

National Transportation Safety Board

Office of Aviation Safety

Washington, DC 20594



ERA23LA009

ENGINE EXAMINATION SUMMARY

August 20, 2024

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A. ACCIDENT

Location: Greensboro, North Carolina
Date: October 6, 2022
Time: 1621 EDT
2021 coordinated universal time (UTC)
Airplane: N655WP, Fisher Celebrity

B. ENGINE EXAMINATION SUMMARY

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C. SUMMARY

On October 6, 2022, about 1621 eastern daylight time, an experimental, amateur-built Fisher Celebrity airplane, N655WP, formerly N917LS, was substantially damaged when it was involved in an accident near Greensboro, North Carolina. The commercial pilot sustained minor injuries. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

The pilot stated that prior to his first flight that day he verified 8.5 gallons of fuel in the airplane's header tank and that no water was present in the fuel system. After engine start while taxiing, he noted a brake issue and returned to the hangar. After repairing the issue, he ran the engine to 2,400 rpm and noted the brakes were not capable of keeping the airplane stationary. He taxied to runway 23R and when cleared for takeoff applied partial power then full throttle which was 3,000 rpm. The airplane climbed and the pilot entered the airport traffic pattern, maintaining full power while climbing to the same altitude as the airplane ahead of him. He was instructed by the tower controller to extend the downwind leg when the engine "stumbled slightly." He then turned the auxiliary fuel pump on and, the airplane experienced a total loss of engine power as if it had run out of the fuel. He verified the fuel shutoff valve was fully open, retarded the throttle and engaged the electric primer two to three times. The engine restarted and operated normally for about 20 to 30 seconds but would not sustain power. The pilot realized that airplane could not reach the runway and maneuvered for a forced landing on a golf course. While maneuvering the right wing impacted a tree causing the airplane to yaw to the right. The airplane descended and

impacted the side of a house. The pilot evacuated the airplane and there were no reported ground injuries.

D. DETAILS OF THE ENGINE INVESTIGATION

1.0. General Engine Information

1.1 Engine Description

The Rotec R2800 engine was a 7-cylinder radial engine that produced 110 horsepower at 3,700 rpm¹ at Take Off/Maximum Continuous and 110 horsepower at 2,450 propeller rpm for Rated power.

1.2 Engine Fuel Path

The path of fuel is from the header fuel tank, to the fuel strainer, to the electrically operated auxiliary fuel pump, then to the mechanical fuel pump, to the fuel pressure regulator, and then to the Rotec NOS MKI 40-S throttle body injection (TBI)².

1.3 Engine Ignition System

The engine was equipped with two full-time independent ignition systems. One consisting of a self-energized magneto and the other a solid-state electronic ignition system, which required external power to operate.

1.4 Engine Fuel System and Metering

The engine's fuel system consisted of a mechanical fuel pump, and an electrically operated auxiliary fuel pump, while fuel metering was accomplished by the installed TBI.

1.5 Engine Maintenance History

At the airplane's last condition inspection, a Rotec NOS MKI 40-S throttle body injector (TBI) was installed along with a mixture control cable. At the same time the throttle cable was adjusted and a wide-open throttle (WOT) stop was added at the "pilot's quadrant" Figure 1.

¹ Per the Rotec Aerosport Radial Engine Operations Manual.

² The TBI and fuel pressure regulator with electric solenoid for manual enrichment were installed on 7/9/2022. An entry dated July 22, 2022, indicated that the wide open throttle (WOT) stop was adjusted to 2,950 rpm on static run-up.

7/9/2022	7/9/2022 Fisher Celebrity CLBR N655WP S/N CE-130 Hobbs 154.0 • Aircraft N # changed from N917LS to N655WP, See FAA letter dated 3/29/2022 • Removed engine to install Rotec Mk I TBI & repair motor mount (rust) Had mount powder coated gun metal. • Leak tested Pitot system to 100MPH. There is no static system installed. • Installed Rotec NOS MKI 40-S TBI and added Mixture control cable. Removed previous choke cable • Installed Rotec fuel pressure regulator. With electric solenoid for manual enrichment. • Fabricated and install TBI air filter connector bracket (4 hole flanged to round) • Replaced throttle cable with new (4 inches longer) • Changed oil and filter (FRAM PH3600). Added 8 qts Castrol 20w-50w. • Adjusted carburetor cable and added WOT Throttle stop at pilot's quadrant. • Bled R/H brakes and added fluid. Tightened fitting at top of R/H Grove spring gear assy. • Perform Cylinder leak down check all cylinders 1-7 80% • Flight controls checked, checked I certify this airplane engine and propeller have been inspected in accordance with A/M Manual & manufacturers directives an found to be in accordance with Airworthiness Condition inspection. I certify this airplane has been inspected and found to be in a condition for safe operation. Wesley H Parker A/P [REDACTED] 7 / 9 / 2021
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Figure 1: Last Condition Inspection Entry.

2.0. General Propeller Information

2.1 Propeller Information

According to the maintenance records, on July 9, 2021, at hour meter reading 135.0³, the Culver Fixed Pitch propeller was removed and a Sensenich Ground-Adjustable Carbon Fiber propeller was installed by the pilot/owner/airframe and powerplant mechanic. The entry also indicated that the propeller pitch was adjusted to "...Medium position (#3) using Sensenich provided adjustment pins. Flight tests good. Propeller RPMs Static and T/O similar to Culver", Figure 2.

7/9/2021 Fisher Celebrity CLBR N917LS S/N CE-130 Hobbs 135.0 • Replaced fixed Culver prop with 2 blade Sensenich Ground adjustable Carbon Fiber propellor • Adjusted pitch to Medium position (#3) using Sensenich provided adjustment pins. • Flight tests good. Propellor RPMs Static and T/O similar to Culver. I certify this airplane engine and propellor have been inspected in accordance with A/M Manual & manufacturers directives an found to be in accordance with Airworthiness Condition inspection. I certify this airplane has been inspected and found to be in a condition for safe operation. Wesley H Parker A/P [REDACTED] 7 / 9 / 2021
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Figure 2: Propeller Installation Entry.

³ The hour meter reading at the time of the accident was 154.0.

3.0. Engine Examination Summary

3.1 Initial Engine Observations

At the start of the examination the Rotec Aerosport R2800 (7 cylinder radial) engine with attached two-bladed Sensenich ground adjustable, carbon fiber propeller was on a pallet (Figure 3). The engine, which did not have a lifting eye was positioned normally and secured to a forklift for examination (Figure 4).



Figure 3: Engine and Propeller



Figure 4: Engine Assembly For Examination and Testing.

3.2 PowerTrain Continuity and Cold Differential Compression

The rocker box covers were removed and then 1 spark plug in each cylinder were removed. The propeller was rotated by hand and crankshaft and valve train continuity was confirmed. No compression was noted in the No. 5 cylinder. A compression gauge was installed into one spark plug hole of every cylinder and during hand rotation of the propeller the following readings were noted-

No. 1- 35 psi

No. 2 - 35 psi. One plug was difficult to remove and damage to the cylinder threads occurred during removal.

No. 3 - 90 psi

No. 4 - 60 psi

Cold Differential Compression Testing Continued -

No. 5 - 0 psi. Air leakage was noted out the intake valve. The piston was moving. Valve train continuity was confirmed.

No. 6 - 60 psi

No. 7 - 60 psi

3.3 Air Induction and Exhaust Inspection

The air induction air filter was clean, and both exhaust outlets were free of obstructions.

3.4 Engine Fuel System and Auxiliary Fuel Pump Inspection and Testing

The engine-driven fuel pump was impact damaged from the engine, and the inlet and outlet hoses were also impact fractured. Examination of the inlet hose to the airframe fuel strainer revealed the hose was tightly secured at the strainer. The b-nut was carefully wiped down and the hose was drained into a clean container and found to contain about 1/4 ounce of fuel. The airframe fuel strainer contained rust (Figure 5). About 1 ounce of fuel was drained from the fuel strainer that was rusty/muddy in appearance. The screen was clean, and the fuel smelled like "old gas." The fuel shutoff valve which was closed, operationally checked satisfactory. The electrically operated fuel pump was electrically checked and operationally checked good. The fuel hose from the fuel strainer to the electric boost pump contained only a few drops of fuel. The inlet hose to the fuel pressure regulator was tight, and maybe 3 drops of fuel drained from the removed hose. The outlet hose of the fuel pressure regulator to the TBI was disconnected at the outlet of the fuel pressure regulator and no fuel came from the fuel hose. The inlet hose at the TBI was tight and the hose was removed and no fuel was present. The TBI inlet was clean, and the throttle and mixture control cables were connected at the TBI but were removed for the inspection. The fuel inlet screen at the TBI was examined and it contained some debris in the screen, but there was no evidence of red silicone. There was no fuel in the TBI. It should be noted that the last place fuel was present was the fuel strainer.



Figure 5: Airframe Fuel Strainer

3.5 Operational Testing of TBI

The auxiliary fuel pump was plumbed into the TBI inlet and using exemplar 100 low lead fuel, the pump was electrically controlled. Changes in the fuel flow were noted with corresponding movement of both the mixture and throttle control levers at the TBI. For example, when the throttle was moved to full open, the fuel flow increased.

3.6 Ignition Testing

During rotation of the propeller by hand, spark was produced at only 2 leads⁴.

The HALL electronic test procedure found on Page 82 of the engine Operators Manual tested satisfactory.

3.7 Propeller Examination

Examination of the propeller revealed nicks and dents on the leading edge of 1 blade, and the other blade had a chordwise tear (Figure 6).

⁴ According to the Engine Operators Manual, no impulse coupling was installed. Thus, the magneto cannot produce enough spark at cranking speeds.



Figure 6: View of Chordwise Crack in One Propeller Blade.

4.0. ENGINE PARTS RETENTION

No engine parts were retained.

Submitted by:

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