Aviation Investigation Final Report

Location:	Sheridan Lake, Colorado	**Accident Number:**	CEN16FA188
Date & Time:	May 18, 2016, 09:01 Local	**Registration:**	N6609P
Aircraft:	Cessna P210N	**Aircraft Damage:**	Substantial
Defining Event:	Loss of control in flight	**Injuries:**	1 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The private pilot was conducting a cross-country flight at 17,500 ft mean sea level (msl) while operating on a visual flight rules clearance. About 2 hours after takeoff, the pilot stated over the radio, "(unintelligible) I'm going down and I'm going down hard." Based on the pilot's speech, it became apparent to the controller that the pilot was experiencing some type of distress. The controller attempted to communicate with the pilot, concerned that he was possibly experiencing hypoxia, carbon monoxide exposure, or another medical condition that was affecting his speech and ability to control the airplane. Throughout the remainder of the flight, the controller provided numerous altimeter setting updates recommending that the pilot descent to a lower altitude in a continued effort to assist the pilot; however, the pilot did not acknowledge or reply to these requests. During three different radio transmissions, the pilot stated, "I can show you…" what the airplane can do. He also stated, "(unintelligible) guys want me to do Muller?", which is an aerobatic maneuver that involves a flat spin and recovery. (The airplane is not approved for aerobatics or spins.) Radar data indicated that the airplane entered a series of turns, climbs, and descents. The final recorded radar return indicated the airplane was about 9,200 ft msl. The airplane subsequently impacted a field in a flat spin. Examination of the airframe, engine, and airplane pressurization system revealed no mechanical malfunctions or anomalies that would have precluded normal operation.

Given that the airplane's descent did not improve the pilot's control of the airplane's heading or the quality of his communication with the controller, it is likely that the pilot's behavior was not the result of hypoxia.

Toxicology testing on the pilot was positive for ethanol at ranges between 0.247 gm/dl and 0.335 gm/dl, which is significantly higher than the legal limit of 0.040 gm/dl. While ethanol can be produced in tissues after death, this occurs by microbial action; and vitreous, where the levels were highest in specimens from the pilot, is typically a sterile fluid. In addition, an approximately half-full bottle of vodka was found in the wreckage, suggesting that the majority of the identified ethanol had been ingested. Further, the tested samples were positive for three additional impairing substances;

diphenhydramine, lorazepam, and zolpidem. The pilot's impaired speech and behavior were most likely caused by the effects of high levels of alcohol along with effects from the three prescription medications, which likely led him to believe that he could perform maneuvers in the airplane that it was not capable of performing.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's severe impairment from the combined effects of high levels of ingested alcohol as well as three impairing medications (zolpidem, lorazepam, and diphenhydramine), which resulted in his decision to attempt an aerobatic maneuver that the airplane was not approved for.

Findings

Personnel issues	Alcohol - Pilot
Personnel issues	Prescription medication - Pilot
Personnel issues	Decision making/judgment - Pilot
Aircraft	Angle of attack - Capability exceeded
Aircraft	(general) - Capability exceeded
Personnel issues	Incorrect action performance - Pilot
Personnel issues	Aircraft control - Pilot

Factual Information

History of Flight

Enroute-cruise	Loss of control in flight
Enroute-cruise	Aerodynamic stall/spin
Maneuvering-aerobatics	Loss of control in flight (Defining event)

HISTORY OF FLIGHT

On May 18, 2016, about 0901 mountain daylight time, a Cessna P210N, N6609P, sustained substantial damage when it impacted a field in a flat spin about 4 miles northeast of Sheridan Lake, Colorado. The pilot sustained fatal injuries. The airplane was registered to and operated by Stubblefield Construction Company under the provisions of the 14 *Code of Federal Regulations* Part 91 as a personal flight. Visual meteorological conditions prevailed at the time of the accident, and no flight plan was filed for the flight, which departed at 0645 from Rock Springs-Sweetwater County Airport (RKS), Rock Springs, Wyoming, en route to Wiley Post Airport (PWA), Oklahoma City, Oklahoma.

Earlier that morning, about 0222, the pilot departed Nampa Municipal Airport, Nampa, Idaho, and flew to RKS, where he landed the airplane about 0442. A witness at RKS reported that the pilot had the airplane topped off with 68 gallons of fuel. He reported that the pilot slept in the pilot's lounge for about 1 hour before departing toward PWA.

After departing RKS, radar data from the Federal Aviation Administration (FAA) indicated that the airplane was flying on a southeast heading at 17,300 ft pressure altitude. About 0800, the pilot established visual flight rules flight following with the Denver, Colorado, Air Route Traffic Control Center, which provided the pilot with the current altimeter setting.

A transcript of the communications between the accident airplane and an air traffic controller indicated that, at 0842:36, the pilot transmitted, "(unintelligible) I'm going down and I'm going down hard."

It became apparent to the controller that the pilot was experiencing some type of distress. The controller attempted to communicate with the pilot, concerned that he was possibly experiencing hypoxia, carbon monoxide exposure, or another medical condition that was affecting his speech and ability to control the airplane. Throughout the remainder of the flight, the controller provided numerous altimeter setting updates in a continued effort to communicate with the pilot; however, the pilot did not acknowledge or reply to numerous controller requests. The controller made numerous recommendations to the pilot to descend to a lower altitude.

At 0846:23, the controller transmitted, "November six six zero nine papa suggest you descend to lower altitude at or below one two thousand uhh sounds like you might have an hypoxic situation."

The recorded radar data indicated that the airplane had maintained a straight-and-level flight track to the southeast at 17,300 ft pressure altitude until 0847. Then, the airplane entered a series of turns, climbs, and descents that ultimately put the airplane on a northerly course.

At 0853:16, the pilot transmitted, "I can show you what a p two ten can do." The radar data indicated that the airplane's altitude was about 11,700 ft pressure altitude at the time of the transmission.

At 0854:05, the pilot transmitted, "(unintelligible) guys want me to do Muller?" The radar data indicated that the airplane's altitude was about 12,275 ft pressure altitude at the time of the transmission.

At 0855:24, the pilot transmitted, "I can show you things this airplane can do." The radar data indicated that the airplane's altitude was about 10,600 ft pressure altitude at the time of the transmission.

At 0858:01, the pilot transmitted, "Let me show you what a (unintelligible) two ten can do." The radar data indicated that the airplane's altitude was about 10,950 ft pressure altitude at the time of the transmission.

At 0858:28, the controller transmitted, "November six six zero nine papa it's possible you're uhh uhh hypoxic and umm and carbon monoxide poisoning is going on if you could just open up that window maybe get some fresh air in that airplane November zero nine pop."

At 0900:30, the pilot's last radio transmission stated, "You got it watch the center watch it go." The last recorded radar return at 0900:32 indicated that the airplane's pressure altitude was about 9,200 ft. Subsequent attempts to contact the pilot were unsuccessful.

Fig. 1 View of the airplane at the accident site

PERSONNEL INFORMATION

The 64-year-old pilot held a private pilot certificate with airplane single-engine land and instrument ratings. He held a third-class medical certificate issued on November 11, 2015, with a limitation for corrective lenses. During his medical examination in November 2015, the pilot reported that his total flight time was 4,250 hours. The pilot's logbook was not recovered during the investigation.

FAA airman records indicated that the pilot was involved in a landing incident in Boise, Idaho, on May 28, 2000. The pilot was found to be operating the airplane under the influence of alcohol with a blood alcohol concentration (BAC) of 0.26 percent, which was above the BAC legal limit of 0.04 percent for operating aircraft. The pilot surrendered his pilot and medical certificates after the incident. He reapplied for a medical certificate on July 5, 2005, and was granted an eligibility letter on August 10, 2005.

AIRCRAFT INFORMATION

The airplane was a pressurized, single-engine Cessna P210N that was manufactured in 1979. The airplane was configured to seat 4 individuals and had a maximum takeoff weight of 4,000 lbs. The

airplane was equipped with a 310-horsepower Continental TSIO-520-P engine and a 3-blade McCauley propeller. No acrobatic maneuvers, including spins, were approved. The last annual maintenance inspection was conducted on June 1, 2015. The total airframe time at the time of the inspection was 3,329 hours, and the total engine time was 1,035 hours. According to available documentation, the airplane was flown about 28 hours since the last annual inspection.

METEOROLOGICAL INFORMATION

At 0853, the surface weather observation at Lamar, Colorado, located about 30 nautical miles southwest of the accident site, included wind from 160° at 9 knots, variable between 140° and 200°, surface visibility 10 miles, clouds broken 6,500 ft above ground level, temperature 13°C, dew point 6°C, and an altimeter setting of 30.25 inches of mercury.

WRECKAGE AND IMPACT INFORMATION

The airplane impacted an open, harvested agricultural field in a wings-level, flat pitch attitude. The left wing was canted aft and the right wing was canted forward, consistent with the airplane being in a left spin at impact. The tail was bent slightly to the left of the fuselage and the engine was displaced slightly to the right. The fuselage was leaning slightly to the left. The landing gear was found in the retracted position.

The left wing remained attached to the fuselage. It was bent downward at the root and bent upward at the flap/aileron junction where the wing was resting on the ground. There was no leading edge compression damage observed to the left wing. The left flap was in the retracted position. The left main fuel tank was ruptured. There was no fuel in the left wing auxiliary fuel tank.

The right wing remained attached to the fuselage. It was bent downward at the root and bent upward in the middle of the right aileron where the wing was resting on the ground. No leading edge compression damage was observed to the right wing. The right flap was hanging down approximately 10°. Examination of the flap cables indicated the right flap cable was separated near the right wing root. The bottom side of the right wing had oil spray from the wing root extending toward the outboard end of the right flap. The right main fuel tank contained an undetermined amount of fuel. There was no fuel in the right wing auxiliary fuel tank.

The tail was fractured almost completely around its circumference at the dorsal. The rudder and elevators remained attached to the empennage. The rudder balance weight was separated from the top of the rudder and was found on the ground directly below the rudder.

The fuel selector handle was found positioned to the right tank, and the fuel selector valve was found in an intermediate position between RIGHT and OFF. The main fuel gauges indicated that the right tank was greater than 1/2 full and the left tank was full. The fuel strainer assembly was removed and contained about 4 ounces of fuel consistent with 100LL fuel; a sample tested negative for water contamination. The fuel strainer screen was installed properly with a cork gasket.

The airplane's pressurization system controls were on and the cabin pressure was set to 5,000 ft. The pressurization outflow and safety valve were examined. The outflow valve diaphragm was pliable and moved freely. The outflow valve was removed, and the diaphragm was compressed by hand. The pneumatic pressure port was covered to restrict airflow and the diaphragm did not move, which

indicated normal operation. The safety valve was also removed for examination. The electric solenoid on the safety valve was found separated from the valve housing by impact damage. A fragment of the safety valve remained connected to the solenoid threads. The safety valve diaphragm was compressed, and a tear was observed where the solenoid had been installed. The "Overhead Vent Fan" switch was found in the LOW position.

The airplane was equipped with an aftermarket supplemental type certificate inflatable door seal. The cabin "Door Seal Activate" switch was observed to be in the OFF position.

Flight control cable continuity was confirmed from the flight controls to their respective attachment points of the elevator, rudder and ailerons. The flap actuator was found in the 0° position; however, the flap handle and flap indicator were in the 10° position. The elevator trim actuator was found in about a 5° tab up position.

The engine remained partially attached to the airframe by cables and lines; all four engine mount legs were broken. The exhaust and induction systems exhibited impact damage, and the oil sump was crushed upward into the crankcase. The throttle, mixture and propeller control arms moved freely between the mechanical stops. There was no oil spray observed on the top of the engine crankcase or cylinders, and there was no oil spray observed on the underside of the engine cowling.

The top spark plugs were removed, and they exhibited normal wear signatures when compared to the Champion Check-A-Plug chart. The cylinder combustion chambers were examined with a lighted borescope and no anomalies were noted. Drive train continuity and cylinder compression was confirmed on all six cylinders as the crankshaft was rotated by hand. Spark was also observed on all top ignition leads.

The engine accessories were removed from the engine and examined. The oil scavenge pump and engine oil pump were disassembled with no anomalies noted to the gears or cavities. The oil pressure relief valve exhibited signatures of normal operation. The engine-driven fuel pump was removed, and its drive coupling remained intact. The fuel pump turned freely by hand. The engine-driven fuel pump was disassembled with no anomalies noted. The fuel manifold valve was disassembled, and its diaphragm remained intact. The plunger and retaining nut remained secured, and the fuel screen was free of debris. The fuel nozzles were removed and found to be free of contamination. Fuel consistent with 100LL was found in various fuel system components and lines. The fuel was tested for the presence of water using water finding paste; no water contamination was identified. The two vacuum pumps were removed and disassembled with no discrepancies noted. The alternator drive turned freely by hand. The turbocharger remained attached to the exhaust system. The turbocharger compressor rotated freely and was coupled to the turbine wheel. The turbocharger's wastegate and controller exhibited no damage.

The 3-blade propeller remained attached to the crankshaft propeller flange. Examination of the propeller revealed all 3 blades were loose in the hub. The propeller blade marked No. 1 was bent forward about 90° about 6 inches from the hub. The outboard 10 inches of the blade exhibited a slight blade twist. The No. 2 blade exhibited a curved bend in the entire length of the blade. The No. 3 blade was bent slightly forward about 12 inches from the hub and exhibited a curved bend along the remaining length of the blade. All three blades exhibited burnishing of the leading edge; however, none of the blades exhibited nicks, gouges, or chordwise scratching of the blades.

During the onsite examination, a half-full bottle of vodka and numerous prescription and over-the-counter medications were found in the airplane.

Fig 2. View of the front of the airplane and propeller

MEDICAL AND PATHOLOGICAL INFORMATION

The El Paso County Coroner, Colorado Springs, Colorado conducted an autopsy of the pilot. The cause of death was the result of multiple blunt force injuries. Toxicology testing detected ethanol at 0.335 gm/dl in vitreous and 0.291 gm/dl in femoral blood as well as diphenhydramine at less than 0.050 ug/ml and zolpidem at 0.077 ug/ml in femoral blood.

The FAA's Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma, performed toxicology testing and identified ethanol at 0.0332 gm/dl in vitreous and 0.247 gm/dl in cavity blood. In addition, diphenhydramine was detected at levels too low to quantify, zolpidem was found at 0.049 ug/ml, and lorazepam was confirmed at 0.029 ug/ml in cavity blood. Clonidine was detected in liver but not in cavity blood. Ethanol is the type of alcohol present in beer, wine, and liquor. It is a social drug that acts as a central nervous system depressant. After ingestion, at low doses, it impairs judgment,

psychomotor functioning, and vigilance; at higher doses, ethanol can cause coma and death. Generally, the rapid distribution of ethanol throughout the body after ingestion leads to similar levels in different tissues. 14 *CFR* 91 section 17 (a) prohibits any person from acting or attempting to act as a crewmember of a civil aircraft while having 0.040 gm/dl or more alcohol in the blood. The effects of alcohol on aviators are generally well understood; alcohol significantly impairs pilot performance, even at very low levels.

Diphenhydramine is a sedating antihistamine used to treat allergy symptoms and as a sleep aid. It is available over the counter under the names Benadryl and Unisom. Diphenhydramine carries the following FDA warning: may impair mental and/or physical ability required for the performance of potentially hazardous tasks (e.g., driving, operating heavy machinery). Compared to other antihistamines, diphenhydramine causes marked sedation; it is also classed as a central nervous system (CNS) depressant and this is the rationale for its use as a sleep aid. Altered mood and impaired cognitive and psychomotor performance may also be observed. In a driving simulator study, a single dose of diphenhydramine impaired driving ability more than a blood alcohol concentration of 0.10 gm/dl. The range of blood levels in which diphenhydramine is thought to have psychoactive effects is between 0.025 and 0.112 ug/ml.

Zolpidem is a prescription CNS depressant used as a short-acting sleep aid, often sold with the name Ambien. It carries the warning, "Due to the rapid onset of action, zolpidem tartrate should only be taken immediately prior to going to bed. Patients should be cautioned against engaging in hazardous occupations requiring complete mental alertness or motor coordination such as operating machinery or driving a motor vehicle after ingesting the drug, including potential impairment of the performance of such activities that may occur the day following ingestion of zolpidem tartrate. Zolpidem tartrate showed additive effects when combined with alcohol and should not be taken with alcohol. Patients should also be cautioned about possible combined effects with other CNS-depressant drugs." Blood levels where the sedating effects are expected are between 0.025 and 0.30 ug/ml.

Lorazepam is a sedating benzodiazepine that is a Schedule IV controlled substance available by prescription and commonly used to treat anxiety; it is often sold with the name Ativan. It carries this warning, "As with all patients on CNS-depressant drugs, patients receiving lorazepam should be warned not to operate dangerous machinery or motor vehicles and that their tolerance for alcohol and other CNS depressants will be diminished." Blood levels where the sedating effects are expected in living subjects are between 0.16 ug/ml and 0.27 ug/ml.

Clonidine is a prescription blood pressure medication that is not generally considered impairing.

TESTS AND RESEARCH

The propeller manufacturer examined 25 digital photographs of the propeller that were provided by the National Transportation Safety Board's investigator-in-charge. According to the propeller manufacturer, the propeller sustained damage that appeared to be a result of impact and subsequent recovery of the airplane. There were no indications of propeller failure or malfunction before impact. Also, the propeller exhibited damage consistent with low rotational energy absorption during the impact sequence, which generally indicates low to no engine power at impact.

The NTSB Vehicle Recorder Division reviewed an excerpt of an ATC recording. The purpose of the study was to determine what was said in the pilot transmission. The sound wave form and spectral image were examined, and pitch contours identified. Sound was listened to by two different people, one who had no knowledge of the investigative facts. The text identified by the two listeners was "guys want me-to do-a muller." Additionally, the pilot's speech was noted to be markedly slurred.

ADDITIONAL INFORMATION

An aerobatic flight maneuver referred to as the "Muller" Tower, Zwiebelturm, or Spiral Tower, is attributed to Swiss and European aerobatic champion Eric Muller, who is believed to have invented it in 1974. It is an aerobatic maneuver where a pilot begins with a vertical climb, performs an aileron snap roll to the right, does a negative push to level out into horizontal flight at the top of the apogee, and enters a flat spin to the left at full throttle before pitching forward and exiting the maneuver in a dive.

Pilot Information

Certificate:	Private	**Age:**	64,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	3-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	November 2, 2015
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	November 2, 2015
Flight Time:	4205 hours (Total, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	**Registration:**	N6609P
Model/Series:	P210N	**Aircraft Category:**	Airplane
Year of Manufacture:	1978	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	P21000192
Landing Gear Type:	Retractable - Tricycle	**Seats:**	4
Date/Type of Last Inspection:	June 1, 2015 Annual	**Certified Max Gross Wt.:**	4001 lbs
Time Since Last Inspection:	28 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	3345 Hrs at time of accident	**Engine Manufacturer:**	Continental Motors
ELT:	Installed, activated, did not aid in locating accident	**Engine Model/Series:**	TSIO-520-P
Registered Owner:	On file	**Rated Power:**	310 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	LAA,3705 ft msl	**Distance from Accident Site:**	30 Nautical Miles
Observation Time:	08:53 Local	**Direction from Accident Site:**	215°
Lowest Cloud Condition:		**Visibility**	10 miles
Lowest Ceiling:	Broken / 6500 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	9 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	160°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.25 inches Hg	**Temperature/Dew Point:**	13°C / 6°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Rock Springs, WY (RKS)	**Type of Flight Plan Filed:**	VFR
Destination:	Oklahoma City, OK (PWA)	**Type of Clearance:**	VFR on top;VFR flight following
Departure Time:	06:45 Local	**Type of Airspace:**	

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Fatal	**Latitude, Longitude:**	38.494998,-102.29

Administrative Information

Investigator In Charge (IIC):	Silliman, James
Additional Participating Persons:	Brian Neal; FAA Denver FSDO; Denver, CO John Childers; FAA Denver FSDO; Denver, CO Mark Petrosky; FAA Denver FSDO; Denver, CO Peter Basile; Textron; Wichita, KS Chris Lang; Continental Motors; Mobile, AL
Original Publish Date:	January 23, 2018
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=93192