



The National Transportation Safety Board

Office of Aviation Safety
Central Region
Memorandum for the Record
Engine Examination Findings
CEN22FA151
Rowlett, Texas
March 25, 2021

A detailed examination of the engine was conducted at the accident site. Summary - no pre-impact anomalies were found with the engine during detailed examination. The damages to the engine were consistent with severe impact and fire damage.

Details:

- As first viewed, the engine remained attached to helicopter firewall and airframe structure with rocker box covers of cylinders 1, 3, and 5 facing upward. The engine showed signs of thermal damage and was coated in dry chem powder consistent with fire extinguisher material. The engine was found attached to the airframe via two of its three engine mounts and the third was impact fractured. The mounts were cut using a Sawzall to facilitate removal from the wreckage. The engine was hung from a forklift for the remainder of the engine exam at the accident site.
- The rocker box covers on cylinders 2, 4, and 6 showed signs of impact damage in the form of dents and deformations. The shroud tubes on cylinder 2 were partially melted towards the engine crankcase. The top spark plug of cylinder number 2 was fractured but remained intact while the lower sparkplug on cylinder number 6 was fractured into 2 pieces and could not be removed due to exhaust pipe impact formed around the plug base. All remaining spark plugs were removed and examined. Plugs were of the massive electrode type and showed coloration and wear consistent with normal operation when compared to a Champion Check-A-Plug chart. All rocker box covers were removed, and valve action confirmed on each cylinder as the engine was rotated via the engine cooling fan. Thumb compression was confirmed on cylinders during the engine examination.
- Both engine driven magnetos were found attached to the accessory section of the engine and were both removed during the exam. The left-hand magneto showed signs of thermal damage and had fractures to its housing material. The magneto was rotated utilizing an electric drill, but no spark was noted at any terminal of the magneto. The right-hand magneto showed signs of thermal damage as well, but its case remained intact with no fractures observed. The magneto was rotated using an electric drill, but no spark was produced at any terminal.
- The oil system was examined starting with the oil filter. It was found attached to the accessory section of the engine with its respective safety wire intact. The filter was removed, cut open, and filter element inspected. The filter element showed signs of thermal damage, was black in color, and brittle to the touch. No debris was noted within the folds of the filter element and was unremarkable. The oil suction screen was removed and found to be free and clear of debris. The oil sump remained attached but had impact damage on the bottom side and was missing material on the top left side along the engine case mating surface.
- The engine starter motor was found detached from the Bendix drive portion of the starter assembly. Its data tag was not legible from the post impact fire and a portion missing from impact forces.

- The engine carburetor was found impact separated from the engine. The unit was located at the engines point of impact with the ground in the bottom of the hole that was filled with a water and oil mixture. The carburetor was disassembled, and its fuel inlet screen was found to be free and clear of debris. The brass floats remained intact but one float showed signs of hydraulic crushing and was deformed. The fluid in the float bowl as disassembled appeared to be clear in color with what appeared to be dirt and sediment. No odor of Avgas was noted during carburetor disassembly. A water finding paste confirmed the presence of water in the float bowl.
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