless otherwise noted.

² The separated portion of the piston ring was intact consistent with fracture at the time the piston was removed from the cylinder.

³ Documentation indicated that the valve covers were initially removed at the time of the airplane examination.

⁴ The camshaft gear and recovered teeth were retained for further examination.

⁵ The camshaft gear installed was the subject of a service bulletin. The revised gear teeth width was 0.500".

The oil filter was secure, and the housing was undamaged. The safety wire had been cut, and the filter contained little or no oil.⁶ The oil sump was dented consistent with impact forces. The oil pickup tube was intact. The pump housing and impeller gears were undamaged. The drive gear splines were intact. The housing cavity was unremarkable. No scoring or evidence of hard particle passage was observed. The cavity base and cap exhibited rotational scoring consistent with contact from the impellers during operation.

The throttle and control had been removed from the engine prior to the examination. The assembly was sooted but appeared otherwise undamaged. The throttle and mixture control cables were attached to the control arms. The control cables had been cut consistent with recovery efforts. The throttle control arm did not rotate under hand pressure. The mixture control rotated freely. The assembly was not disassembled further.

The engine-driven fuel pump was secure; however, a nut was missing from the attachment stud.⁷ The input drive coupling was intact. The component was not examined further.

The propeller governor was secure and appeared intact. The input drive shaft and splines were undamaged. The drive shaft rotated freely. The control arm was free to rotate, and the spring was operational.

The turbo charger assembly was sooted. The turbine disc appeared intact and rotated freely. The component was not examined further. The waste gate assembly remained attached to the throttle and control ducting. It appeared intact and was not examined further.

----- end of summary -----

⁶ The observations were consistent with removal of the oil filter during the airplane examination.

⁷ Documentation indicated that the fuel pump was initially removed during the airplane examination.