

National Transportation Safety Board

Office of Aviation Safety

Washington, DC 20594



CEN22LA351

INVESTIGATION SUMMARY

December 8, 2022

TABLE OF CONTENTS

A. ACCIDENT	3
B. INVESTIGATION SUMMARY	3
C. SUMMARY	3
D. DETAILS OF THE INVESTIGATION	4
1.0 HELICOPTER EXAMINATION	4
2.0 MAINTENANCE LOGBOOK INFORMATION	5

A. ACCIDENT

Location: Arcadia, Iowa
Date: August 1, 2022
Time: 0915 central daylight time
Helicopter: Bell 206B, N169AA

B. INVESTIGATION SUMMARY

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Party Coordinator	Luis Deliz Federal Aviation Administration Ankeny, Iowa
Party Coordinator	Jon Michael Rolls-Royce Corporation Indianapolis, Indiana

C. SUMMARY

On August 1, 2022, about 0915 central daylight time, a Bell 206B helicopter, N169AA, was substantially damaged when it was involved in an accident near Arcadia, Iowa. The pilot sustained minor injuries. The helicopter was operated as a Title 14 Code of Federal Regulations (CFR) Part 137 aerial application flight.

The pilot reported that he was completing an aerial application run about 6 ft above the corn field when the engine experienced a loss of power. The helicopter descended into the corn and impacted the field. A small post-crash fire ensued near the engine and was extinguished. The pilot stated that the helicopter was recently down for significant maintenance, and he had only flown it about 12 hours since then.

Aircraft Type: Bell 206B
Aircraft Reg: N169AA
Aircraft TT: 13,248.3 (as of 7/12/2022)
Engine Model: M250-C20B
Engine S/N: 831700
Engine Rating: 420 shaft horsepower (takeoff)
Engine TT: 12,141 (as of 7/9/2022)
Cycles: 13,746 (as of 7/9/2022)

D. DETAILS OF THE INVESTIGATION

1.0 Helicopter Examination

An FAA Inspector and Rolls Royce representative completed an examination of the helicopter on October 7, 2022.

The engine was secure and in place with no damage to the mounts. There was some thermal damage and sooting noted on the top of the engine and adjacent engine cowling. Fire retardant residue was also noted. The engine N1 system was not examined. The engine N2 system was locked and the No. 5 bearing area of the exhaust collector was buckled. The fourth stage turbine wheel was normal in appearance when viewed from the exhaust collector but was covered in fire retardant residue.

Linkages from the collective to the Power Turbine Governor (PTG) and from the throttle twist grip to the Fuel Control Unit (FCU) were secure. The FCU throttle input lever was rigged appropriately and contacted the min and max stops when the throttle was rotated to the cut off and fly position respectively. The PTG rotated through ~20deg when the collective was moved from full down to full up.

All external air, fuel, and oil line connections were at least finger tight except for the pneumatic air line connecting the PTG to the FCU. The air line was not connected to the FCU and an observed gap was noted between the line and FCU union. This pneumatic line is one of several that use air pressure to communicate fuel scheduling demands between the PTG and FCU. The security of this line is necessary for proper engine operation and the result of the observed disconnection would be a reduction in fuel supplied to the engine.

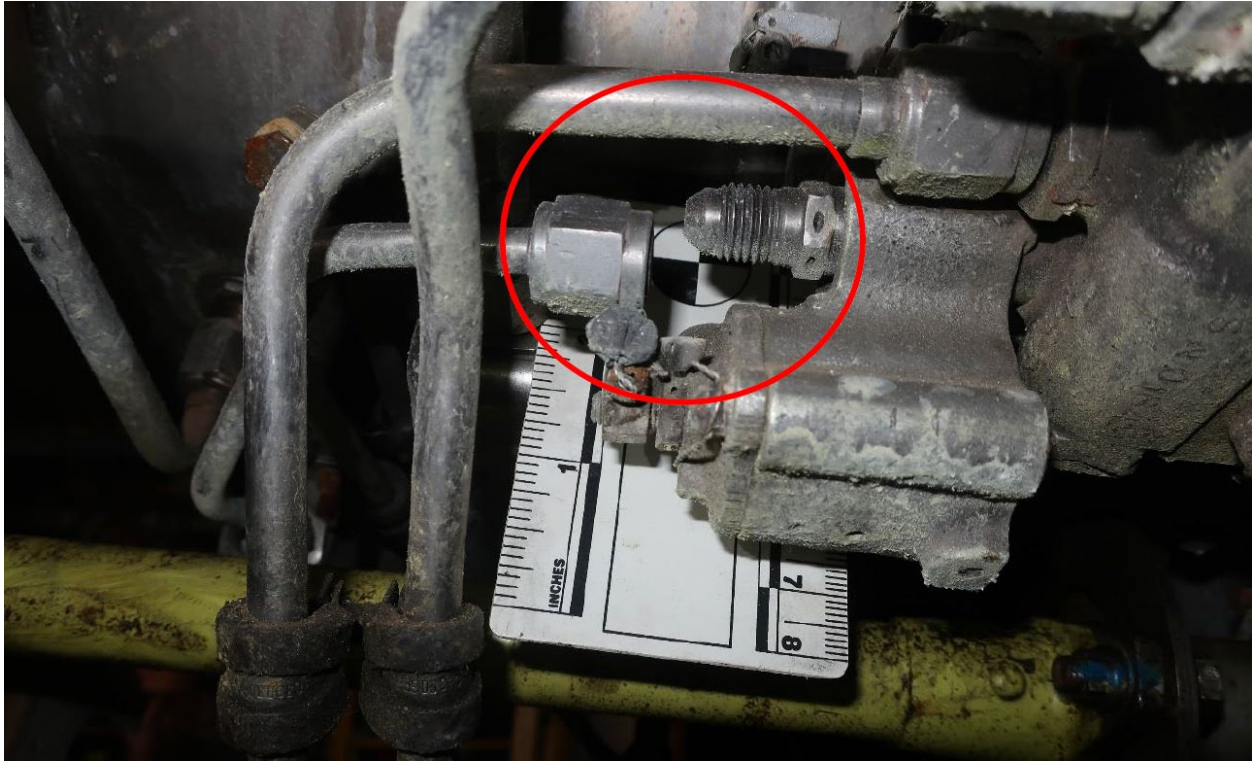


Figure 1. Loose pneumatic line connection at the FCU

A fuel sample was taken from the aircraft fuel filter bowl and left with the aircraft. The sample observed by the author was clear and normal in appearance and the fuel filter element contained no debris. An oil sample was taken from the aircraft mounted scavenge oil filter bowl and was dark brown in appearance. The filter element was clear and some minor non-ferrous debris was noted in the bowl, consistent with carbon particles. The pending bypass button was not extended.

The only anomaly observed which would preclude normal engine operation was the disconnected pneumatic air line from the PTG to the FCU. This condition would result in the FCU reducing fuel to a sub-idle condition and the engine would not be capable of producing power for continued flight.

2.0 Maintenance Logbook Information

On July 9, 2022, a maintenance facility completed 100-hour engine and airframe inspections, 300-hour engine and airframe inspections, 12-month airframe inspection, an engine oil change, and many other inspection items. Additional maintenance work included removing the turbine assembly for an over temperature inspection and turbine outlet temperature indicator reset due to the over temperature event. During a post maintenance engine start attempt, the fuel management system failed to properly control the temperature. The engine start was aborted with no exceedances noted. A fuel nozzle was removed and a newly

overhauled fuel control unit was installed. A post fuel system maintenance ground run was completed. The logbook noted that an independent control check was performed for security and safety of, among other things, the fuel control linkage at the control lever and the droop compensator at the governor control arm.

On July 10, 2022, a post maintenance ground run and test flight were completed, and the helicopter was returned to service.

On July 12, the helicopter was flown from the maintenance facility in Langley Regional Airport (CYNJ), British Columbia, Canada, to Bellingham International Airport (KBLI), Bellingham, Washington. Helicopter total time was 13,248.3 hours.

3.0 Corrective Actions

During the engine examination a B-Nut on the tube p/n 6870035 was found with no thread engagement at the fuel control end. Residual torque paint was identified, however, there was no new-effective torque paint identified on any B-Nut.

The B-Nut that was found loose is difficult to access when other tubes are installed. Rolls-Royce designed, developed, and released a special tool, p/n 23083893, to access this B-Nut. On October 24, 2016, it was released to the field via Commercial Service Letter (CSL) 1273. The CSL provides details on how to manufacture the tool locally. The tool is also available for purchase on the Boeing web site. Operators are advised that torque paint / slippage indication is to be applied to all B-Nuts per the Operation and Maintenance Manual (OMM). Strict adherence to Rolls-Royce specified manuals is essential to the safe and reliable operation of the M250-C20 Series engine. Failure to maintain the M250-C20 Series engine in accordance with the OMM and supporting customer publications can result in a decrease in airworthiness of the engine.

Submitted by:

Joshua Lindberg
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