



## **NATIONAL TRANSPORTATION SAFETY BOARD**

Office of Aviation Safety  
Western Pacific Region

February 19, 2010

# **SUMMARY OF ACCIDENT SITE EXAMINATION**

**WPR10FA136**

This document contains 0 embedded photos.

## **A. ACCIDENT**

Location: East Palo Alto, California  
Date: February 17, 2010  
Aircraft: Cessna 310R, N5225J  
NTSB Investigator-in-Charge: Joshua Cawthra

## **B. EXAMINATION PARTICIPANTS:**

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## **C. SUMMARY**

Examination of the accident site was conducted by representatives from Cessna Aircraft Company and Teledyne Continental Motors under the supervision of the Federal Aviation Administration (FAA) and NTSB investigator-in-charge (IIC) on February 17 and 18, 2010.

## **D. DETAILS OF THE INVESTIGATION**

### **1.0 Accident Site Examination**

Examination of the accident site revealed that the first identified point of contact (FIPC) was an electrical tower located about 0.41 nautical miles northwest of the departure end of runway 31. And examination revealed that the airplane struck the tower and power lines about 40 to 50 feet above ground level (AGL). Wreckage debris from the aircraft was spread throughout the approximate 897-foot long wreckage energy path, which was oriented on a magnetic heading of about 237 degrees.

Two left propeller blade tips were located adjacent to the FIPC. Remains of the left engine cowling, nose cowling, left main gear door, and left gear door hinge were located near the FIPC. The outboard portion of the left wing (left fuel tank, left aileron, and a portion of the left flap) was located adjacent to a residential structure about 462 feet southwest of the FIPC and exhibited thermal damage. The aileron bell crank was in place with two links of cable attached. Areas of

separation were consistent with overload. The main fuel tank was almost completely consumed by fire. The main and auxiliary fuel tanks were located within the fire-damaged portion of left wing. All fuel lines were consumed by fire. The left fuel pump screens (main and auxiliary) were free of debris and contained remains of molten aluminum. A section of power line cable was observed adjacent to the outboard portion of the left wing. One end of the power line cable was fused within the molten aluminum. The aileron trim tab was located on the left aileron and measured 1.8 inches, which equated to about 5 degrees tab up. Both aileron trim cables and aileron control cables were separated at the inboard area of the wing separation point. The cables exhibited broom straw signatures, consistent with overload. The aileron trim chain remained intact and positioned on the trim actuator.

The inboard portion of the left wing (top left engine cowling, left engine nacelle, inboard portion of the left flap, left main gear) was located about 560 feet from the FIPC and in a partially inverted position. The left main gear was observed secured within the wheel well. Forty-five degree striations were observed on the top middle area of the nacelle baggage door. The baggage door was found ajar. A set of aircraft jumper cables and aircraft covering were observed within the baggage compartment. No significant amount of engine oil was observed on the top and bottom surfaces of the engine nacelle or engine cowling. The outboard portion of the inboard area of the left flap exhibited a slight amount of oil residue. A portion of the left aileron control cable was observed within the left inboard wing assembly. Both the inboard and outboard areas of the control cable were separated and exhibited broom straw signatures, consistent with overload. The left mechanical (push/pull) fuel selector was found in the "OFF" position. The left engine air filter was removed from the air filter box and was free of debris. The alternate air door was in the "OFF" position.

Three impact marks were observed on the concrete street curb about 686 feet from the FIPC. The impact marks observed were consistent with propeller blade strikes. An impact mark on the adjacent sidewalk was consistent with engine impact. Additional scoring was observed on the sidewalk within the area of the propeller strike marks and was consistent with the main fuel tank impact.

About 15 feet beyond the strike marks on the curb, a portion of a landscaping retaining wall was displaced and extended towards the main wreckage. The main wreckage was observed adjacent to a residential structure, remaining partially on the residence driveway, yard, sidewalk, and street. Within the main wreckage, three vehicles and a light standard were observed. The main wreckage consisted of remains of the fuselage, cockpit structure, empennage, horizontal stabilizer, elevators, vertical stabilizer, rudder, right wing, and right engine. The main wreckage, vehicles, and light standard exhibited severe thermal damage.

Elevator control cable continuity was established from the cockpit controls aft throughout the airframe to the elevator bell crank. One area of separation was observed on the elevator up cable near the elevator bell crank. The area of separation exhibited broom straw signatures consistent with overload. The elevator push pull tube between the elevator horn and bell crank was separated at the elevator horn. The area of separation exhibited thermal damage and overload signatures. The elevator trim actuator measured 1.2 inches, which equates to a 12-degree tab down setting. The elevator push pull tube between the elevator bell crank and control yoke was

intact with thermal damage noted to the control yoke end. The control yoke was consumed by fire. Aileron control continuity was established. Areas of control cable separation for the left wing were found consistent with overload. The aileron bell crank exhibited thermal damage. The aileron balance cable to the right wing was disconnected at the turnbuckle and exhibited severe thermal damage. The aileron cables were continuous to the aileron bell crank and right wing. The aileron bridle cables were continuous from the auto pilot servo to the right aileron bell crank. The aileron trim cables were continuous from the aileron trim chain to overload separations of the left wing. The area of separation was consistent with overload. The rudder control cables were continuous from the rudder pedals aft to the rudder horn. The rudder trim cables were continuous from the rudder actuator chain aft to an overload separation at the cockpit control (the elevator trim chain in the cockpit was continuous). The rudder trim actuator measured 1.1 inches, which equates to a 14 degree tab right setting.

The elevator trim and rudder trim chains were separated. The Cessna Aircraft Company representative stated that due to the areas of separation, elevator and rudder trim measurements may not be reliable.

The right flap was consumed by fire. The flap motor chains were displaced. A flap position could not be obtained. The flap chains and cables were intact and continuous from the flap motor to the flap bell crank. The landing gear actuator was observed in the "UP" position. The right landing gear was observed secured within the wheel well. The nose landing gear was partially attached to the airframe structure and located near the nose of the airframe.

The right main fuel tank and auxiliary fuel tank were mostly consumed by fire. The right main auxiliary fuel pump screens were clear of debris. The tip tank transfer pump was located with the auxiliary fuel pump. The right fuel selector valve was observed in the "OFF" position. The right fuel selector valve handle was located in a position beyond "OFF."

The cockpit structure was consumed by fire. The throttle quadrant was intact with the surrounding structure burned away. The throttle, mixture, and propeller lever positions could not be verified. The left and right throttle handles were partially bent. Multiple radios were located within the main wreckage and displaced from the instrument panel and fire damaged. Multiple instruments were located throughout the main wreckage and displaced from the instrument panel.

The altimeter reading was observed indicating an altitude of 85,870 feet with a kollsman setting of 29.98. The vertical speed indicator face showed a climb rate of positive 1,600 feet per minute.

The RPM gauge showed the right engine RPM was 400 and the left engine RPM was 200. The manifold pressure gauge was impact damaged. The turn and bank indicator indicated a left turn and the ball moved freely. The turn and bank indicator was disassembled. The electrical driven gyro was disassembled. A radial score mark was observed on the rotor. One of the internal components was in an area that was in line with the score mark on the rotor. The horizontal situation indicator (HSI) was separated from the instrument panel and exhibited thermal damage. The heading displayed on the HSI was 225 degrees, and the HSI heading bug was set to 225 degrees. The HSI was disassembled and the vacuum powered gyro was removed. The gyro

exhibited score marks on the rotor and face plate. Soot was noted on the air inlet. Two small pieces of debris was noted inside the rotor housing.

The forward left and right seats were located and displaced from their seat tracks. Both seats exhibited severe fire damage. Exact seat location (left or right forward) could not be determined. One seat base was fractured and displaced downward. The other seat base was fire damaged, however, was not structurally distorted. Two seat belt buckles were located within the wreckage and were buckled. One of the two seat belt buckles located had a shoulder harness attached. Four forward facing cabin seats were located within the main wreckage and exhibited severe fire damage. Two of the seat bases were fractured.

A flight control lock was found loose within the wreckage debris. No scoring or marks were observed indicating engagement.

Examination of the right engine (TCM IO-550-A (8), S/N: 817081-R) revealed that it was separated from its mounts. The engine was found near the main wreckage and in an inverted position. The engine exhibited thermal and impact related damage. The propeller assembly was separated and fragmented into multiple pieces. The propeller hub assembly was destroyed. Remains of the propeller hub assembly remained attached to two propeller blades. The induction assembly was separated and not located with the engine. The exhaust system was crushed (both mufflers and exhaust pipes were separated). The fuel manifold valve and all six fuel lines were intact and separated from the engine. The top portion of all six fuel nozzles were separated from the lower portion and remained attached to the fuel lines. Impact damage was observed on the alternator and tops of cylinder numbers four, six, three, and five. The left and right magnetos were separated. One magneto remained intact with two ignition harness leads remaining attached to the engine. The opposite magneto was located within the main wreckage. The vacuum pump remained attached to the engine via its mount. The oil filter was separated from the oil filter adapter housing. The crankcase exhibited impact related damage along its backbone and upper accessory section.

An unknown amount of oil was observed leaking from the damaged oil sump as the engine was moved to an upright position. The upper spark plugs were removed and examined. The top one, three, and five exhibited impact damage to the upper shell. Oil and debris was observed within the electrode areas on the top one, three and five spark plugs. Cylinders two, four, and six spark plugs were intact and exhibited light amounts of deposits within the electrode area. Top spark plug number six was damaged during the removal process. All six cylinders were examined using a lighted borescope. Cylinders one, three, and five exhibited oil within the combustion chambers. Cylinders two, four, and six were dry and exhibited normal deposits within the combustion chamber. All piston heads and valve faces appeared to be undamaged. Cylinders three and five exhibited severe thermal and impact damage with a heavy amount of missing material. The right vacuum pump was removed and would not rotate freely. The drive couplings were intact and undamaged. The vacuum pump was disassembled. The rotor and one blade were observed fragmented.

The left engine (TCM IO-550-A (8), S/N: 817080-R), was displaced from its mounts. The engine was located throughout the wreckage distribution path, adjacent to the inboard portion of the left

wing. The engine was observed in an inverted position underneath a residential structure. The engine was extracted from the residential structure. During the extraction, oil was observed leaking from the engine. The propeller assembly was intact and remained attached to the propeller flange. All three propeller blades exhibited impact damage. The induction system and exhaust assemblies exhibited impact damage. Cylinder number one and five cylinder heads exhibited impact damage. The oil sump was crushed. Both left and right magnetos were separated from its mounts and remained attached to their respective ignition leads.

The crankcase exhibited impact damage to the upper accessory section. The throttle body and fuel control unit remained attached to the left wing. The throttle plate was observed in open position. All linkages were intact and moved freely by hand. The upper spark plugs from all cylinders were removed. The top two, four, and six spark plugs exhibited damage to the upper shells. The cylinders were examined internally using a lighted borescope. Oil like deposits were observed within cylinders two, four, and six combustion domes. The cylinder one, three, and five combustion domes were dry and exhibited a normal amount of combustion deposits. All piston heads and valve faces were intact and undamaged. The left vacuum pump remained attached to the engine. The vacuum pump was removed and rotated freely by hand. The vacuum pump coupler was intact. The pump was disassembled and examined. The internal rotor and blades were intact and undamaged.

Submitted by: Joshua Cawthra