NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Western Pacific Region

April 6, 2016

SUMMARY OF AIRPLANE EXAMINATION

(WPR14FA286)

This document contains 3 embedded photos.

A. ACCIDENT

Location:	Fall City, Washington
Date:	July 8, 2014
Aircraft:	Cessna 182, N5816B
NTSB Investigator-in-Charge	Thomas Little

B. EXAMINATION PARTICIPANTS

Thomas Little
Air Safety Investigator
National Transportation Safety Board
Federal Way, Washington

William D. Shinn
Federal Aviation Administration
Flight Standards District Office
Renton, Washington

Ernie Hall
Air Safety Investigator
Textron Aviation
Wichita, Kansas

Nicole Charon
Air Safety Investigator
Continental Motors, Inc.
Mobile, Alabama

C. SUMMARY

On July 8, 2014, about 0800 Pacific daylight time, a Cessna 182, N5816B, was substantially damaged following impact with terrain at a golf course near Fall City, Washington. The certified private pilot, the owner and sole occupant of the airplane, sustained fatal injuries. The local flight was being operated in accordance with 14 Code of Federal Regulations Part 91, and a flight plan was not filed. Instrument meteorological conditions prevailed in the area of the accident at the time of the event. The flight had departed the Fall City Airport (1WA6), about 5 minutes prior to the accident, with its destination being Harvey Field (S43), Snohomish, Washington.

In a postaccident interview, a family member reported that the purpose of the flight was for the pilot to take the airplane to S43 to undergo its scheduled annual inspection. The family member opined that the pilot would have never taken off into the fog, that he was a very meticulous and cautious pilot in all regards, and that on many occasions the pilot would cancel a flight if there was the slightest discrepancy with the airplane.

Several witnesses who were at the golf course at the time of the accident submitted statements to the National Transportation Safety Board (NTSB) investigator-in-charge (IIC). One witness reported that he heard the airplane, but could not see it due to the fog and low ceiling, which was about 50 feet above ground level (agl). The witnesses stated that he looked toward the noise and observed the airplane heading west barely off of the ground prior to the right wing impacting a tree and subsequently hitting a second tree. A second witness, who reported that the overcast condition was between 100 to 150feet agl, stated that he heard the sound of a sputtering engine, which was immediately followed by a loud thud, "…and suddenly there was a plane, upside down, in the middle of the 9th fairway." A third witness estimated that the fog was about 20 feet off of the ground and that he heard the airplane flying over but could not see it. He heard the engine "…throttling up, then back, and then throttling up really heavy" right before impact. A fourth witness reported that the vertical visibility was about 75 feet due to the

fog. He heard the airplane take off, which he thought was to the west, made a right turn, headed north, then made a left turn heading south over the Snoqualmie River. The witness stated that he observed the airplane flying directly overhead at about 75 feet heading south, and then about 5 seconds later heard one explosion. A fifth witness reported, that while he never saw the airplane due to the very low fog, he believed he heard it flying for about 1 to 2 minutes during which he heard the engine throttle up, then throttle back before the airplane impacted the tree.

Figure 1 - accident site looking east

D. DETAILS OF THE EXAMINATION

1.0 Accident Site Examination

A survey of the accident site by representatives from the NTSB and the Federal Aviation Administration (FAA), revealed that he airplane's initial impact was on a measured magnetic heading of about 270 degrees, and with a tree about 80 ft in height, at about the 15-foot level with its right outboard wing section. The airplane the proceeded across a fairway on the golf course heading west for about 200 ft prior making impact with a second tree of about equal height as the first, and at about the 18-foot level head on with the engine at a very high rate of speed; the engine separated from the airplane and was located at the base of the tree. The airplane, minus its engine, then traveled about another 60 ft to the west before coming to rest in the middle of an adjacent fairway on a measured magnetic heading of 090 degrees. The

airplane was observed to have been severely fragmented, and there was no postcrash fire. All components necessary for flight were accounted for at the accident site.

The airplane was recovered to a secure location for further examination.

2.0 Follow-up examination

A follow-up examination of the airframe, engine and propeller was conducted July 16, 2014, at the facilities of AV-Tech Services, LLC, Auburn Airport, Auburn, Washington. The examinations were overseen by the NTSB IIC, and a representative from the FAA.

The following examination notes are a compilation of those provided by the respective manufacturer representatives, the NTSB IIC, and the FAA IIC

2.0.1 Airframe examination notes

The recovered wreckage was laid out and all major components (ailerons, flaps, elevators, and rudder) of the airplane were accounted for during the wreckage examination. No pre-impact anomalies were noted to the airframe. During the 07-16-14 wreckage examination, the following was observed:

Fuselage Front Section:
The fuselage front section was fragmented. The firewall was partially separated.

Right Wing:

The right wing was fragmented into large sections. The right wing leading edge exhibited an aft semicircle buckle toward the right wing front spar at approximately mid-section.

Left Wing

The left wing was intact with wrinkles and buckles in the wing skin. The leading edge from the left wing strut inboard was crushed aft toward the left wing front spar.

Aft Fuselage/Empennage:

The aft fuselage exhibited cut signatures consistent with recovery initiatives forward of the top rotating beacon (About Fuselage Station (FS) 108.00”). The vertical and both horizontal stabilizers remained attached to the aft fuselage. The top mid-section of the vertical stabilizer was crushed down and to the right. The right horizontal stabilizer outboard section/tip was crushed toward to the aft fuselage.

Cockpit/Cabin Fuselage:

The cockpit/cabin fuselage was reduced in volume.
Flight control cable continuity was established from the cockpit to each flight control. The aileron and flap cable separations exhibited signatures consistent with tensile overload. The elevator, rudder, and stabilizer trim cable separations exhibited cut signatures consistent with recovery initiatives in the aft fuselage (about F.S. 108.00). The mechanical flap and stabilizer trim positions could not be determined due to impact damage.

The fuel selector valve shaft assembly attached to the fuel selector valve handle was separated from the fuel selector valve. Both fuel tanks were breached during the impact sequence resulting in fuel blighting to the fairway grass.

The pilot's seat rails displayed signatures indicating the seat position locking pin was secured in the third adjustment hole from the front. A secondary seat stop was not installed.

The airspeed indicator needle was jammed by broken glass at 125 MPH.

The ignition key was separated, with the switch in the BOTH position.

The examination revealed no anomalies detected that would have precluded normal operation.

2.0.2 Engine examination notes

The engine sustained impact damage that resulted in the separation of the magnetos and carburetor, the partial separation of the #4 and #5 cylinders, as well as a fractured crankcase. The impact-related damage precluded any functional testing of any of the components. In addition, rotation of the crankshaft was not possible due to the fractures of the crankcase and cylinder damage. However, examination of the engine and its components did not reveal any anomalies that would have prevented the production of full power.

Figure 2 - picture of engine and propeller as received

The #4 and #5 cylinders were partially separated from the crankcase. The topside of the crankcase was fractured permitting a view inside the engine in the area of the four aft cylinders.

Both magnetos were separated from the engine. Portions of the ignition leads remained with the engine. The carburetor was separated from the engine as was the oil cooler, starter motor, and vacuum pump. The exhaust system remained attached to the engine; however, it sustained deformation damage and flattening. The primer system and primer lines remained attached to the engine.

The exhaust risers and manifold remained with the engine; however, they sustained deformation damage and were flattened.

The induction system was destroyed and only portions were observed among the recovered wreckage. The carburetor's throttle body was destroyed and only the throttle valve remained with the engine.

The left magneto was separated from the engine and was intact, though it sustained impact damage that separated all of the ignition leads and left mechanical deformation damage to the housing. The drive shaft could be manually rotated and the snap of the impulse coupling was audible.

The right magneto was separated from the engine and was fractured. Examination of the identified components did not reveal any pre-impact anomalies.

The ignition harness was fragmented and untestable.

The top sparkplugs were removed from their respective cylinders. The #2 top sparkplug sustained mechanical damage. Otherwise, they were unremarkable, showing normal wear and combustion signatures when compared to the Champion Service Manual AV6-R.

The carburetor was separated from the engine and the throttle valve was separated from the carburetor as was the accelerator pump. The mixture lever was separated from the carburetor. The throttle shaft was bent but remained attached to the throttle plate. The throttle lever remained attached to the shaft. The carburetor housing was fractured permitting a view into the carburetor bowl. Disassembly of the carburetor revealed that the inlet screen was clean, and the floats, though deformed, were intact.

The oil pump remained secured to the backside of the engine. It was removed and disassembled. Some light scoring and corrosion was noted on the pump housing walls. There were no signs of operational distress with the oil pump housing or gears.

The engine was modified using a remote, disposable, oil filter. The oil filter supply and return lines were separated from the adapter. The oil filter was located and cut open. There were no visible signs of contamination.

The oil sump was destroyed and not observed during the examination.

The oil pick-up tube and screen were not observed during the examination.

The oil cooler was separated from the engine and sustained deformation damage. There were no signs of operational distress with the unit.

The #1 cylinder remained attached to the crankcase. No anomalies were noted with the rockers or valve springs. Borescope examination of the cylinder revealed no anomalies with the piston, barrel, cylinder head, valves or valve seats.

The #2 cylinder had broken cooling fins around the tops sparkplug. A hole was punctured in the rocker cover. The cylinder remained attached to the crankcase. No anomalies were noted with the rockers or valve springs. Borescope examination of the cylinder revealed no anomalies with the piston, barrel, cylinder head, valves or valve seats.

The #3 cylinder remained attached to the crankcase, though some of the deck studs were displaced due to the crankcase damage. No anomalies were noted with the rockers or valve springs. Borescope examination of the cylinder revealed no anomalies with the piston, barrel, cylinder head, valves or valve seats.

The #4 cylinder was partially separated from the crankcase. No anomalies were noted with the rockers or valve springs. Borescope examination of the cylinder revealed no anomalies with the piston, barrel, cylinder head, valves or valve seats.

The #5 cylinder was partially separated from the crankcase exposing the connecting rod and backside of the piston. No anomalies were noted with the rockers or valve springs. Borescope examination of the cylinder revealed no anomalies with the piston, barrel, cylinder head, valves or valve seats.

The #6 cylinder remained attached to the crankcase. No anomalies were noted with the rockers or valve springs. Borescope examination of the cylinder revealed no anomalies with the piston, barrel, cylinder head, valves or valve seats.

The crankcase was fractured exposing the internal components on the aft end of the engine. There was no evidence of any pre-existing anomalies with the crankcase.

The crankshaft was not examined in its entirety; however, portions that were visible through the fractured crankcase halves and removed components revealed no anomalies or signs of operational distress or malfunction. The crankshaft could not be rotated due to the fractured crankcase halves and the partially separated cylinders.

Examination of the #1connecting rod through the fractured crankcase halves revealed that it remained intact and the rod bolts were secured. The connecting rod did not display any evidence of operational or heat distress.

Examination of the #2 connecting rod through the fractured crankcase halves revealed that it remained intact and the rod bolts were secured. The connecting rod did not display any evidence of operational or heat distress.

Examination of the #3 connecting rod through the fractured crankcase halves revealed that it remained intact and the rod bolts were secured. The connecting rod did not display any evidence of operational or heat distress.

Examination of the #4 connecting rod through the fractured crankcase halves revealed that it remained intact and the rod bolts were secured. The connecting rod did not display any evidence of operational or heat distress.

Examination of the #5 connecting rod through the partially separated cylinder revealed that it remained intact and the rod bolts were secured. The connecting rod did not display any evidence of operational or heat distress.

Examination of the #6 connecting rod through the partially separated #5 cylinder revealed that it remained intact and the rod bolts were secured. The connecting rod did not display any evidence of operational or heat distress.

The camshaft was not examined in its entirety; however, portions that were visible through the fractured crankcase halves and removed components revealed no anomalies or signs of operational distress or malfunction. The hydraulic lifters were also examined through the fractured crankcase halves and no anomalies were noted.

The starter motor was separated from the engine. Rotation of the starter shaft did not reveal and anomalies or binding.

The starter adapter remained attached to the aft end of the engine; however it sustained impact damage that fractured a portion of the starter motor mount and the adapter cap.

The 12 Volt generator was separated from the engine and sustained impact damage. A portion of the generator mount remained with the generator and a portion remained attached to the engine; both of which sustained deformation damage.

The wet vacuum pump was separated from the engine. It was disassembled and no anomalies were noted with the rotor or vanes. All components displayed normal wear patterns.

2.0.3 Propeller examination notes

The propeller separated from the engine crankshaft propeller flange. The two-bladed propeller assembly blades remained attached to the hub. Both propeller blades exhibited twisting toward the non-camber side, and leading edge polishing. All six propeller bolts remained with the propeller flange. The aft spinner bulkhead was deformed aft around the topside of the crankcase. The two-bladed propeller was lying on the floor adjacent to the engine. Both blades remained attached to the hub, both were twisted toward low pitch, and both displayed a polished erosion of the paint from the tips. One of the blades also displayed s-bending signatures. The threaded areas of the hub where the propeller bolts are normally positioned displayed distortion and elongation signatures. The propeller mounting dowels were also displaced.

Figure 3 - picture of propeller blades (courtesy of Continental Motors, Inc.)