National Transportation Safety Board
Office of Aviation Safety
Washington, DC 20594

ERA23FA033

PROPELLER EXAMINATION SUMMARY

April 1, 2024

TABLE OF CONTENTS

A. ACCIDENT

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

B. PROPELLER EXAMINATION SUMMARY

IIC	Timothy W. Monville NTSB-OAS/ERA Washington, DC
Party Coordinator	Kurt Gibson Textron Aviation Wichita, Kansas
Party Member	Kevin Stahl Textron Aviation Wichita, Kansas

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.

Following examination of the airframe and engine, the propeller was removed from the engine, and shipped on November 2, 2022 to Textron Aviation via FEDEX Freight 770377546250. It was delivered on November 4, 2022, and remained secured pending Virtual Examination by NTSB.

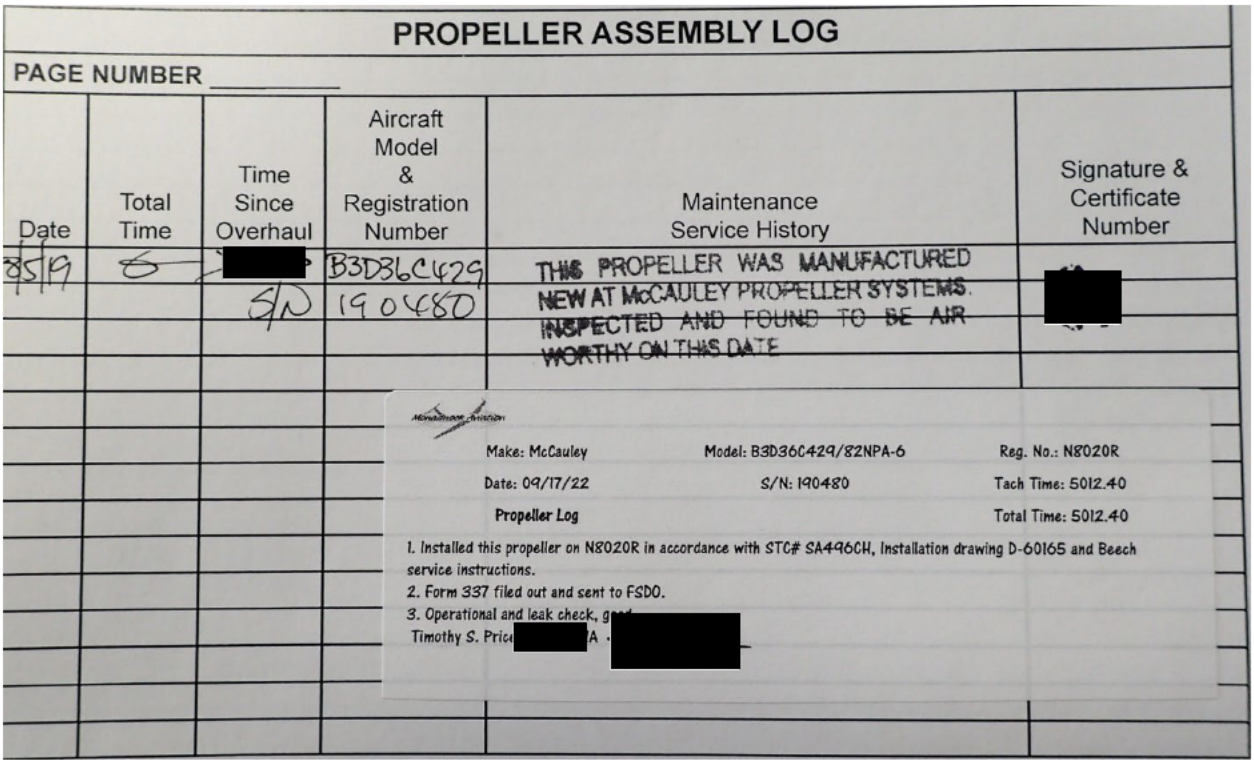
D. DETAILS OF THE PROPELLER INVESTIGATION

1.0 Propeller Information

1.1 Propeller Manufacturing and Installation

The McCauley three-bladed, constant speed, single acting, B3D36C429/G-82NPA-6 propeller, serial number 190480 was manufactured on August 5, 2019, and was installed on the engine of the accident airplane on September 17, 2022, in accordance with Supplemental Type Certificate (STC) SA49CH.

At manufacture, all propeller blade angles were set at blade station 30. The low pitch stop was specified to be 10.5° + or – 0.2°, while the high pitch stop was specified to be 33.8° + or – 0.5°.



PROPELLER ASSEMBLY LOG

PAGE NUMBER _____

Date	Total Time	Time Since Overhaul	Aircraft Model & Registration Number	Maintenance Service History	Signature & Certificate Number
8/5/19	0	[redacted]	B3D36C429 S/N 190480	THIS PROPELLER WAS MANUFACTURED NEW AT McCAULEY PROPELLER SYSTEMS. INSPECTED AND FOUND TO BE AIR WORTHY ON THIS DATE	[redacted]

Make: McCauley Model: B3D36C429/82NPA-6 Reg. No.: N8020R

Date: 09/17/22 S/N: 190480 Tach Time: 5012.40

Propeller Log Total Time: 5012.40

1. Installed this propeller on N8020R in accordance with STC# SA496CH, Installation drawing D-60165 and Beech service instructions.
2. Form 337 filed out and sent to FSDO.
3. Operational and leak check, g[redacted]

Timothy S. Pric[redacted]A [redacted]

Figure 1: Propeller Manufacture and Installation Entries.

1.2 Propeller Flight Manual Supplement Information

The Flight Manual Supplement for the propeller specified that the green arc rpm range was between 2,200 and 2,700, while the "Radial Red Line – (Rated)" rpm was 2,700. The supplement also indicated there was no performance change. The POH/AFM specified that during a static power check, the engine rpm should be between 2,650 and 2,700[1].

2.0 Propeller Examination

Examination of the propeller revealed all blades were free to rotate in the propeller hub and all retaining rings were dislodged. Examination of the propeller blades revealed the following observations.

[1] NTSB interviewed 3 days after the accident the airframe and powerplant mechanic with inspection authorization (A&P/IA) who performed a full power static check earlier on the accident date following completion of the annual inspection. He recalled the maximum rpm attained during a full power check was between 2,300 and 2,375. Refer to NTSB Record of Conversations which are in the NTSB public docket for the investigation.

Figure 2: View of the Propeller At Inspection.

No. 1 Blade – Free to Rotate in the Propeller Hub. The leading edge was rotated 180° from the normal orientation. Extensively heat damaged.

No. 2 Blade – Free to Rotate in the Propeller Hub. Extensively heat damaged.

No. 3 Blade – Free to Rotate in the Propeller Hub. The leading edge was past the high pitch stop. Appeared to be full span. Heat damaged.

The screws for the cylinder were safety wired but exhibited melted aluminum.

All three of the A-4577 phenolic blade actuating links were fractured at varying locations, but still connected to the C-4784 piston of blades No. 1, 2, and 3. The phenolic blade actuating link for the No. 2 blade was fractured at the attach point at the piston but a section of block remained.

Figure 3. View of the Fractured Phenolic Blade Actuating Link for the No. 2 Propeller Blade.

The spring was intact, and it and the piston were at low pitch.

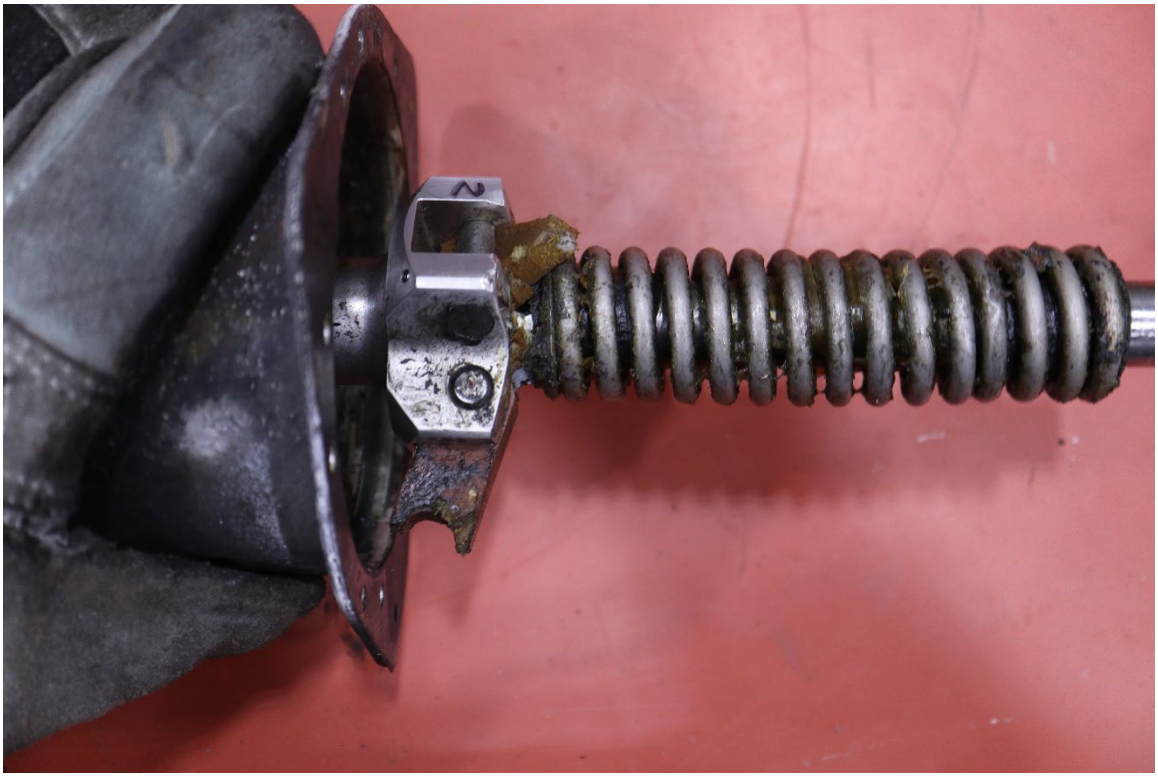


Figure 4: View showing the spring and piston on the low Pitch.

Further examination of the propeller blades revealed the following:

No. 1 Blade – Pitch pin was separated from the butt end of the blade. The threads in the holes that attach the pitch pin were damaged.

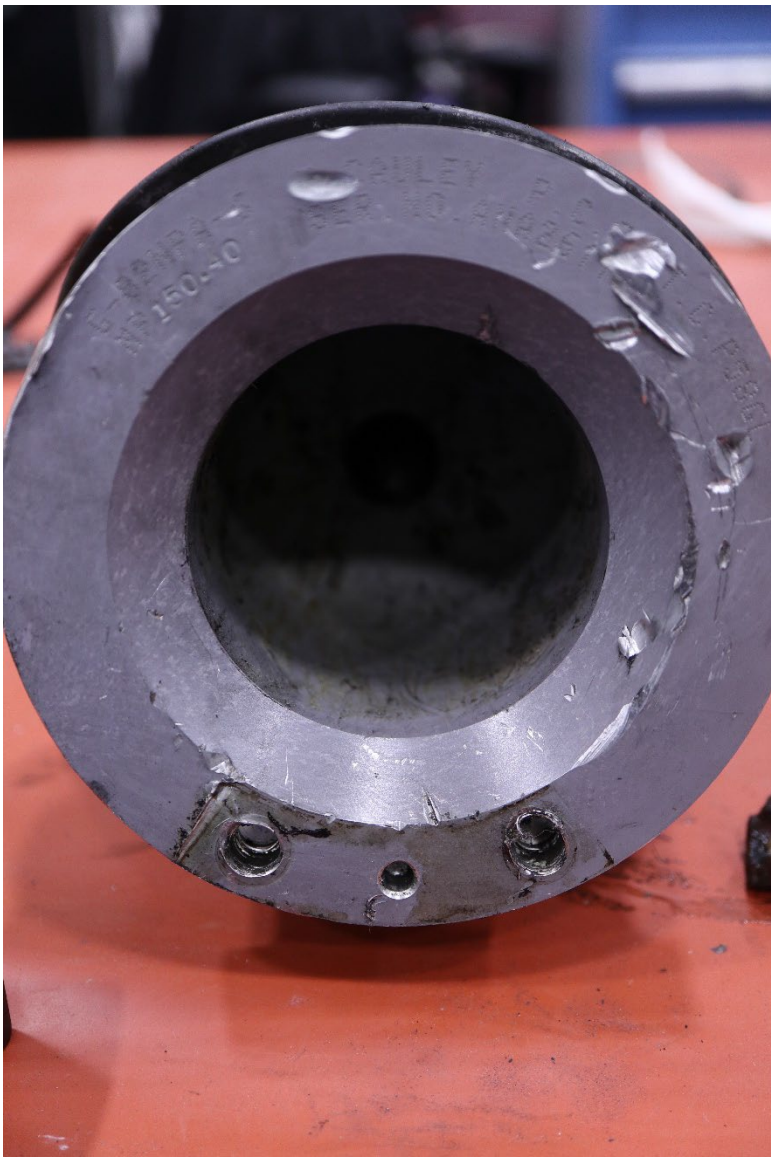


Figure 5: View of the Butt End of the No. 1 Propeller Blade. Note the Damaged Bolt Holes.

A lip on the butt end of the blade was filed to allow removal of the blade from the propeller hub.

No. 2 Blade – Pitch pin remained attached to the butt end of the blade. A lip on the butt end of the blade was filed to allow removal of the blade from the propeller hub.

No. 3 Blade - Pitch pin was nearly separated remained attached to the butt end of the blade.

Residual oil was noted in the cylinder (normal).

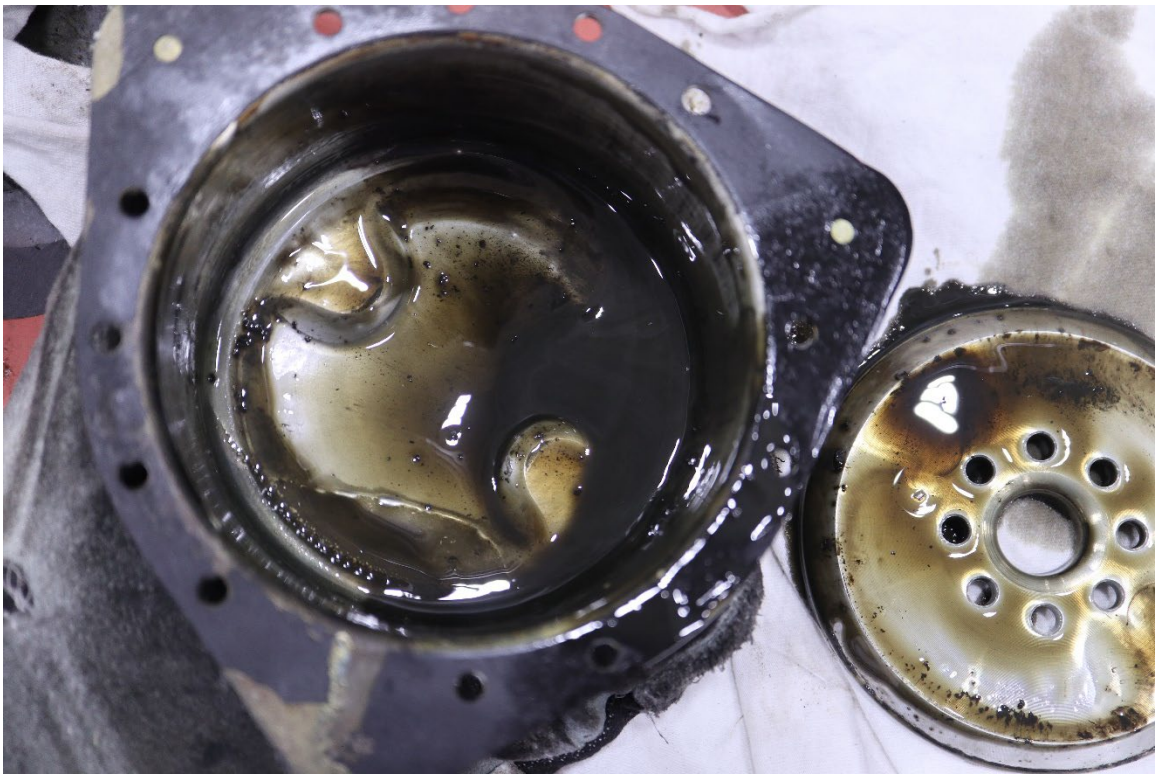


Figure 6: View of the Residual Oil in the Cylinder.

The propeller was not equipped with high pitch shims. The low pitch shims were measured with a dial caliper that was calibrated on November 4, 2022 and due May 3, 2023. One shim measured 0.008 inch and second measured 0.0625 inch, and a third measured 0.004 inch. Combined, all shims were calculated to be 0.0745 inch, but when measured with the dial caliper measured 0.074 inch.

Because of the propeller design, the exact propeller blade angle at impact could not be determined, but, based on the impact marks on the butt end of the No. 1 blade by the corresponding pitch pin from the No. 3 blade, the propeller blade angle was at or near the low pitch stop.

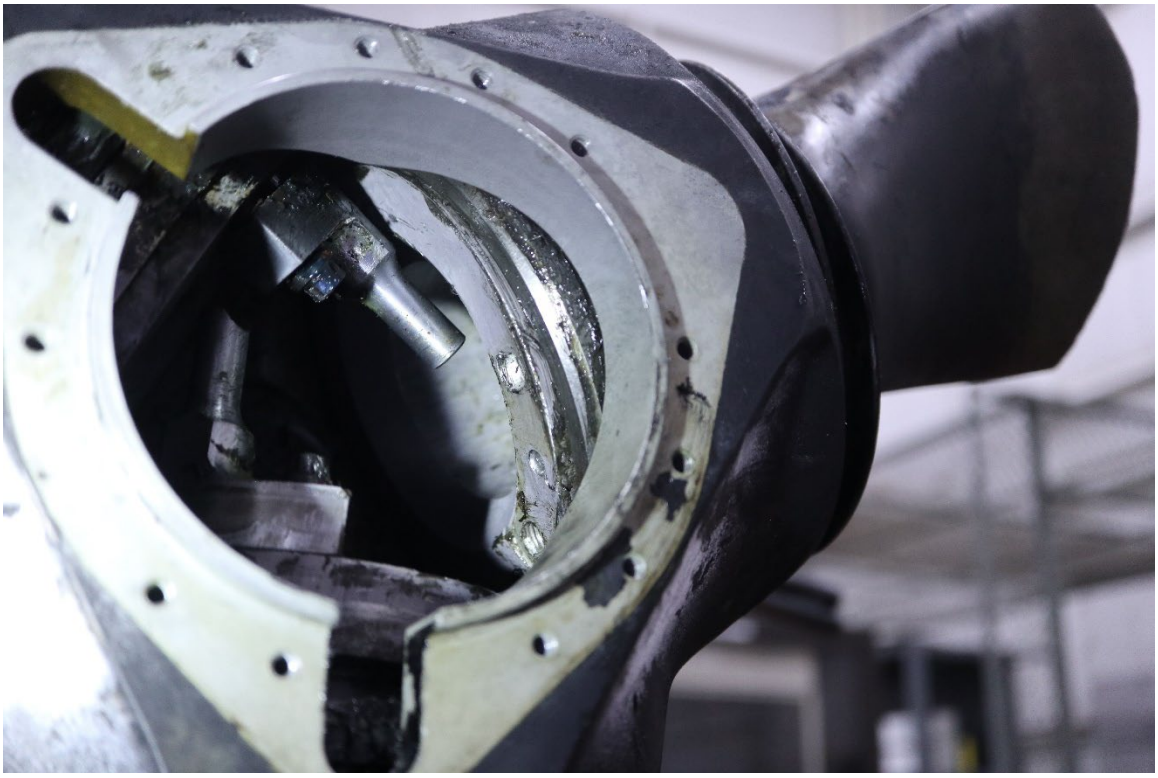


Figure 7: View of Inside the Propeller Hub With the Butt End of the No. 1 Blade and the Pitch Pin from the No. 3 Blade Noting the Impact Damage. The Correlation of the two was used to Derive Approximate Blade Angle at Impact.

The bearings appeared to be greased; however, given that the propeller sustained significant postimpact heat damage it could not be proven factually if the amount of grease was normal.

3.0 Parts Distribution

No parts were retained. The propeller was shipped to the salvage facility. Refer to NTSB Evidence Control Form contained in the public docket for the investigation.

Submitted by:

Timothy W. Monville
Sr. Air Safety Investigator