



## RECORD OF EXAMINATION

**Mitchell Gallo**  
**Aviation Accident Investigator**  
**Central Region**

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**Participants: Robert Smith; Lubbock FSDO**  
**Mark Platt; Lycoming Engines**

**NTSB Accident Number: CEN17FA080**

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### **Narrative:**

A post-accident examination of logbook records and aircraft wreckage revealed the following:

An engine logbook entry dated April 7, 1991, stated that a supplemental type certificate (STC), SA1970CE, for automotive fuel. The STC stated was for the operation of airplanes on unleaded automotive gasoline, 87 minimum antiknock index and leaded automotive gasoline, 88 minimum antiknock index (RON + MON)/2 per ASTM Specification D-439 or D-4814 for 150 horsepower or less installations. Operation of airplanes on unleaded and leaded automotive gasoline, 91 minimum antiknock index (RON+MON/2) per ASTM Specification D-439 or D-4814. Inter-mixing with aviation gasoline also approved.

An engine logbook entry dated April 20, 1991, stated that the engine was installed at a total time in service of 3,946.8 hours, a time since major overhaul of 750.0 hours, and a tachometer time of 310.0 hours. The engine logbook showed that the engine had several cylinders changed during this time period and there was no record of an engine overhaul.

According to the latest revision of Lycoming Engines Service Instruction SI1009, "Recommended Time Between Overhaul Periods," the engine should be overhauled at 2,000-hour intervals or before the twelfth year, whichever occurs first.

There was no record that the carburetor was replaced or overhauled since the installation of the engine. The last maintenance entry relating to the carburetor was referenced in the April 20, 1991 entry for the engine installation. This entry stated, "NEW METAL FLOAT KIT + ACCEL PUMP IN MA45PA CARB".

According to Precision Airmotive Corporation Service Bulletin MSA-3, float carburetors should be overhauled or replaced every 10 calendar years regardless of time in service. There were no subsequent maintenance record entries indicating that the carburetor was overhauled or replaced. The engine logbook had an entry listing the left and right magnetos and their serial numbers that were installed on the engine when the engine was installed on the airframe dated April 20, 1991. There was no record that these magnetos were replaced or overhauled since their installation. An engine logbook entry for a 100-hour inspection that was dated August 29, 2003, at a total time in service of 4,676.6 hours and a tachometer time of 1,481.0 hours, stated that a 500-hour magneto impulse coupling inspection was due at an engine total time of 1,700.9 hours. On March 9, 2005, the tachometer time was replaced at a total time in service of 4,734.2 hours and a tachometer time of 1,538.6 hours. The replaced tachometer indicated 0 hours at the time of replacement. The last engine logbook entry for an annual inspection of the engine was dated April 11, 2016 at a total time in service of 5,625.1 hours, a time since overhaul of 1,678.7 hours, and a tachometer time of 140.1 hours. This entry stated that the [magneto] impulse coupling inspection was due at a tachometer time of 162.3 hours. There were no subsequent entries for inspection of the magneto coupling. The next and last entry was dated October 7, 2016, at a tachometer time of 193.1 hours for changing the engine oil, cleaning the oil sump screen, replacing engine mount bushings, replacing the air filter, and lubing the throttle cable; there was no reference to the magnetos in this entry.

According to Continental Ignition Systems Service Support Manual (Publication X42002-3, August 2011), Section 2-3, stated that magnetos equipped with snap ring impulse couplings every 500 hours and to inspect all magnetos at the first 500 hours in service and every 500 hours thereafter in accordance with Section 6-2.3. The publication stated that magnetos must be overhauled or replaced five years after the date of manufacture or last overhaul or four years after the date placed in service, whichever occurs first, without regard to accumulated operating hours since new or overhaul.

The airplane wreckage was located about 0.55 nautical miles and 205 degrees from the airport and had a northerly tail-to-nose heading. The accident site GPS elevation was about 1,956 feet mean sea level. The airplane was upright with an area of ground scarring that extended north about 10 feet from the airplane nose. The ground scar contained plexiglass, landing gear, and the engine propeller. The engine, wings, and horizontal and vertical stabilizers were attached to the fuselage. The propeller was separated at the attachment bolts from the engine's crankshaft flange. The bolts had 45-degree granular fracture features consistent with torsional overstress. One of the two propeller blades exhibited S-shaped bending and chordwise scratching consistent with torsional rotation. There was no evidence of soot or fire.

Both wing fuel filler caps were in place. The tops of each cap had white colored labels with faded and unreadable writing. There was no marking for the type of fuel to be used. There was a placard in the cockpit stating that the fuel to be used was unleaded automotive gasoline and intermixing with aviation fuel was allowed.

Both wing flaps and the cockpit flap control lever were in the 0-degree flap position. Flight control continuity from the control surfaces to both cockpit controls was confirmed.

The instrument panel exhibited impact damage. The magneto key switch was in the both position, the master switch was in the on position, the carburetor heat control was in the off position, and the primer was in the off position. The fuel selector was in the on position. The cockpit throttle control was in about the full forward position and the carburetor heat control was in the midrange position. The cockpit throttle and carburetor heat control quadrant was damaged by the impact. The airspeed indicator indicated 0 knots. The altimeter indicated about 1,300 feet mean sea level and had a setting of about 29.35 inches of mercury. The tachometer gauge was broken out of the instrument panel and the case covering was separated from impact forces. The gauge's needle position was about 1,500 rpm, and a witness mark consistent in the shape and color of the needle was on the tachometer gauges' face about 1,700 rpm. The tachometer's hour indication was 238.1 hours.

There was no data plate attached to the engine (serial number information was obtained from the engine logbooks and no other sources), and there was no matching engine case number. The oil, fuel, and ignition system components were intact. The engine contained oil, and the engine oil suction screen did not contain metallic debris. The exhaust was unobstructed and did not contain oil residue.

The carburetor was a "Marvel Schebler" and it had a black colored data plate with the following inscriptions: model - unreadable, part number - "10-368-(unreadable) 2", and serial number - "A 2 230". The carburetor was attached to its mounting flange, and the carburetor sustained impact with a resulting crack. The throttle control was attached to the carburetor throttle control arm, and the mixture control cable was separated from the carburetor mixture control due to overstress. The throttle and mixture control cables exhibited impact pulling. The cockpit mixture control was in the full forward position. The carburetor fuel inlet screen was unobstructed. The carburetor float chamber was removed, and the chamber contained a liquid consistent in color and odor with a mixture of 100 low lead aviation fuel and engine oil. The liquid was tested with water sensing paste and there was not resultant indication for the presence of water. The brass colored metallic float was attached to its hinge, was not damaged, and did not contain fluid within the float. The float did not exhibit signatures of impingement. The float moved without impingement when manipulated by hand.

The top spark plugs were removed, and the engine was rotated through the engine flywheel. During rotation, air was expelled, drawn into, and compression felt from the top spark plug holes. Engine and valve train continuity to the engine accessory section was confirmed.

The left magneto was a Bendix S4LN-21, part number 10-51360-37, serial number 61287A and the right magneto was a S4LN-20, part number 10-51360-29, serial number 904810. Both magnetos were removed and rotated by hand by their accessory drive shafts. Ignition timing was checked and was within the engine manufacturer's specifications. An electrical spark obtained from the ignition harness' spark plug leads during rotation. The left magneto impulse coupling functioned without any mechanical anomalies. An electrical spark obtained from the ignition harness' spark plug leads during rotation.

Part 91.303, Aerobatic Flight, states in part that no person may operate an aircraft in aerobatic flight:

- (a) Over any congested area of a city, town, or settlement;
- (b) Over an open air assembly of persons;
- (c) Within the lateral boundaries of the surface areas of Class B, Class C, Class D, or Class E airspace designated for an airport;
- (d) Within 4 nautical miles of the center line of any Federal airway;
- (e) Below an altitude of 1,500 feet above the surface; or
- (f) When flight visibility is less than 3 statute miles.

For the purposes of this section, aerobatic flight means an intentional maneuver involving an abrupt change in an aircraft's attitude, an abnormal attitude, or abnormal acceleration, not necessary for normal flight.

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