NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Western Pacific Region

August 8, 2010

ACCIDENT SITE, AIRFRAME AND ENGINE EXAMINATION

WPR10FA383

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A. ACCIDENT

Location:	Phoenix, Arizona
Date:	August 4, 2010
Aircraft:	Cirrus Aircraft SR-22, N146CK
NTSB Investigator-in-Charge:	Joshua Cawthra

B. EXAMINATION PARTICIPANTS:

Joshua Cawthra
Aviation Accident Investigator
National Transportation Safety Board
Federal Way, Washington

Brad Miller
Manager, Air Safety
Cirrus Aircraft
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Air Safety Investigator
Continental Motors Inc.
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C. SUMMARY

Examination of the accident site, airframe, and engine were conducted on scene and at the facilities of Air Transport, Phoenix, Arizona. No evidence of preimpact mechanical malfunction was noted during the examination of the airframe and engine.

D. DETAILS OF THE INVESTIGATION

1.0 Accident Site and Airframe Examination

Examination of the accident site revealed that the airplane impacted an asphalt parking lot adjacent to a building structure about 2,570 feet west of the approach end of runway 7L. The main wreckage came to rest on a heading of about 354 degrees magnetic at an elevation of about 1,438 feet mean sea level (msl). Wreckage debris remained within an approximate 100-foot radius to the main wreckage. No impact related damage was observed on the building structure or surrounding trees around the perimeter of the parking lot. The main wreckage and surrounding area, including the building structure, exhibited fire damage.

Examination of the wreckage revealed that the fuselage was mostly consumed by fire. The engine remained attached to the firewall and exhibited impact damage. The left and right wing remained attached to the fuselage and was mostly consumed by fire. Fiberglass and carbon fiber cloth remained from the wing skins, torque box structure and main spar. The left outboard

section of left wing was separated at the outboard end of the left flap and was located adjacent to the main wreckage. Portions of the left flap were present and exhibited impact and fire damage. An approximate 6 to 8 inch section of the outboard end of the left aileron was observed with the separated section of the left wing. Portions of the right flap were observed and exhibited impact and fire damage. The right aileron was present and exhibited fire and impact damage. The aileron trim motor was observed at the accident site. The position of the motor could not be determined due to the impact and fire damage. The flap actuator was observed extended approximately one inch, which is consistent with a fully extended flap setting. Control continuity was established from the cockpit controls to the left and right ailerons. The left aileron control cable was separated between the left wing root and the left aileron actuation pulley. The areas of separation exhibited broomstraw signatures, consistent with tension overload.

The vertical stabilizer remained attached to the empennage and was mostly consumed by fire. The rudder was separated from the vertical stabilizer and located adjacent to the vertical stabilizer. The rudder exhibited impact and fire damage. Rudder control cable continuity was established from the rudder to the cockpit controls.

The horizontal stabilizer remained attached to the empennage and exhibited impact and fire damage. The left and right elevators remained attached to the horizontal stabilizer and exhibited impact and fire damage. Elevator control cable continuity was established from the elevator control surfaces to the cockpit controls. The pitch trim setting was not determined due to impact and fire damage.

The nose landing gear assembly was separated from the engine mount structure and exhibited impact and fire damage. The left and right main landing gear assemblies were separated from the wing structure and exhibited impact and fire damage.

The left cabin door was separated from the fuselage and was mostly consumed by fire. The upper and lower door latches were both observed in the open position. When actuated by hand, the lower latch would click shut and lock in the closed position. The latch could be opened by hand by moving the actuation arm at the door handle. Latch control cable continuity was established from the lower latch to the upper door latch. Damage was observed to the upper door latch, which prevented the normal range of motion of the upper door latch when actuated by hand. The upper latch could only be locked in place when pressure was added to the end of the upper rotary latch to assist in locking the latch in a closed position. Once locked, it was possible to unlatch the mechanism by applying pressure to the upper rotary arm to aid in moving the cable as would occur if full cable movement were possible.

The right cabin door was found separated from the airframe and located near the right of the main wreckage. The upper door hinges remained attached to separated portions of the upper cabin roof structure. The upper and lower door latches were intact and undamaged. The door latches functioned normally by hand.

The baggage door was not observed and was presumed to be consumed by fire.

The cabin area of the fuselage was mostly consumed by fire. Remains of various avionics and instruments were observed within the main wreckage. Impact and fire damage precluded documentation of the cockpit instruments, switch, and avionics settings.

All passenger seats were mostly consumed by fire. The front left crew seat was observed in a mid-range position with the seat track pin engaged.

A number of items were identified in the baggage compartment and back seat area of the airplane. The items included remains of a Jeppesen manual, assorted bags of coffee, hardcover books, boxes of candles, two different sets of plates, and glassware. Additionally there was burnt wood present and steel tubing from some type of furniture or similarly shaped item.

A piece of rocket motor was located by an unidentified individual and turned over to a Federal Aviation Administration (FAA) inspector who responded to the accident site. The recovered portion of rocket motor was located in a nearby parking lot (exact location unknown). Additional pieces of the rocket motor were located near the main wreckage. The condition of the rocket motor pieces was consistent with ignition of the propellant in a manner that produced pressure in excess of the motor housing design. The "D-link" that attaches the incremental bridal to the lanyards was located in an adjacent parking lot about 98 feet to the rear of the main wreckage. The pickup collar support was located approximately 39 feet from the main wreckage and exhibited damage.

The pickup collar and a portion of the lanyards were located approximately 79 feet from the main wreckage. The lanyards were fractured. The fracture surfaces exhibited broom straw separation and were consistent with tension overload. The CAPS launch tube and igniter assembly exhibited impact and fire damage. The activation cable exhibited fire damage. Activation cable continuity was established from the igniter assembly to the activation handle holder.

2.0 Recovered Engine Examination

Examination of the recovered IO-550-N (60) engine, serial number 1000383, revealed that it was modified from factory new condition with a tornado alley turbo system. The engine exhibited extensive fire and impact damage. All of the engine accessories were separated from the engine expect for the engine driven fuel pump, propeller governor, standby alternator, and the left and right turbo chargers. The aft portion of the crankcase halves was crushed and portions of the accessory case were separated. All cylinders and exhaust system exhibited fire and impact damage. The ignition harness exhibited fire damage. The throttle control cable remained attached to the throttle lever and was frozen in a near idle position. The throttle control lever could not be moved by hand. The mixture control cable was attached to the mixture control lever and moved freely by hand from stop to stop. The propeller governor control cable remained attached to the control arm and was observed in almost the full aft position.

The rocker box covers, top spark plugs, and remaining engine accessories were removed from the engine. The crankshaft was rotated with extreme difficulty using a pipe wrench attached to the remaining portion of the crankshaft. Movement of all six pistons was verified as the

crankshaft was rotated. The cylinders were examined internally using a lighted borecope and exhibited very light deposits on the piston heads and cylinder combustion domes. The number four cylinder was removed. The number four cylinder was unremarkable.

The top spark plugs, Champion RHB32S, exhibited normal wear signatures with light gray deposits within the electrode area.

The engine driven fuel pump was intact and impact damaged. The fuel pump remained partially attached to the engine. The fuel pump drive coupling was intact and bent. The fuel pump safety wire was intact. The fuel pump drive shaft would not rotate by hand. The fuel pump was disassembled and no anomalies were noted. All of the internal areas of the fuel pump exhibited heat discoloration.

The left magneto exhibited impact damage and thermal damage. The magneto driveshaft would rotate freely with impulse coupling engagement; however, no spark was produced on any of the six terminals. The magneto was disassembled and exhibited extensive heat discoloration within the internal areas of the magneto.

The right magneto exhibited impact and thermal damage. The magneto drive shaft rotated freely by hand with impulse coupling engagement. When the magneto drive shaft was rotated, spark was observed on all six terminals.

The fuel manifold valve was intact and exhibited thermal damage. The safety wire was observed in place and secure. The fuel manifold valve was disassembled. The internal diaphragm exhibited thermal damage and was melted into the fuel manifold valve screen. The spring was intact and in place. The interior parts of the plunger were loose and separated from the plunger when the unit was disassembled.

The fuel metering unit was thermally damaged. The fuel lines remained attached and exhibited thermal discoloration.

The left turbo charger exhibited impact damage. The left compressor shroud was separated. The compressor exhibited impact damage to the blades and rotated by hand.

The right turbo charger exhibited impact damage. The internal turbine wheels could not be rotated due to the shroud damage.

The propeller was separated from the engine crankshaft along with the crankshaft propeller flange. The spinner was crushed and exhibited thermal damage. Two of the three blades were separated from the propeller hub. The remaining propeller blade was melted outboard of the mid span point. The remaining portion of crankshaft exposed from the front of the engine case exhibited extensive spiral cracking throughout half of its respective circumference.

The oil sump was removed from the engine and exhibited impact damage. A two inch hollow cylinder like object was observed within the oil sump. The object was oil coated and did not

match any parts or components found within the engine's illustrated parts catalog. The source of the object was not found.

Submitted by: Joshua Cawthra