



MEMORANDUM OF RECORD

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Air Safety Investigator
Eastern Region Aviation

July 30, 2014

Subject: ERA14LA330 – Examination of engine and airframe by inspectors from the Federal Aviation Administration and a representative from Lycoming engines.

Date of Examination: July 10, 2014

Persons at the Examination: John P. Wilkens (FAA), Jon Ross (DAR), and Judson Rupert (Lycoming Engines)

Examination of the airplane by a Federal Aviation Administration inspector and a representative from the engine manufacturer revealed damage to fuselage, left wingtip leading edge, and the right canard trailing edge. The pilot had a personal parachute pack, and when recovered, the parachute had been deployed, remained attached, and was found trailing behind the airplane. Examination of the canopy brackets attached to the fuselage and both hinges revealed no tearing or shearing of the bolts; however, no bolts nor the canopy were present.

Flight control continuity was confirmed to all flight control surfaces from the cockpit control, except for the rudders. Rudder continuity was confirmed from the cable fracture point in the vicinity of the rudder pedals to the rudder control surfaces; however, the rudder pedals were absent.

The left wing and left canard remained attached to the fuselage. The left wing exhibited leading edge damage which extended from the wingtip inward approximately 4 feet



Photo 1: Airplane - Post Recovery (Courtesy of Lycoming)



Photo 2: Damage to Left Wing - Post Recovery (Courtesy of Lycoming)

The nose section exhibited impact damage and was partially fractured on the right side circumferentially around the bottom of the nose but remained partially attached on the

left side. The nose wheel remained attached and was partially extended. Examination of the canopy brackets attached to the forward section of the fuselage and both hinges revealed no tearing or shearing of the bolts; however, no bolts nor the canopy were present.



Photo 3: Front View of Airplane - Post recovery (Courtesy of Lycoming)

The canopy was subsequently located July 9, 2014, floating in the water, about 39 miles northeast of the last recorded radar return. The canopy remained intact and the windscreen was not damaged. The canopy quick release remained attached to the canopy; however, was found in the released position. The four locking pins and associated locking pin holes exhibited no distortion and was unremarkable. The four pins were reinstalled into the locking pin holes and appeared to lock into place. The quick release line was pulled by an FAA inspector and all four pins released and operated normally.

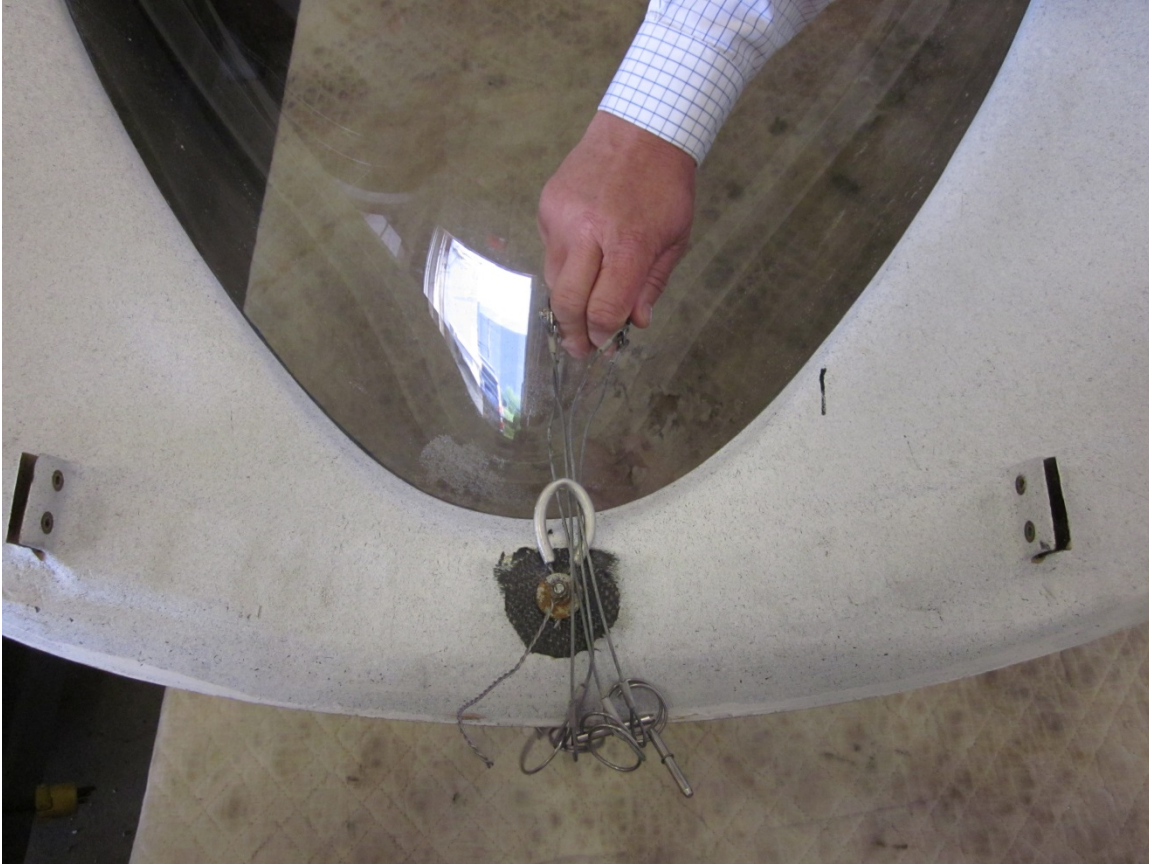


Photo 4: Canopy Locking Pins after operational check (Courtesy of the FAA)

The instrument panel exhibited impact damage but remained attached to the forward portion of the cockpit. The throttle lever handle was impact separated; however, the lower portion of the throttle lever arm remained attached and was in the full forward or "OPEN" position. The mixture lever was in the full forward or full "rich" position. The fuel selector valve was in the "BOTH" position. The landing gear position indicator located aft of the fuel selector valve indicated three "UP" positions. Both ignition switches were found guarded and in the "ON" position. The glareshield consisted of circuit breakers and several switches. The following switches were found in the on position: Master, Radio Master, Landing Light, Strobe Lights, Pitot Heat, Spare Circuit, and Fuel Pump. The left side control stick remained attached to the control column. The left and right cockpit molded seats remained attached and had various fractures located along the back. Both seatbelts and shoulder harnesses remained attached to the associated attach point; however, the right seat belt and should harness had been cut by first responders to facilitate recovery of the occupant.



Photo 5: Cockpit Section - Post Recovery (Courtesy of Lycoming)

The right wing and right canard remained attached to the airplane. The right rudder remained attached to the winglet at all hinge points. The right aileron remained attached at all hinge points.

Both fuel caps remained secured and in place. Each fuel tank indicated a 30 gallon capacity.

The aft pusher engine compartment remained attached to the fuselage and the firewall was not damaged. The lower and upper engine cowlings exhibited impact damage but remained attached to the fuselage. The engine assembly remained attached to all engine mounts. The composite three-blade propeller remained attached to the propeller crankshaft flange. The propeller blades were not damaged, and the personal parachute canopy and associated cords were found wrapped around the blades and hub.



Photo 6: Engine as found - Post Recovery (Courtesy of Lycoming)

Examination of the engine assembly revealed the left and right engine exhaust pipes exhibited impact crush damage at the Nos. 1 and 2 cylinders. All induction tubes were attached to their respective attached points. The oil sump was intact and the oil dip stick remained in place. The oil suction screen was removed and no anomalies were noted. An unmeasured amount of oil was present in the oil sump. The oil cooler, mounted on the right side of the aircraft, aft of the firewall, was not damaged.



Photo 7: Oil Filter - Post Removal (Courtesy of Lycoming)

The alternator and drive pulley remained attached to the engine assembly and was not damaged. The alternator cooling fan was not damaged. The starter remained attached to the engine and the drive pinion was retracted. A Light Speed Engineering plasma capacitive discharge (CD) ignition system was installed in lieu of magnetos with an ignition box installed behind the firewall. Six ignition coil packs were installed on top of the engine with automotive style ignition leads. The CD ignition was not tested due to the manufacturer reporting that the ignition would be operable as long as there was even a small amount, approximately 2 amps, of electrical power either being produced or in the battery. Due to the radar return recorded near the area of the impact location, electrical power was still available on the aircraft.



Photo 8: Dual Light Speed Ignition System as found - Post Recovery (Courtesy of Lycoming)

The aircraft fuel injection servo was impact separated from its mount but retained by the mixture and throttle cables and contained about 1 teaspoon of blue liquid that smelled similar to 100LL aviation fuel. The fuel screen was removed and was free of contaminants. The fuel lines leading to engine driven fuel pump and the fuel injector servo were removed and contained fuel. The engine driven fuel pump was removed and contained fuel. The engine driven fuel pump produced pressure at the outlet port and suction at the inlet port when it was actuated by hand.



Photo 9: Fuel Injector Servo - Post Removal (Courtesy of Lycoming)

The throttle cable remained attached to the throttle control arm on the fuel injector servo and was at mid-range. The mixture control remained attached to the mixture control arm and was in the full rich position. The fuel injector servo fuel inlet screen was removed and free of contaminants. The fuel flow divider was removed, disassembled and no anomalies were noted. The fuel injector nozzles were removed from all cylinders and no anomalies were noted.

The spark plugs were automotive type sparkplugs and were removed. The upper spark plugs displayed dark gray combustion deposits and exhibited normal wear condition. The bottom spark plugs associated with cylinders Nos 2, 3, and 6 exhibited dark brown combustion deposits and were oil wet. All of the bottom spark plugs exhibited normal wear conditions.



Photo 10: Spark Plugs - Post Removal (Courtesy of Lycoming)

The engine was partially disassembled. The engine was rotated by hand using the propeller. Suction and compression was obtained on all cylinders. Valve train continuity was observed through all cylinder rocker arms. The accessory drive gears were observed rotating. Crankshaft and valve train continuity was verified.



Photo 11: Engine as Left - Following Examination (Courtesy of Lycoming)



Photo 12: Propeller as Left Following Examination (Courtesy of Lycoming)