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Subject: ERA24LA311- Fuel Calculations.

The following fuel calculations were made for the July 21, 2024, accident flight of N9581S, a Champion 7ECA, in Beaufort, North Carolina. The airplane was equipped with a Lycoming O-320-A2B rated at 150hp at 2700RPM, and a Sensenich two-bladed aluminum fixed-pitch propeller model 74DM6S8-0-56.

A fuel log showed on the day of the accident the airplane was serviced with 25.1 gallons of fuel. The pilot reported that the airplane departed with 32 gallons of fuel. The Automatic Dependent Surveillance - Broadcast (ADS-B) data from the FAA, showed that the duration of the flight was 2.5 hours and its first data point was about 2 miles south of the airplane's point of departure.

The Operator's Manual for the Lycoming O-320 Series indicated at 2350 RPM, 65% economy cruise, the fuel consumption would be 8.8 gallons per hour, and 10.0 gallons per hour at 2450 RPM, 75% performance cruise (refer to figure 1). The airplane's flight manual was not made available during the investigation.

Based on this information, the total fuel consumption for the 2.5-hour flight at 8.8 gph would be 22.0 gallons and 25 gallons at 10.0 gph respectively. Note that none of the calculations account for fuel used during start, taxi, run-up, take-off or climb.

Operation	RPM	HP	Fuel Cons. Gal./Hr.	Max. Oil Cons. Qts./Hr.	*Max. Cyl. Head Temp.
O-320-A, -E** Series					
Normal Rated	2700	150	-----	.67	500°F (260°C)
Performance Cruise (75% Rated)	2450	110	10.0	.37	500°F (260°C)
Economy Cruise (65% Rated)	2350	97	8.8	.33	500°F (260°C)
O-320-B, -D† Series					
Normal Rated	2700	160	-----	.72	500°F (260°C)
Performance Rated (75% Rated)	2450	120	10.0	.40	500°F (260°C)
Economy Cruise (65% Rated)	2350	104	8.8	.35	500°F (260°C)

* - At Bayonet Location – For maximum service life of the engine, maintain cylinder head temperatures between 150°F (66°C) and 435°F (223.86°C) during continuous operation.

** - O-320-E2A and –E2C have alternate rating of 140 HP at 2450 RPM.

† - O-320-D2H has alternate rating of 150 HP at 2500 RPM. O-320-D2J has alternate rating of 150 HP at 2500 RPM and 155 HP at 2600 RPM.

Figure 1: Lycoming O-320 Series Operator's Manual Excerpt.

END