

# National Transportation Safety Board

Office of Aviation Safety

Washington, DC 20594



ERA23FA033

## **WRECKAGE EXAMINATION SUMMARY**

April 1, 2024

## TABLE OF CONTENTS

A. ACCIDENT .....	3
B. WRECKAGE EXAMINATION PARTICIPANTS.....	3
C. SUMMARY.....	3
D. DETAILS OF THE INVESTIGATION .....	4
1.0 ACCIDENT SITE .....	4
2.0 AIRFRAME EXAMINATION.....	5
2.1 Wings.....	6
2.2 Flight Controls.....	7
2.3 Fuel System.....	7
3.0 ENGINE EXAMINATION .....	7
4.0 PROPELLER EXAMINATION .....	10
5.0 PROPELLER GOVERNOR.....	10
6.0 TESTS AND RESEARCH.....	10
7.0 FUEL INFORMATION .....	11

## **A. ACCIDENT**

Location: Keene, New Hampshire  
Date: October 21, 2022  
Time: 1845 EDT  
2245 coordinated universal time (UTC)  
Airplane: N8020R, Beech A24R

## **B. WRECKAGE EXAMINATION SUMMARY**

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## **C. SUMMARY**

On October 21, 2022, about 1845 eastern daylight time, a Beech A24R, N8020R, was destroyed when it was involved in an accident near Dillant/Hopkins Airport (KEEN), Keene, New Hampshire. The flight instructor and commercial-rated pilot were fatally injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

Prior to departure from KEEN, airport security video depicted the airplane taxi to the fuel farm where 24.380 gallons of 100 low-lead fuel were purchased. Following fuel purchase, a witness noted the airplane taxi to the approach end of runway 02.

According to recorded audio from the common traffic advisory frequency (CTAF), about 1843 EDT, an occupant of the airplane called on the frequency that the flight was departing from runway 02 and would remain in the airport traffic pattern.

According to several witnesses who were located on-airport, one of whom was a pilot and the other was a pilot and airframe and powerplant mechanic, the engine sounded abnormal with the pilot exclaiming that it never sounded smooth during the entire time the airplane was on the runway or while airborne. The pilot-rated mechanic stated that when the flight was airborne along the runway he heard a momentary power reduction, followed by a power advance. The flight continued and was noted to be in a very shallow climb, by witness accounts climbing to between 50 and no higher than about 200 ft when the flight was near the intersection of runways 02/20 and 14/32, which was about 5,200 ft down the runway, with about only 1,000 ft of runway remaining. The flight continued in a wing and nose level attitude while several witnesses who were located northwest of the departure end of the runway reported the poor engine sound continued. A witness located about .5 nautical mile north-northeast from the departure end of runway 02 reported the airplane was flying not much higher than 50 ft above ground level when it flew by him. When he heard the airplane, he reported hearing pop pop sounds then the airplane began descending and the engine sound became louder but the popping sound stopped when the flight was descending. He heard the impact and ran to the accident site.

The airplane impacted into a storage building attached to a 2-story wood frame apartment building that had 5 separate apartments. There was no distress call made by an occupant of the airplane on the CTAF.

## **D. DETAILS OF THE INVESTIGATION**

### **1.0 Accident Site**

The main wreckage was located among the building; the main wreckage was located at 42.913141° north latitude and -72.267627° west longitude, or about .54 nautical mile north-northeast from the departure end of the runway<sup>1</sup>.

Examination of the accident site revealed extensive heat and impact damage to the storage building and its contents and its metal roof, several of the apartments, and its roof. Inspection of the metal roof which was displaced from its normal position revealed it contained red paint transfer oriented on a magnetic heading of 021°. The red paint transfer was located to the right side of the energy path. Two parallel slash marks on the metal roof were oriented 66 inches apart, though the scars were not oriented in a direction consistent with the direction of flight.

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<sup>1</sup> Straight line distance and direction. Does not imply route of flight.



**Figure 1: Aerial Photograph of Accident Site. Arrow Points to Aft Empennage.**

## **2.0 Airframe Examination**

Examination of the wreckage revealed the cockpit, cabin, right wing, portion of the left wing, and forward portion of the aft empennage were nearly consumed by the postcrash fire to approximately fuselage station 250.00.



**Figure 2: Image of Reconstructed Wreckage.**

One restraint buckle was located in the wreckage and was found in the buckled position; the buckle released easily. Although the remains of several flight instruments were recovered the readings could not be determined. The backs of both rear seats were recovered.

The aft portion of the aft empennage, heat-damaged sections of the left wing, pitot tube, and melted aluminum were found on top of the metal roof. Additional wreckage debris was found among the building debris. The engine with attached propeller was resting on its right side forward of the aft empennage. No bird remains was found among the wreckage. A 1.5 inches diameter tree limb located on the ground beneath a tree immediately adjacent to the accident site had a 45° slash thru nearly 1/2 diameter.



**Figure 3: Aerial Photograph of Close-Up of Engine Assembly with Attached Propeller at the Accident Site.**

## **2.1 Wings**

Examination of the left wing revealed it was fragmented. The pitot tube and landing gear were separated from the structure; the pitot tube was clear. The landing gear actuator was located and was measured to have an 11 inches extension; the actuator was capable of movement by hand. The fuel tank outlet screen had melted material adhering to it and the fuel tank was breached; no fuel was observed.



**Figure 4: Cropped Image of Remains of Left Wing in Foreground.**

Aside from the right landing gear assembly that was thermally damaged, no components of the right wing were recovered.

## **2.2 Flight Controls**

Examination of the flight controls for pitch, yaw, and roll revealed stabilator control cable continuity was established from the stabilator actuating tube to the control column through cuts made by first responders. The stabilator trim control cable was established through breaks consistent with thermal damage; the stabilator trim measurement was measured at .875". When moving the stabilator to an approximate neutral position, the stabilator trim was noted to be close to the neutral position. Rudder cable continuity was established from the rudder bellcrank to the control attachment hardware; the left rudder cable was continuous while the right rudder cable had a break consistent with tension overload. Examination of the direct aileron control cables from the control column to the bellcrank attachment hardware revealed cuts that were consistent with first responder cuts and thermal damage. The thermally damaged cable was fractured approximately 45" from the bellcrank attachment point was retained for examination by the NTSB Materials Laboratory. The balance cable continuity was confirmed from the left bellcrank to the other end of the cable attachment hardware through a broken turnbuckle that was consistent with impact damage, the right bellcrank was not located at the time of the examination. The flap actuator was not located. Both control yokes were found among the wreckage.

## **2.3 Fuel System**

Examination of the airframe fuel supply and vent systems revealed the fuel strainer sustained significant thermal damage. Disassembly examination of the fuel strainer revealed minor debris observed on the screen and bowl consistent with post impact accumulation. The remaining fuel and vent lines were consumed by the post-impact fire. The fuel selector valve was not located.

## **3.0 Engine Examination**

Examination of the engine revealed it sustained heavy fire damage.



**Figure 5: Frontal View of the Engine Assembly with Attached Propeller and Firewall.**

Examination of the engine revealed crankshaft, camshaft, and valve train continuity. Thumb suction and compression were noted at each cylinder. No pushrods or pushrod housings were bent. Borescope inspection of the inside of each cylinder revealed no discrepancies to the cylinder walls, piston, intake, or exhaust valve faces. Visible crosshatching was observed on all cylinders. Examination of the ignition system revealed both magnetos remained tightly secured to the accessory case, but both magnetos and ignition harness were extensively heat damaged by the postcrash fire. Rotation of the left magneto revealed the shaft rotated and the impulse coupling could be heard, but the points were consumed. Inspection of all spark plugs revealed that except for the No. 2 top spark plug, all spark plug electrodes appeared to be new. The No. 2 top spark plug wear was normal. The coloration of all spark plugs was consistent with normal operation. Operational testing of the spark plugs was performed without cleaning at 80 psi with all producing bright blue spark with no discrepancies noted. Inspection of the air induction system revealed the air filter was destroyed but the screen remained installed in the duct. Inspection of the muffler revealed no internal issues of either end.

The servo fuel injector was removed for further examination. The fuel inlet screen was secured and removed for further examination and found to be clean. Minor debris was noted inside the filter screen cavity in the body of the injector. The



flow divider remained attached to the top of the engine. The injector lines from the flow divider to the injectors were all secured. The unit was exposed to thermal forces and the data plate was not legible. The fuel injector nozzles remained installed in their respective cylinder heads. They were removed for further examination and none had the inserts or restrictors installed.



**Figure 6: View Following Removal of Fuel Injector Nozzles.**

Nozzles 1 and 3 had oil in the units from the resting position of the engine at the mishap location, while the Nos. 2 and 4 were found unobstructed when removed. Nozzles 1 and 3 were unobstructed when light air was pushed through to remove the liquid oil. The fuel injector nozzles without inserts, fuel injector lines, and servo fuel injector were retained for further examination at a repair station. Refer to Fuel Systems Examination And Testing Summary which is included in the NTSB public docket for the investigation.

The engine-driven diaphragm-type fuel pump remained installed on the accessory housing of the engine and was found to be partially consumed by the post-impact fire. The unit was safety wired in place and was removed for further examination. The lever of the unit actuated when removed, but the damage to the bottom portion of the pump from the thermal forces prevented the pump from pumping air. The unit was disassembled and photographed.

Several fuel hoses remained with the engine but were all heavily damaged by the post- impact fire. The airframe line to the engine-driven fuel pump remained

secured at the fuel pump inlet. The fuel pump to fuel injector line was separated at the fuel pump side from the impact and post-impact fire, however, it remained secured to the fuel injector unit. The fuel line from the fuel injector unit to the fuel manifold remained secured on both ends of the line.

Examination of the lubricating system revealed the oil filter element sustained extensive fire damage. About 1 gallon of oil was drained from the oil sump. The oil suction screen was clean.

#### **4.0 Propeller Examination**

Examination of the propeller which remained attached to the crankshaft flange revealed it was heavily damaged by the post-impact fire. The full span of one blade remained attached to the propeller hub, while the remaining two blades also remained attached to the propeller hub but only approximately 6 inches of each blade remained. The propeller was retained for further examination at the manufacturer's facility. Refer to Propeller Examination Summary which is included in the NTSB public docket for the investigation.

#### **5.0 Propeller Governor**

The governor remained attached to the accessory housing on the rear of the engine. The governor control cable remained attached to the governor spring end; however, the spring end was impact separated from the governor body. The unit was removed for further examination. The drive of the governor rotated freely. A date on the data plate of the unit reads 02-09-21. The propeller governor was retained for further examination at the manufacturer's facility. Refer to Propeller Governor Examination Summary which is included in the NTSB public docket for the investigation.

#### **6.0 Tests and Research**

Testing was performed by the witness who noted the rotation point, airplane at 25 ft, power reduction then power increase, level off, and when he lost sight of the airplane. The testing involved a vehicle on the runway in constant communication with the witness in the location he was at when he witnessed the flight. When the vehicle was at the point on or along the runway when he witnessed key points the vehicle was stopped and the coordinates were logged. The results of the testing are included below:

Rotation Point- 42.896282° north latitude and -72.270169° west longitude. That location when plotted on Google Earth was located 2,890 ft before the departure end of the runway.

Location when at 25 ft - 42.898330° north latitude and -72.270000° west longitude. That location when plotted on Google Earth was located 2,178 ft before the departure end of the runway.

Leveled off Point - 42.899141° north latitude and -72.269951° west longitude. That location when plotted on Google Earth was located 1,864 ft before the departure end of the runway.

Throttle Back Point - 42.899572° north latitude and -72.269911° west longitude. That location when plotted on Google Earth was located 1,693 ft before the departure end of the runway.

Throttle Forward Point - 42.899847° north latitude and -72.269877° west longitude. That location when plotted on Google Earth was located 1,607 ft before the departure end of the runway.

Lost Sight of the Airplane - 42.901916° north latitude and -72.269736° west longitude. That location when plotted on Google Earth was located 845 ft before the departure end of the runway.

## **7.0 Fuel Information**

Postaccident, the KEEN airport director suspended fueling operations pending fuel testing results. Postaccident testing of a sample of fuel for API from the fuel tank and fuel filter vessel revealed the API for the tank was the same value as it was when the last 4,000 gallons of fuel were delivered on October 13, 2022, and was .2 API higher for the sample taken from the fuel filter vessel (within limits). The samples from the storage tank filter sump and self-serve filter sumps were both noted to be 2A which are associated with slight contamination and bright. Additionally, a sample of fuel was placed on a brown bag and no oily residue was noted which indicated there was no cross contamination. The testing concluded that the fuel was within limits for Avgas. The report specified that there were 45 aircraft fueled from the same source before the accident, and 2 aircraft fueled from the same source after the accident. Formal fuel testing was not performed.

Submitted by:

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