



CASE FINDINGS

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During the course of the investigation, the following information was obtained.

The pilot departed the Waukesha County Airport (KUES), Waukesha, Wisconsin, using runway 18. At approximately 200 ft AGL, while still over the departure end of the runway, the engine lost all power. The pilot attempted to land on the remaining runway but overran the departure end. The airplane went over an embankment and collided with terrain.

Pilot Information

The pilot reported 4,707 total hours with 882 hours in make and model. 45 hours in the preceding 90 days and 125 hours for the preceding year. His last regulatory check ride was on July 19, 2019.

Airplane Information

The 2001 Raytheon A36 Turbine Bonanza, was equipped with an Allison 250-B17F/2 engine, serial number CAE 881300.

Engine Examination October 30, 2019

The engine was examined by a technical representative of Rolls-Royce Engines on October 30, 2019, under the auspices of the FAA. The engine was secure in the airplane and all of the engine mounts were intact.

- External engine damage consisted of a fractured Propeller Gearbox (PGB) and subsequent linkages and lines connecting the PGB to the engine.
- The exposed sun gear and planetary gear systems appeared normal with no missing teeth or sign of pre-event damage.
- Two of the propeller blades were separated near the hub and the remaining three blades were broken mid-span.
- Mud/vegetation was observed on the compressor inlet and first stage blades.
- The N1 rotor was locked when rotation was attempted from the first stage compressor wheel.

- The N2 system turned freely and was continuous from the fourth stage turbine wheel to the sun gear, which drives the propeller through the PGB.
- The linkages from the aircraft power lever and condition lever were checked and found to be secure and continuous from the cockpit to the engine coordinator.
 - The power lever travel was limited due to impact damage sustained by the Beta rod, which is attached to the propeller.
 - Once the Beta rod linkage was freed, the power lever moved normally.
- The two coordinator output connections to the prop-power turbine governor could not be measured as they were fractured near the governor consistent with impact forces which displaced the PGB and governor forward during the event.
- During the power lever rigging checks, the coordinator output connections to the FCU were measured.
- The position of the power lever corresponded correctly to the coordinator quadrant and FCU input at the 0°, 30°, and 40° degree settings. However, the maximum power setting was limited to ~90° (vs. specified 95°) and the FCU lever did not hit the maximum flow stop per specification.
 - The lever was ~3mm from the stop. An offset index line was noted on the FCU input lever serrated washer, suggesting a previous rigging setting was altered.
- All external air, fuel, and oil line connections were at least finger tight.
- A pneumatic system leak check was performed with shop air and no leaks were detected.
- The aircraft mounted fuel filter bowl was full of fuel which was normal in appearance and smell.
- The fuel line from the filter to the engine inlet contained fuel.
- The aircraft mounted fuel filter element presented no contamination.
- A fuel sample was retained from the filter bowl.
- The fourth stage turbine wheel displayed no damage when viewed through the exhaust collector.
- The aircraft mounted engine oil scavenge filter was examined with no significant debris observed.
 - The bypass indicator button was not extended.
- The aircraft mounted oil reservoir was full of dark-colored oil.
- The aircraft fuel transfer pumps were both operational
- Fuel lines from the tanks were not obstructed.

Engine Examination, December 12, 2019

The engine was shipped to Keystone Turbine Services, Coatesville, PA, for further examination under the auspices of the FAA.

- The compressor was removed from the engine and the N1 system (previously locked) rotated with no resistance.
- Both the N1 and N2 gear systems turned normally with continuity noted to all output pads.
 - Due to confirmed continuity, the gearbox was not disassembled.
- The compressor was removed and disassembled.
- Residual dirt noted within the inlet and first stage guide vanes,

- The compressor front support, inlet guide vanes, and first stage blades were undamaged and appeared normal.
- All of the compressor rotor wheels, blades, and vane segments were intact with no evidence of foreign object damage (FOD).
- The first and second stage bearings rotated freely with no damage noted.
- Examination of the turbine module revealed no obvious internal damage observed.
- The main shaft bearings rotated normally, and the entire wheel and nozzle airfoils were present and undamaged.
- Turbine shafting remained connected with no spline or joint wear noted.
- The fuel pump was removed for bench testing.
 - The input driveshaft was intact with no obvious spline wear noted.
 - The fuel filter element was clear of debris.
 - The pump output flow was within specifications at all four test points.
- The fuel nozzle was removed and visually inspected.
 - The fuel orifices and air shroud face were clean with no carbon present.
 - The nozzle tested within service limits with no discrepancies.
- The fuel control was removed and inspected.
 - The input driveshaft turned freely with no play.
 - Bench testing revealed that the fuel control functioned normally.
 - It did not meet all test point specified limits
 - Deviations were minimal and deemed to not have greatly affected engine performance.
- The bleed valve was tested within service limits.
- The external lines and connectors were visually inspected, and no cracks or abnormal conditions were noted

Woodward Control Examination, January 23, 2020

The propeller overspeed governor and prop-power turbine governor were bench tested at Woodward controls in Loves Park, Illinois under the auspices of the FAA.

- No anomalies were detected that would have contributed to the power loss event.