



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Western Pacific Region

AIRFRAME AND ENGINE EXAMINATION

WPR17FA213

This document contains 14 embedded photos.

A. ACCIDENT

Location: Perkinsville, Arizona
Date: September 22, 2017
Aircraft: Cessna 172L, N7070Q, SN: 17260370
NTSB IIC: Elliott Simpson

B. EXAMINATION PARTICIPANTS:

Elliott Simpson
Senior Aviation Accident Investigator
National Transportation Safety Board
Western Pacific Regional Office

Peter Basile
Senior Air Safety Investigator
Textron Aviation

Mark Platt
Air Safety Investigator
Lycoming Engines

Leon Kelley
Air Safety Inspector
Federal Aviation Administration FSDO
Scottsdale, Arizona

C. SUMMARY

Examination of the airframe and engine was conducted at the facilities of Air Transport in Phoenix, Arizona on November 15, and 16, 2017. No evidence of preimpact mechanical malfunction was noted during the examination.

D. DETAILS OF THE INVESTIGATION

1.0 Airframe Examination

Fuselage

The fuselage, from the tailcone at the baggage door frame, through to the firewall, was consumed by fire (Photo 1). Remaining remnants included a 3 ft square section of the lower fuselage floor assembly, and the main landing gear, which remained attached to the lower box assembly. The left door had detached from the airframe, the right door had been consumed with only the window frame remaining.

The rear seat frame was intact and undamaged. The forward seats, with the exception of the steel seat adjustment members were consumed. Four of the seat rollers were located. The front

seat lap buckles were located latched, the belts were consumed by fire. The rear seat buckles were unlatched, and the belts were also consumed (Photo 2).

The nose gear, which included the lower fork, had separated from the oleo strut, which had detached from the firewall. All flight instruments and radios had been consumed by fire. The Garmin GDL-88 was undamaged, and remained mounted to the tail cone. The FAA inspector removed the ELT from the tailcone at the accident site and switched it off. At that time, the ELT remained attached to its mount, and connected to the antenna which was undamaged on the top of the tailcone.

Tail

The vertical and horizontal stabilizers remained attached to the tailcone. The left side of the tailcone was largely undamaged, and the right side sustained thermal damage along its entire length, and had been cut off during recovery (Photo 3).

The elevator remained attached to the horizontal stabilizer by its hinges; the trim tab was in place and its control rod had extended 1.25 inches out of the actuator (Photo 4), which according to Cessna documentation was consistent with a 5° tab down position. The underside of the right stabilizer and elevator sustained thermal damage, bubbling the paint. The control cables remained attached to the rudder horn, and were continuous to the aft cabin, where they had been cut by recovery personnel.

The rudder had sustained crumple damage to its lower rib and trailing edge. The rudder remained attached to the vertical stabilizer at its hinges. The rudder cables remained attached to the rudder horn assembly, and were continuous to the aft cabin.

Left Wing

The left wing was intact and largely undamaged, except for thermal damage to the inboard leading edge at the fuel tank (Photo 5). The main and aft spars had melted away. The lift strut remained attached to the spar, and had separated about 3 ft inboard from the fuselage.

The flap remained attached at its rails, and flap the control cables were continuous to the wing root, where they had been cut by recovery. The flap could be moved freely on the rails. The aileron remained attached to the wing at its hinges, and could be moved freely by hand. The aileron control rod and bellcrank were intact, and the control cables were continuous to the wing root, where they appeared to have been cut during recovery. Movement of the cables at the root resulted in appropriate movement of the aileron.

The fuel cap had partially melted, and remained in place at the filler neck. The stall warning horn had been consumed by fire.

Right Wing

The inboard section of the wing was consumed by fire, with only remnants of the fuel tank, flap actuator assembly, outboard flap and rail, and wing spar remaining (Photo 6). Outboard, the wing had sustained accordion-like crush damage to the underside, outboard of the lift strut attach point. The aileron remained attached at its hinges, and exhibited a crease midspan. The aileron control rod had separated in the area of crush damage. The bellcrank was intact, and the control cables were continuous to the wing root, where they appeared to have been cut during recovery.

The flap actuator jack screw exhibited an extension of about 1/8 inch (Photo 7), which according to Cessna documentation was consistent with fully retracted flaps.

Cabin Flight Controls

The steel sections of the control column were intact and had detached and burnt away from fuselage. Both yoke universal joints were intact and undamaged, and the yokes appeared to have melted away. The aileron interconnect chains were intact and appeared undamaged and still attached to the interconnect cable. The elevator push-pull tube remained attached at base of the control column. The tube was still attached to the elevator bellcrank and control cables (Photo 8).

The foot pedal and brake assembly were intact, and remained attached to both steering links, the parking brake assembly, and the rudder cables (Photo 9).

1.1 Engine Examination

Model Number: O-360-A4M
Serial Number: L-39893-36A

The engine remained attached to its mount, which was still attached to the crushed firewall. The engine sustained thermal damage, consuming the right magneto, the spark plug harness, oil sump, alternator, and the right side of the accessory case. The crankcase did not exhibit any breaches indicative of internal catastrophic failure (Photo 10).

The propeller remained attached at the crankshaft flange; and the ring gear had detached from the flywheel. The tip of one blade had melted off, about 24 inches from the root, the remaining section of the blade exhibited one-inch-deep leading edge gouges midspan (Photo 11). The tip of the second blade had separated about 28 inches from the root, and the blade had bent about 15° aft midspan (Photo 12).

The top and bottom spark plugs were removed and examined. Their electrodes remained mechanically undamaged, and coated in dark grey deposits. The top plugs displayed normal short service life wear signatures, and the bottom plugs displayed worn out-normal wear signatures when compared with the Champion Spark Plugs AV-27 Check-A-Plug chart (Photo 13,14).

Visual inspection of the combustion chambers was accomplished through the spark plug bores utilizing a borescope; there was no evidence of foreign object ingestion or valve damage and all combustion surfaces exhibited grey deposits.

The exhaust muffler had been completely crushed, and the down pipes remained attached to the cylinder heads. The inner surfaces of the muffler and pipes were coated in light and dark brown deposits.

The crankshaft could not be turned, so drive train continuity was established through visual inspection. The camshaft and magneto drive idler gears were intact, undamaged and secure on the back of the crankcase. Holes were then drilled in the upper crankshaft deck adjacent to the cam lifting surfaces in order to examine the camshaft. The cams were then examined utilizing a borescope through the holes, and all lifting lobes appeared undamaged.

The carburetor sustained thermal damage, and remained partially attached to the sump flange, which had detached from the sump. The fuel inlet line fitting remained attached to the carburetor, and its line had broken away. The inlet screen was free of obstructions. The throttle arm remained attached to the control rod, and the butterfly valve was seized in the partially open position.

Disassembly of the carburetor revealed that all gaskets and seals had become charred, fragmented, and thermally destroyed. The float was consumed, with only burnt flakes remaining. The float pivot arm was intact, and remained attached to the float valve.

2.0 Examination Photographs



Photo 1 – Airframe Remnants



Photo 2 – Seat Belt Latches



Photo 3 - Tail

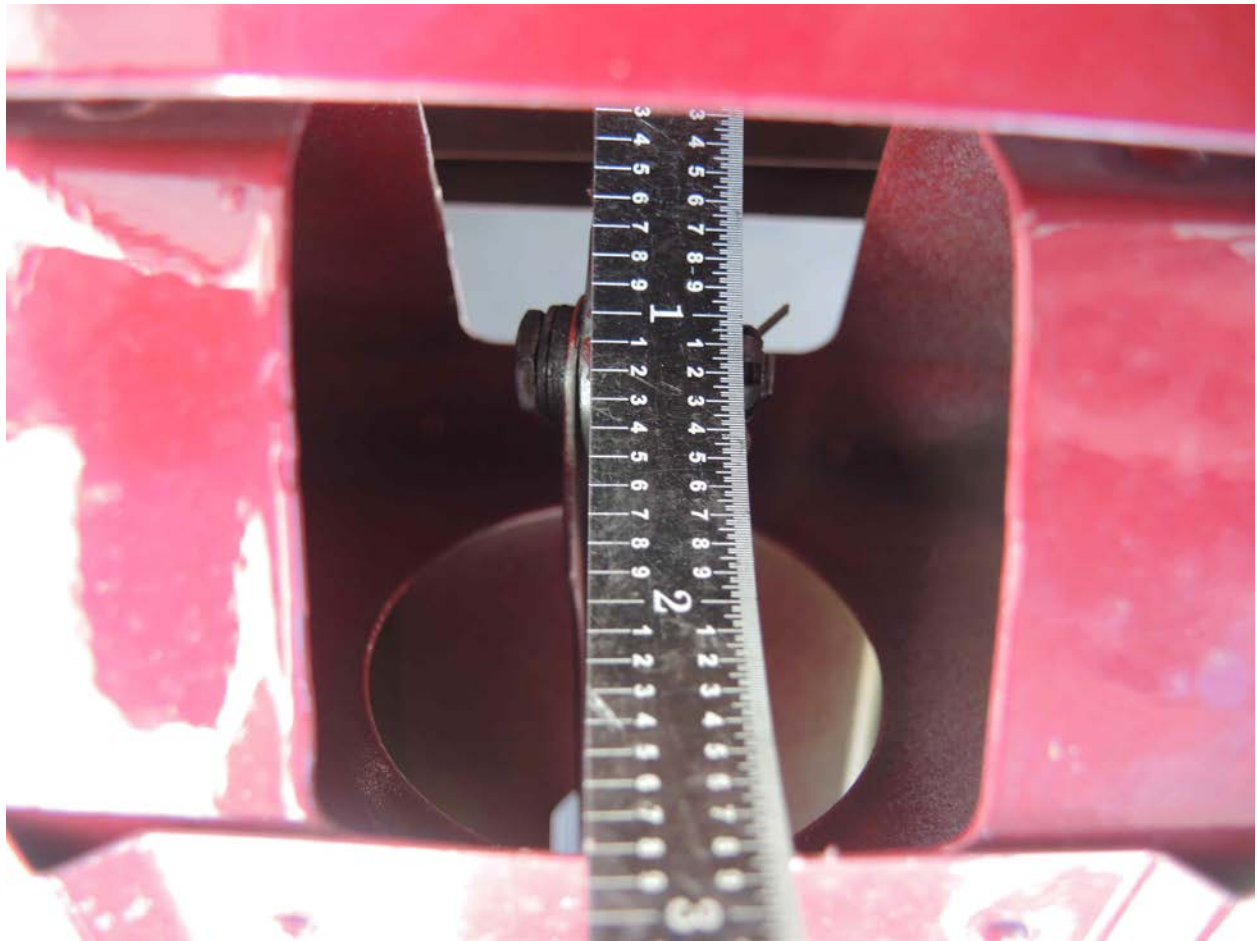


Photo 4 – Elevator Trim Actuator



Photo 5 – Left Wing



Photo 6 – Right Wing



Photo 7 – Flap Actuator



Photo 8 – Control Column



Photo 9 – Foot Pedal Assembly



Photo 10 - Engine



Photo 11 – Propeller Blade



Photo 12 - Propeller Blade

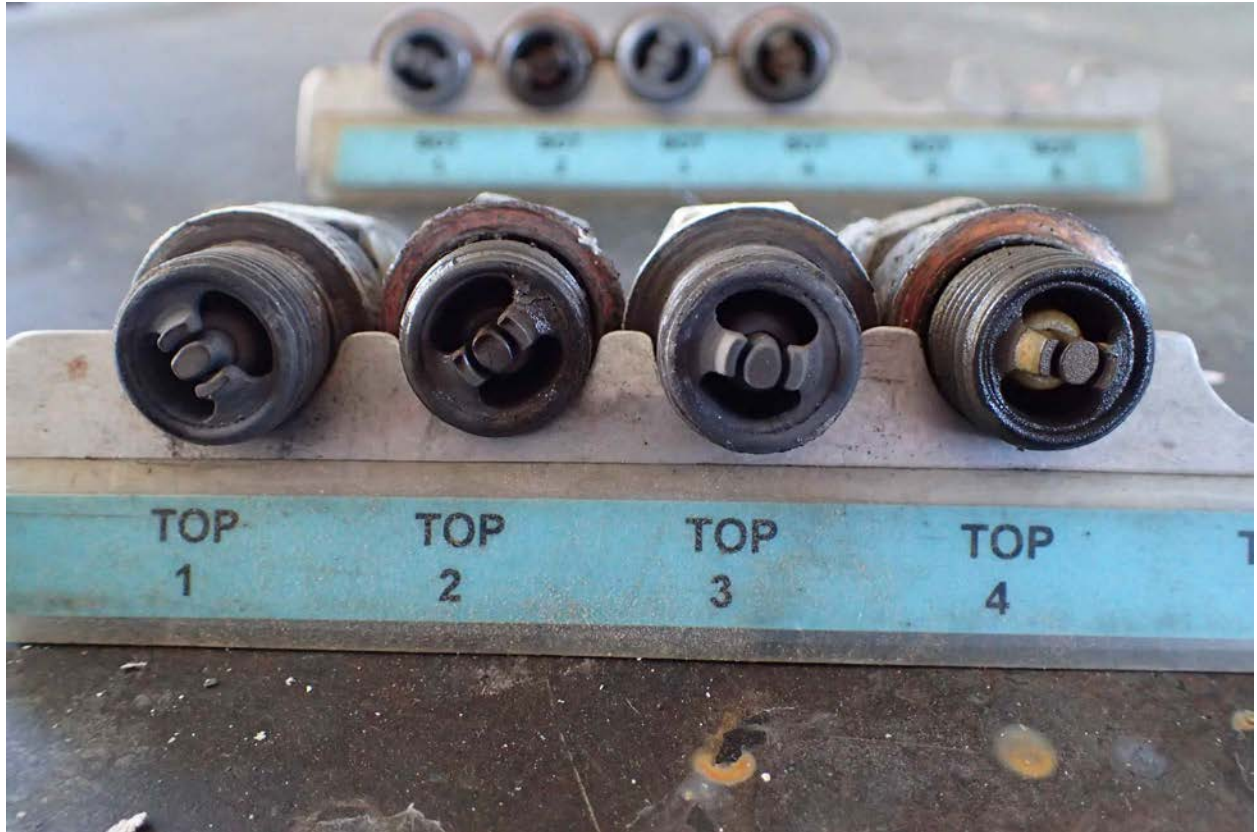


Photo 13 – Top Spark Plugs

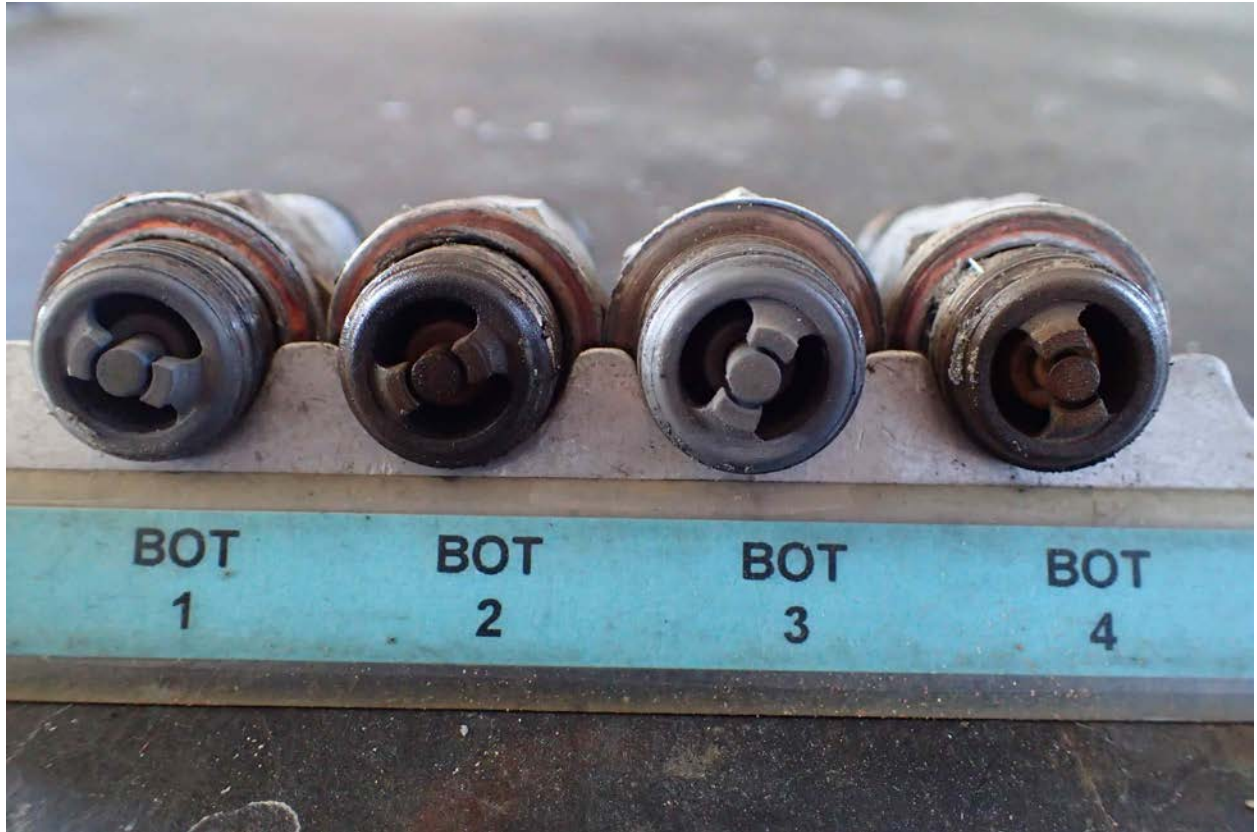


Photo 14 – Bottom Spark Plugs

Submitted by: Elliott Simpson