



Rolls-Royce Engine Investigation Report

Accident Date: 1 August 2022
Accident Location: Arcadia, IA
Aircraft Type: Bell 206B
Aircraft Reg: N169AA
Engine Model: M250-C20B
Engine S/N: 831700
Engine Rating: 420 shp (takeoff)

Wreckage Exam Date: 7 October 2022
Wreckage Exam Location: Wentworth Aviation - Lakeville, MN

The engine was examined in-situ on 7 October 2022 under the supervision of an FAA FSDO inspector from the MSP FAA office.

The aircraft was recovered to Wentworth Aviation and was positioned on the skid landing gear and belly. One main rotor blade was fractured / liberated near the doubler while the second was attached and normal in appearance.

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.

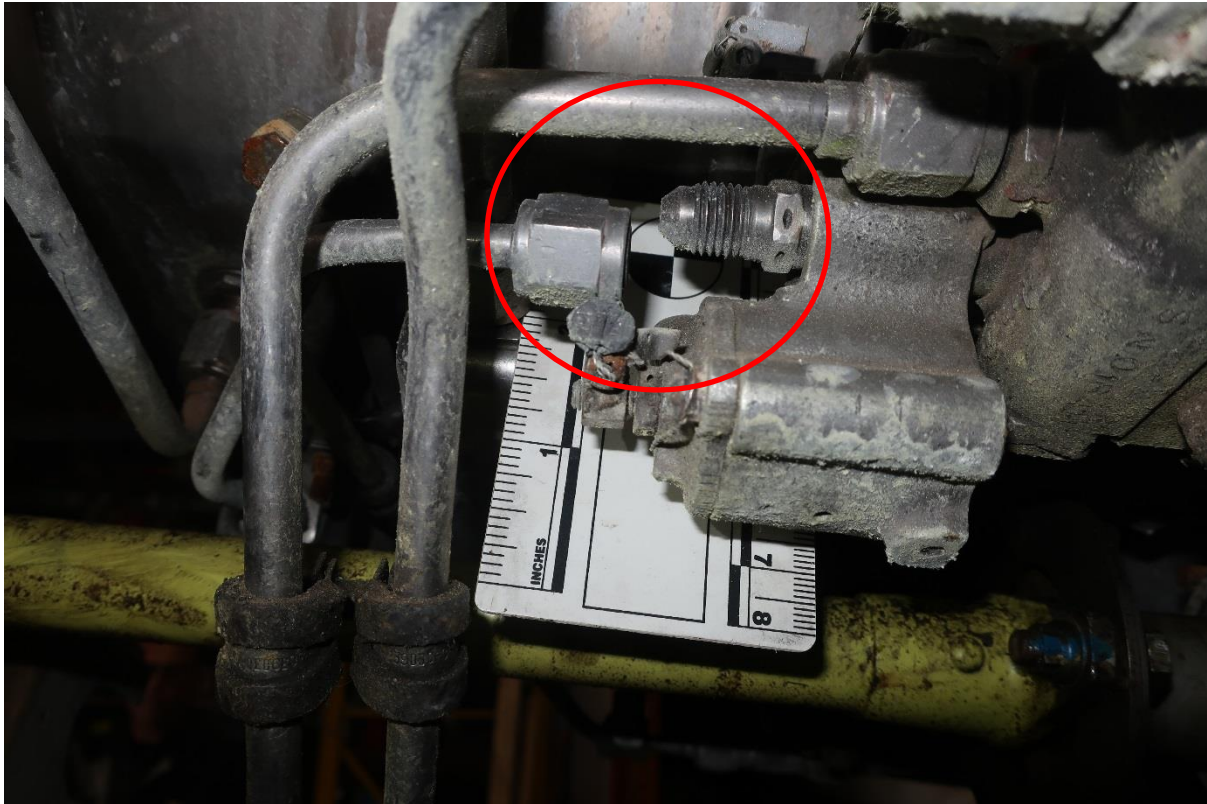


Figure 1. Loose pneumatic line connection at the FCU

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.

Engine Information:

Engine Model	250-C20B
Rating	420 Shaft Horsepower
Serial Number	CAE 831700
Total Time	Unk hrs

Component	Serial Number	Part Number
Engine 250-C20B	CAE 831700	6887190
Gearbox	CAG 80174	6894171
Compressor	CAC 40233	6890550
Turbine	CAT 25908	23069745
PTG	HR49191	M250-10817
FCU	331050	M250-10816
Fuel Nozzle	N/A	N/A
Bleed Valve	FF22618	23053176
Fuel Pump	N/A	N/A

Summary: 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.


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Jon-Adam Michael
Chief of Air Safety (U.S.)



Rolls-Royce Corporation