

National Transportation Safety Board

Office of Aviation Safety

Washington, DC 20594



ERA23FA006

ENGINE EXAMINATION

August 22, 2023

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A. ACCIDENT

Location: Arundel, Maine
Date: October 5, 2022
Time: 1356 EST
1856 UTC N906AT,
Airplane: Beech A36

B. ENGINE EXAMINATION

IIC Brian Rayner
National Transportation Safety Board
Washington, D.C.

Investigator Josh Young
National Transportation Safety Board
Washington, D.C.

Party Coordinator Casey Love
Textron Aviation
Wichita, KS

Party Coordinator Phillip Grice
Continental Aerospace Technologies
Mobile, AL

C. SUMMARY

On October 5, 2022, about 1356 eastern daylight time, a Beech A36, N902AT, was destroyed when it was involved in an accident near Arundel, Maine. The private pilot and passenger were fatally injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 business flight.

Local emergency services personnel located the airplane's fuselage in hilly, wooded terrain about 1 hour after the accident, and the wreckage was examined at the accident site the following day. The initial impact point was in a tree about 40 ft above the ground. The wreckage path was oriented 050° and was about 150 ft in length; all major components of the airplane were accounted for at the scene. The fuselage came to rest upright with the engine and propeller still attached. The propeller blades displayed similar twisting, bending, and chordwise scratching.

The cockpit, cabin area, and nearly all the empennage, were consumed by a postcrash fire. The tail section remained largely intact. The wings displayed impact damage consistent with collision with trees and terrain. Flight control cable continuity was confirmed from the cockpit to the flight control surfaces through several breaks consistent with impact and thermal damage.

The engine was separated from the airframe. The propeller was rotated by hand and continuity was established through the powertrain to the valvetrain and the accessory section. Compression was attained using the thumb method. The magnetos were secure in their mounts and produced spark at all terminal leads when the crankshaft was rotated. The engine was retained for further examination.

D. DETAILS OF THE EXAMINATION

1.0 Engine Examination

The engine was shipped from the recovery facility in Westfield, MA to the engine manufacturer's facility for examination. The engine was unboxed under federal supervision and the engine examination began on August 22, 2023.

The throttle body metering unit was not shipped with the wreckage and an exemplar throttle body metering unit was attached to the engine to facilitate an engine run. The engine driven fuel pump remained attached to the engine and exhibited thermal and impact damage. The fuel pump was removed, and bench tested for functionality. The pump operated on the test bench and was reinstalled on the engine before a test run of the engine was conducted.

The following items were removed from the engine to facilitate an engine run:

- The alternator was impact damaged, removed, and a plate installed where the alternator attached to the engine.
- The engine baffling was removed.
- The starter exhibited thermal damage and was removed and replaced by an exemplar unit.
- The ignition harness exhibited damage and was replaced with exemplar units.
- All the air intakes on the engine were impact damaged, these were removed and replaced with exemplar intakes.
- The oil filter exhibited thermal damage and was replaced with an exemplar filter.
- The exhaust was impact damaged and replaced with straight pipe exhaust.
- The propeller governor was removed and replaced with a test cell governor.
- The tach drive was removed, and the opening covered with a plate.
- The vacuum pump was not shipped with the engine and the position on the crankcase was plated over.
- The pushrod and pushrod housing for the No. 5 cylinder exhaust valve were impact damaged and replaced with exemplar units.
- All 4 engine mount legs were replaced with exemplar units.

The oil cooler leaked at engine start due to impact damage and was replaced with an exemplar unit.

An engine test run was then performed, and the engine accelerated smoothly from idle to a maximum of about 2550 RPM (Maximum-rated 2700 rpm) with the throttle fully open. During the engine test run the engine idled at about 500 RPM. The engine was then accelerated to 1800 RPM and ran smoothly at that power setting for about 3 minutes. It was then advanced to about 2100 RPM which would be consistent with a power setting used for an instrument approach procedure. The engine ran smoothly at that power setting for about 4 minutes. The engine ran at maximum RPM for about 3 minutes. A magneto check was performed at 2100 RPM when switched to only the left magneto the RPM dropped 124 RPM and when switched to only the right magneto the RPM dropped 135 RPM.

The No. 6 cylinder exhaust gas temperature (EGT) was "low," likely due to an inoperative test cell EGT probe. The cylinder head temperature was on the "low side" of the normal operating range. The fuel flow was lower than expected which likely resulted in the lower than expected RPM during full throttle application. The altitude compensating engine driven fuel pump was disassembled, the impact damage to the fuel pump punctured the aneroid bellows and resulted in the bellows being fully expanded. The bellows being expanded would result in a lower than normal fuel flow.

Cylinder compression was tested at the completion of the test run with the results listed below.

1.55/80

2.50/80

3.62/80

4.50/80

5.65/80

6.70/80



Photo 1: Engine as first viewed at the facility.



Photo 2: The engine fitted to the stand for test run.



Photo 3: The engine fitted to the stand for test run.



Photo 4: Exemplar aneroid bellows (lower) vs aneroid bellows from accident engine (upper).

Submitted by:

Joshua Young
Air Safety Investigator