NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Western Pacific Region

October 28, 2014

AIRFRAME AND ENGINE EXAMINATION

WPR15LA014

This document contains 27 embedded photos.

A. ACCIDENT

Location:	Big Bear City, CA
Date:	October 16, 2014
Aircraft:	Cessna 172S, Registration Number: N612SP, Serial #: 172S8594
NTSB IIC:	Howard Plagens

B. EXAMINATION PARTICIPANTS:

Howard Plagens
Senior Air Safety Investigator
National Transportation Safety Board
Desert Hot Springs, CA 92240

Tom Dickerson
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Williamsport, PA

Jan Smith
Air Safety Investigator
Cessna Aircraft Company
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C. SUMMARY

Examination of the recovered airframe and engine was conducted on October 28, 2014, at the facilities of Air Transport, Phoenix, Arizona. No evidence of preimpact mechanical malfunction was noted during the examination of the recovered airframe and engine.

D. DETAILS OF THE INVESTIGATION

1.0 Airframe Examination

The airplane was a Cessna 172S, serial number 172S8594.

The tachometer read 2,725.5; the Hobbs hour meter read 3,509.6.

The belly of the airplane was oil stained.

The cabin exhibited circular inward crush damage in the lower left side by the pilot's leg area.

The wings were removed from the fuselage. The rear attach points on each wing were separated at the structure, and the forward spar attach points were removed for recovery. The wing struts remained attached to the wings, and were removed from the fuselage. The outboard half of the left wing had semicircular crush damage aft past the spar. The right wing had leading edge crush damage, and skin torn away. The right wing was buckled in several places. The fuel tanks did not contain a significant amount of fuel. The tank caps were in place with pliable rubber seals.

The horizontal stabilizers were removed near the root for recovery. The elevators remained attached to the horizontals at the hinge points. The stabilizer trim actuator measured 9/10", equating to an approximate 10-degree tab down position. The cockpit trim wheel assembly was impact damaged. The vertical stabilizer remained attached to the tailcone. The rudder remained attached to the vertical stabilizer. The aft fuselage separated from the forward fuselage at the aft end of the cargo compartment.

The front seats remained secured to the seat rails with the adjustment pins engaged in the 2nd holes back from the front of the track. The front seats were intact. The front seat belts were functional. The back seat belts were functional. The back seat back was pushed forward, and would not return to the normal upright position due to crushing damage. The rear seat base was intact.

The left cabin door separated from the aircraft. The right door remained attached.

The flap handle was in the 10-degree flap position. The flap actuator was in the retracted position, and both flaps were in the retracted position.

The electrical master switch was in the ON position. The ignition switch was in the BOTH position with the key in the switch. The auxiliary fuel pump switch was in the ON position.

There was a fuel shutoff valve on the center portion of the instrument panel that was in the forward position, which was OPEN. The fuel selector valve had three positions that were 90 degrees apart; left was LEFT, forward was BOTH, and right was RIGHT. The selector lever had partially broken off, and was pointing was to the 1-o'clock position. Investigators removed the valve, and determined that it was in the BOTH position. The mixture cockpit control was in the full forward position.

The gascolator contained a clear blue fluid that smelled like aviation gasoline; a water paste test had no response indicating that there was no water contamination. The screen was clean.

The emergency locator transmitter (ELT) was a Pointer 3000-11, serial number 329437, TSO C-91a. The ELT was in the ARMED position.

1.1 Airframe Exam Photos

Photo 1 Airframe Data Plate

Photo 2 Left Side of Front Cabin

Photo 3 Left Wing

Photo 4 Right Wing

Photo 5 Vertical Stabilizer and Rudder

Photo 6 Lower Left Portion of Instrument Panel

Photo 7 Throttle Quadrant

Photo 8 Fuel Selector Valve

Photo 9 Front Seats

Photo 10 Rear Seats

Photo 11 Tachometer

Photo 12 Emergency Locator Transmitter

Photo 13 Gascolator Bowl

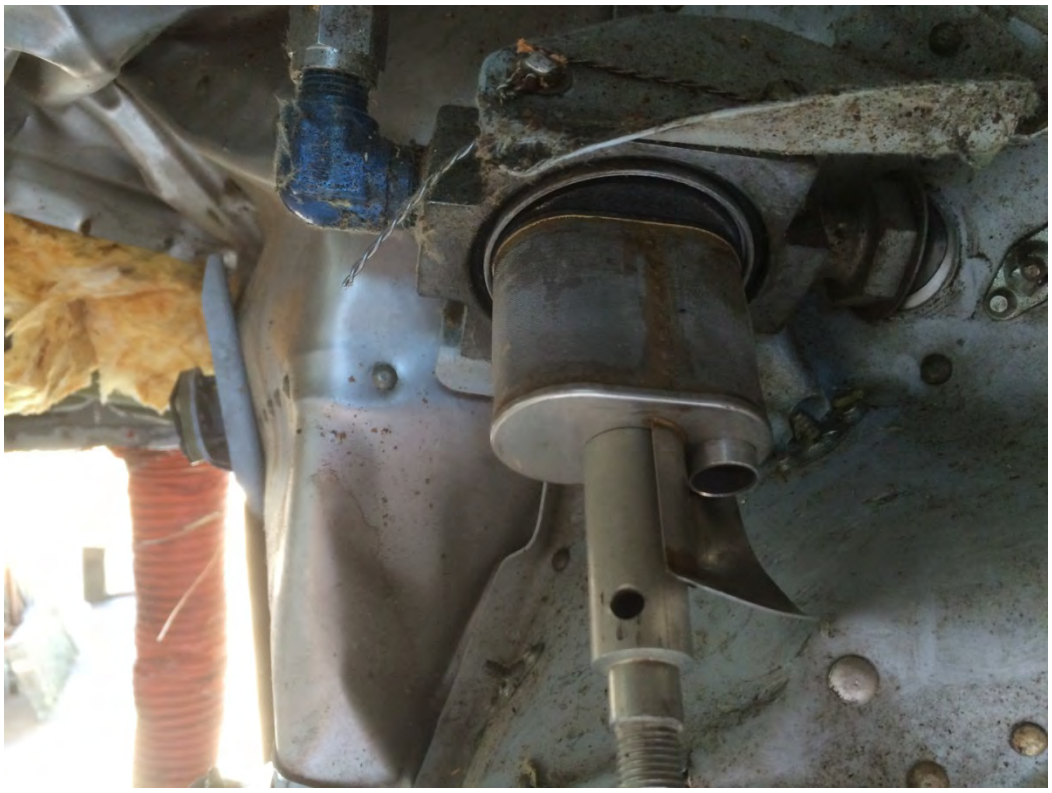

Photo 14 Gascolator Screen

2.0 Engine Examination

The engine was a Lycoming IO-360-L2A, serial number L-29095-51A, rated at 160/180 horsepower at 2,400/2,700 rpm.

Investigators slung the engine from a hoist. They manually rotated the crankshaft with the propeller flange. The crankshaft rotated freely, and the valves moved approximately the same amount of lift in firing order. The gears in the accessory case turned freely. Investigators obtained thumb compression on all cylinders in firing order.

Investigators removed the spark plugs. The center electrodes were circular for the top and bottom of cylinder number one and top number three; they were elliptical in the remaining positions. The plugs for cylinders number one and three were oil soaked; the airplane was on its right side for several days prior to recovery. The plugs for cylinders number two and four were clean and gray, which corresponded to normal operation according to the Champion Aviation Check-A-Plug AV-27 Chart. None of the electrodes exhibited mechanical deformation.

A borescope inspection revealed no mechanical deformation on the valves, cylinder walls, or internal cylinder head.

The right magneto was a Slick 4371, serial number 00041849; the left magneto was a Slick 4371, serial number 00041832. The engine to magneto timing was 25 degrees before top dead center. Investigators manually rotated the magnetos, and both magnetos produced spark at all posts.

The oil filter was disassembled, and the paper element was clean.

The fuel pump's rubber diaphragm was unbroken.

The flow divider’s rubber diaphragm was flexible and not cracked; the nozzles were clear.

The muffler was unremarkable.

2.1 Engine Exam Photos

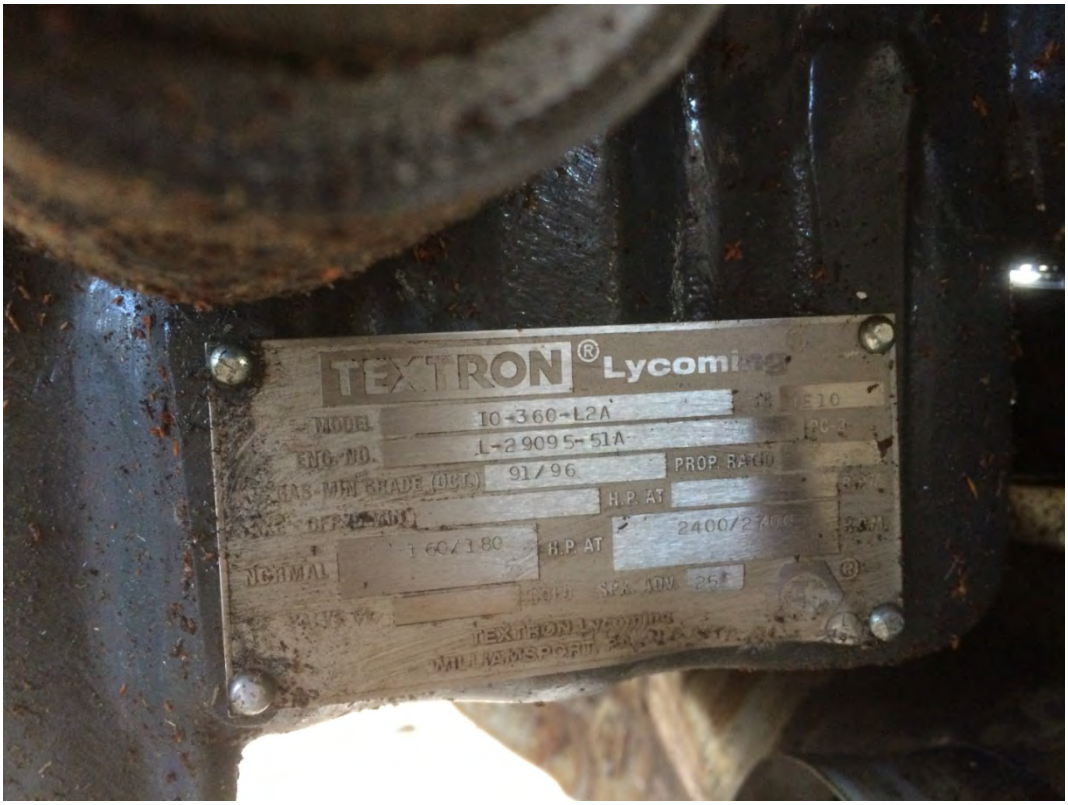

Photo 15 Engine Data Plate

Photo 16 Right Side of Engine

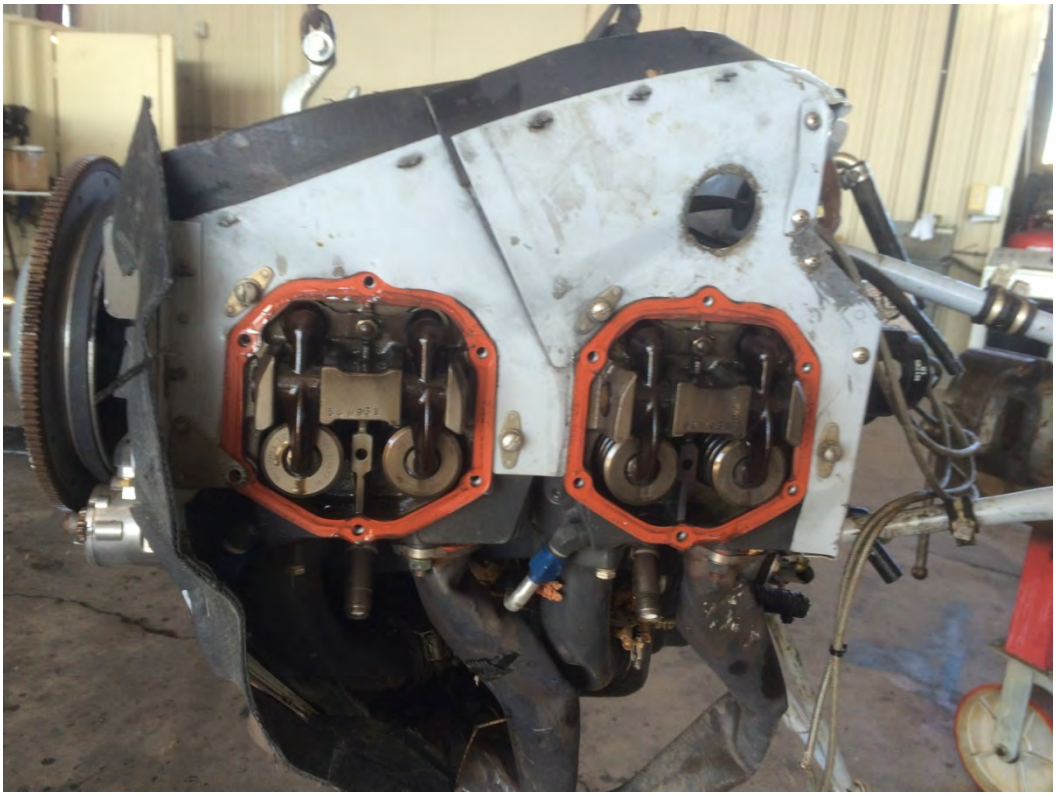

Photo 17 Left Side of Engine

Photo 18 Rear of Engine

Photo 19 Accessory Section of Engine

Photo 20 Bottom of Engine

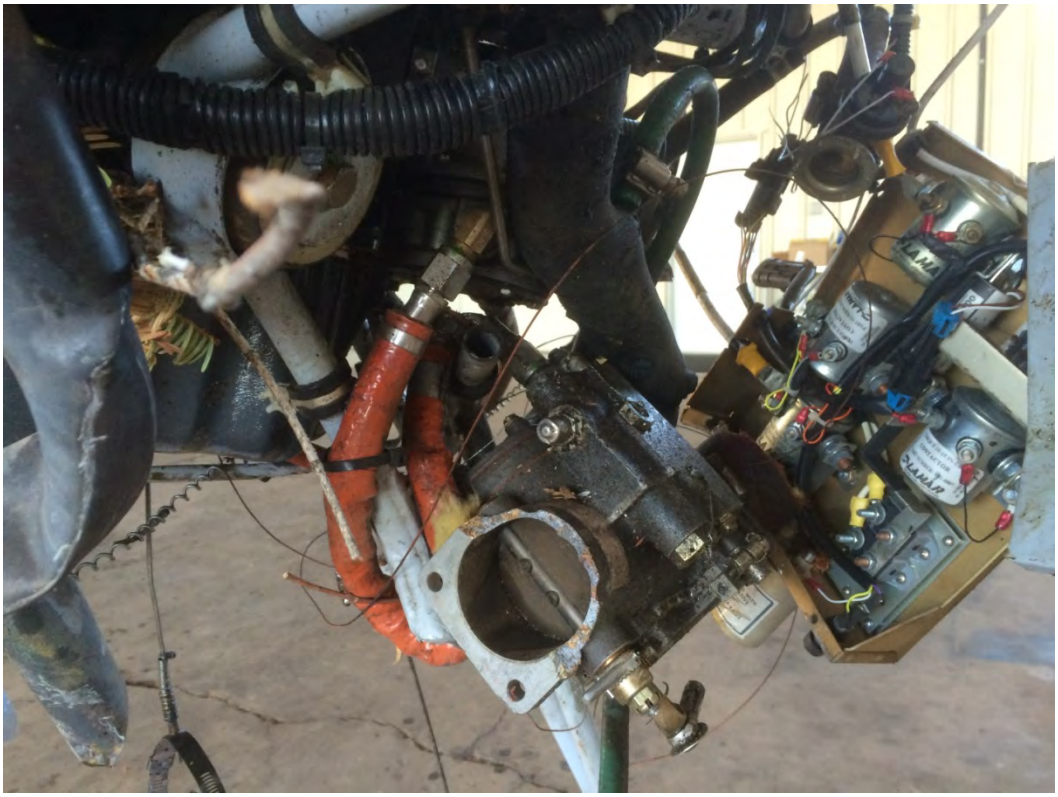

Photo 21 Throttle Body

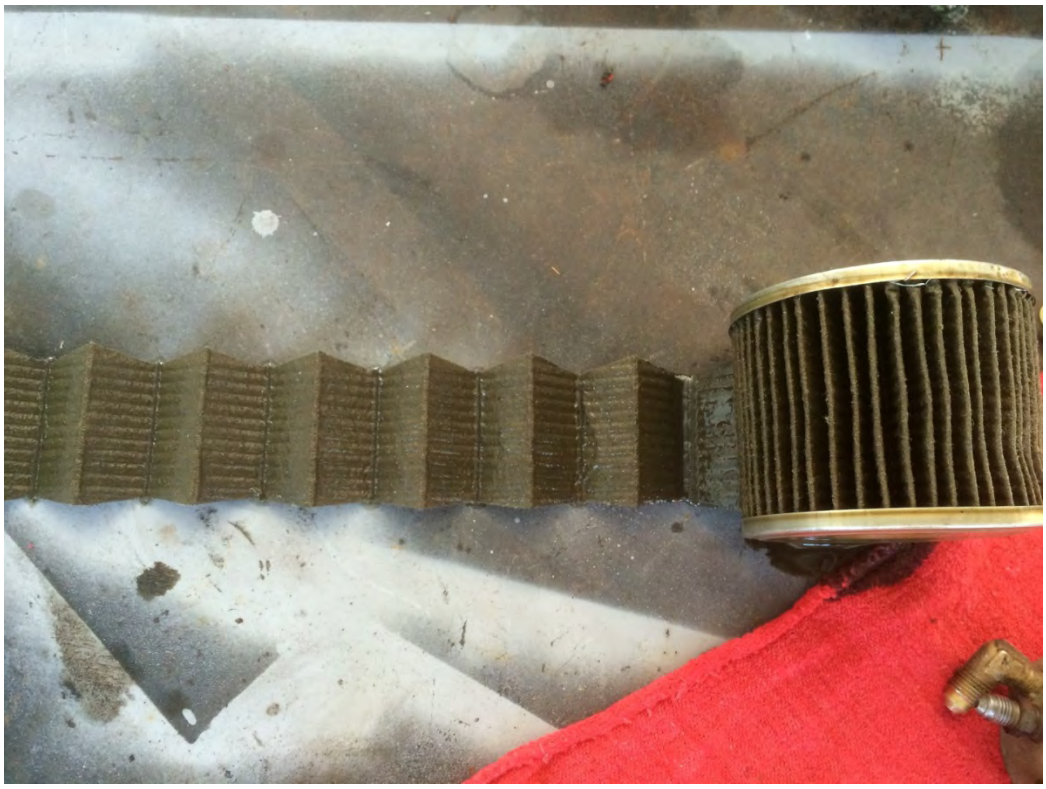

Photo 22 Oil Filter Element

Photo 23 Fuel Pump

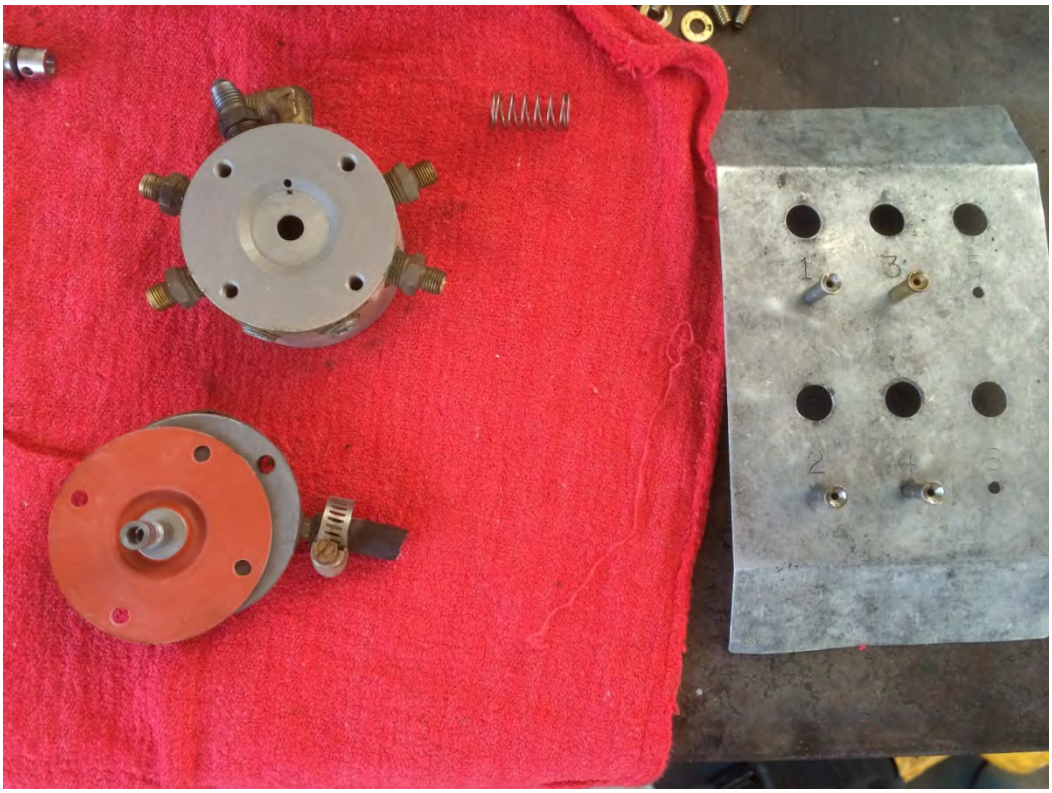

Photo 24 Fuel Distribution Valve

Photo 25 Spark Plugs

Photo 26 Magnetos

3.0 Propeller Examination

The propeller was a Model 1A170E, serial number UC 138E, JHA 7660.

The blades were bent and twisted. Both blades exhibited leading edge gouges and chordwise striations.

3.1 Propeller Exam Photos

Photo 27 Propeller