Aviation Investigation Final Report

Location:	Mosca, Colorado	**Accident Number:**	CEN13FA327
Date & Time:	June 8, 2013, 10:50 Local	**Registration:**	N7147R
Aircraft:	Piper PA-28-140	**Aircraft Damage:**	Substantial
Defining Event:	Low altitude operation/event	**Injuries:**	2 Fatal, 1 Serious
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot was attempting to fly over a high-altitude mountain pass. Several witnesses reported seeing the airplane flying at a slow groundspeed, about 150 feet above the terrain, through the mountain pass. These witnesses stated that the airplane's engine sounded as if it was operating normally, but the airplane's wings were banking up and down erratically. One of the airplane's passengers reported that the airplane had encountered very turbulent conditions toward the end of the flight and eventually "fell out the sky." The airplane impacted rising terrain near the summit of the 10,040-foot mountain pass in a near vertical impact consistent with an inflight loss of control and subsequent aerodynamic stall. The postaccident investigation did not identify any anomalies that would have prevented normal operation of the airplane.

A postaccident weather simulation indicated that there was a significant potential for turbulence while operating in and downwind of the mountain pass. Additionally, there were several pilot reports of mountain wave action and light-to-moderate turbulence in the mountainous areas surrounding the accident location. Therefore, it is likely that the airplane experienced turbulence while operating within the mountain pass. Additionally, the density altitude was about 12,000 ft, and this would have negatively affected the airplane's climb performance. The combination of the airplane's diminished climb performance and the turbulence made it unlikely that the airplane would be capable of maintaining clearance from the rising terrain, and the pilot likely lost control of the airplane while attempting to do so.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's failure to maintain airplane control while attempting to clear a mountain pass in turbulent conditions at a high density altitude, which resulted in the airplane exceeding its critical angle-of-attack and experiencing an aerodynamic stall.

Findings

Personnel issues	Aircraft control - Pilot
Aircraft	Angle of attack - Not attained/maintained
Aircraft	Airspeed - Not attained/maintained
Aircraft	Climb rate - Attain/maintain not possible
Environmental issues	High density altitude - Effect on operation
Environmental issues	Mountainous/hilly terrain - Effect on operation
Environmental issues	Terrain induced turbulence - Effect on operation

Factual Information

History of Flight

Enroute	Low altitude operation/event (Defining event)
Enroute	Turbulence encounter
Enroute	Loss of control in flight
Enroute	Aerodynamic stall/spin

On June 8, 2013, about 1050 mountain daylight time, a Piper model PA-28-140 single-engine airplane, N7147R, was substantially damaged during a collision with terrain near the summit of Medano Pass, located within the Great Sand Dunes National Park and Preserve, near Mosca, Colorado. The commercial pilot was fatally injured during the accident. One passenger died on June 18, 2013, while being treated for her injuries sustained during the accident. The other passenger sustained serious injuries. The airplane was registered to and operated by the pilot under the provisions of 14 Code of Federal Regulations Part 91 without a flight plan. Day visual meteorological conditions prevailed for the pleasure flight that departed Monte Vista Municipal Airport (MVI), Monte Vista, Colorado, about 1015, and was en route to Fremont County Airport (1V6), Canon City, Colorado.

The pilot's son reported that he received a brief phone call from his father at 0954, during which his father told him that he was departing shortly for a flight north of the San Luis Valley, to Salida and Canon City. The pilot's son indicated that his father had flown in the mountains for several years and that it was not uncommon for him to use the Medano Pass to cross over the Sangre De Cristo Mountain Range. He indicated that the Medano Pass, situated at 10,040 feet mean sea level, was the lowest mountain pass in the nearby area that allowed passage to the Wet Mountain Valley on the northeast side of the mountain range.

About 1045, several witnesses, who were located at various positions along the Medano Pass Primitive Road, reported seeing the accident airplane flying low above the tree line (about 100-200 feet above the ground) toward the Medano Pass. The witnesses remarked that the engine was operating normally as the airplane passed over their position at a slow ground speed, but the airplane's wings were banking up-and-down erratically. According to available information, there were no witnesses to the airplane impacting terrain. At 1101, a group of hikers notified local law enforcement of the accident after discovering the wreckage near the Medano Lake Trailhead junction.

The front-seat passenger reported that the purpose of the flight was to fly to Canon City where they intended to inspect and purchase a car. The plan was for the two passengers to drive home in the purchased car and that the pilot would fly back to MVI by himself. The passenger reported that he did not remember a majority of the accident flight, and that his memories were limited to boarding the airplane and the moments immediately preceding the accident. He recalled that he was seated in the forward right seat and that the pilot was seated next to him in the forward left seat. His remaining memory of the accident flight was the pilot announcing that the airplane was "going down" presumably in the moments before the accident. The passenger, who held a student pilot certificate, stated that he did

not recall receiving any flight instruction during the accident flight.

The remaining passenger was not formally interviewed before she died of her injuries sustained during the accident. However, the passenger's sister, who had discussed the accident flight with the passenger, was interviewed. The passenger told her sister that the airplane encountered very turbulent conditions toward the end of the flight and that the airplane eventually "fell out the sky." Additionally, the other passenger, who was seated in the forward right seat, had manipulated the flight controls earlier in the flight, but the pilot resumed control of the airplane after it encountered the turbulent conditions toward the end of the flight.

Pilot Information

Certificate:	Commercial; Flight instructor	**Age:**	69,Male
Airplane Rating(s):	Single-engine land; Single-engine sea; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	Lap only
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	Airplane single-engine; Instrument airplane	**Toxicology Performed:**	Yes
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	September 10, 2012
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	(Estimated) 3110 hours (Total, all aircraft)		

Pilot-rated passenger Information

Certificate:	Student	**Age:**	59,Male
Airplane Rating(s):	None	**Seat Occupied:**	Right
Other Aircraft Rating(s):	None	**Restraint Used:**	Lap only
Instrument Rating(s):	None	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	December 19, 2011
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	(Estimated) 41.2 hours (Total, all aircraft)		

Passenger Information

Certificate:		**Age:**	Female
Airplane Rating(s):		**Seat Occupied:**	Left
Other Aircraft Rating(s):		**Restraint Used:**	Lap only
Instrument Rating(s):		**Second Pilot Present:**	Yes
Instructor Rating(s):		**Toxicology Performed:**	No
Medical Certification:		**Last FAA Medical Exam:**	
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:			

--- Pilot ---

According to Federal Aviation Administration (FAA) records, the pilot, age 69, held a commercial pilot certificate with single and multi-engine land airplane, single-engine sea airplane, and instrument airplane ratings. He also held a flight instructor certificate with single-engine land airplane and instrument airplane ratings. His last aviation medical examination was completed on September 10, 2012, when he was issued a third-class medical certificate with a limitation for corrective lenses. A search of FAA records showed no previous accidents, incidents, or enforcement proceedings. A current logbook for the pilot was not located during the investigation; however, on the application for his current medical certificate, the pilot reported having accumulated 3,110 hours of flight experience.

--- Pilot-Rated-Passenger ---

According to FAA records, the pilot-rated-passenger, age 59, held a student pilot certificate. His last aviation medical examination was completed on December 19, 2011, when he was issued a third-class medical certificate with the limitation for corrective lenses. A search of FAA records showed no previous accidents, incidents, or enforcement proceedings. According his pilot logbook, the pilot-rated-passenger had accumulated 41.3 hours of flight time as of the final logbook entry that was dated September 23, 2012. All of the accumulated flight time was logged as dual flight instruction in single-engine land airplanes.

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	**Registration:**	N7147R
Model/Series:	PA-28-140	**Aircraft Category:**	Airplane
Year of Manufacture:	1966	**Amateur Built:**	
Airworthiness Certificate:	Normal; Utility	**Serial Number:**	28-21853
Landing Gear Type:	Tricycle	**Seats:**	4
Date/Type of Last Inspection:	June 1, 2012 Annual	**Certified Max Gross Wt.:**	2150 lbs
Time Since Last Inspection:	14 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	4484.52 Hrs at time of accident	**Engine Manufacturer:**	Lycoming
ELT:	Installed, activated, did not aid in locating accident	**Engine Model/Series:**	O-320-E2A
Registered Owner:	On file	**Rated Power:**	150 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

The accident airplane was a 1966 Piper model PA-28-140, serial number (s/n) 28-21853. The airplane incorporated a low-wing design with a fixed tricycle landing gear. The airplane had a certified maximum gross weight of 2,150 pounds and could seat four occupants. A Lycoming O-320-E2A reciprocating engine, serial number L-16859-27A, powered the airplane. The normally-aspirated, 150-horsepower, engine provided power through a Sensenich 74DM6-0-60, fixed-pitch, two-bladed propeller.

The airplane was issued a Standard Airworthiness Certificate on June 6, 1966. A review of the maintenance records revealed that the airplane had undergone an annual inspection on June 1, 2012, at 4,471 tachometer hours. At the time of the accident, the airframe and engine had accumulated 4,484.5 hours in service. The engine had accumulated 2,017.3 hours since the last overhaul that was completed on January 17, 1992. A review of maintenance documentation did not reveal any unresolved airworthiness issues.

According to the Piper PA-28-140 Owner's Handbook, the accident airplane had a service ceiling of 14,300 feet msl at the maximum gross weight of 2,150 pounds. The airplane performance charts indicated that the density altitude at the time of the accident was about 12,000 feet msl and that an exemplar airplane, operating at maximum continuous power under optimal conditions, could have potentially achieved a climb rate of about 200 feet per minute.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	ALS,7539 ft msl	**Distance from Accident Site:**	37 Nautical Miles
Observation Time:	10:52 Local	**Direction from Accident Site:**	210°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	7 knots /	**Turbulence Type Forecast/Actual:**	/ Terrain-Induced
Wind Direction:	350°	**Turbulence Severity Forecast/Actual:**	/ Moderate
Altimeter Setting:	30.07 inches Hg	**Temperature/Dew Point:**	21°C / 0°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Monte Vista, CO (MVI)	**Type of Flight Plan Filed:**	None
Destination:	Canon City, CO (1V6)	**Type of Clearance:**	None
Departure Time:	10:15 Local	**Type of Airspace:**	Class G

The nearest aviation weather reporting station was located at San Luis Valley Regional Airport (ALS), Alamosa, Colorado, about 37 miles southwest of the accident site. At 1052, the ALS automated surface observing system reported the following weather conditions: wind 350 degrees true at 7 knots, visibility 10 miles, sky clear, temperature 21 degrees Celsius, dew point 0 degrees Celsius, altimeter setting 30.08 inches of mercury.

A review of available weather data established there was a high-pressure center in south-central Colorado, close to the accident location. A cold front was advancing south-westward immediately northeast of the accident location. Station models ahead of the cold front depicted a relatively light and variable wind, with magnitudes on the order of 5-10 knots at many stations. However, behind the cold front, station models depicted the wind from the north-northeast with magnitudes of 15-20 knots or greater. A review of weather radar data did not reveal any significant areas of precipitation in the immediate vicinity of the accident site or along the planned route of flight.

A Weather Research and Forecasting Model simulation was run to estimate wind magnitudes and turbulence in the area of the accident location. The model data estimated the wind was from the west between 20-24 knots. The model also depicted an increase of the horizontal wind vector when moving from west to east across the mountain pass. Additionally, the model indicated a significant potential for turbulence while in and downwind of the mountain pass.

A review of pilot weather reports made within three hours of the accident and within 100 miles of the accident location revealed several reports of mountain wave action and light-to-moderate turbulence.

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 Fatal, 1 Serious	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 Fatal, 1 Serious	**Latitude, Longitude:**	37.850276,-105.435279

An on-scene investigation was completed by representatives with the National Transportation Safety Board, Federal Aviation Administration, National Park Service, and Lycoming Engines. The main wreckage contained all primary structural components and flight control surfaces. The accident site was located at 9,660 feet mean sea level. The lack of any significant tree damage and the absence of a wreckage debris path were consistent with a near vertical impact with the prevailing terrain. The engine was found partially buried in the terrain. There was fuel blight of the ground foliage located in front of the main wreckage. The accident site contained an odor consistent with aviation fuel. Flight control continuity was confirmed from the flight control surfaces to their respective cockpit controls. The flight control cables were subsequently cut to facilitate wreckage movement and recovery. The wing flap selector handle was found engaged in the second position, consistent with the wing flaps being partially extended; however, damage to the flap torque tube prevented an actual measurement of flap extension. Although a handheld GPS device was recovered in the airplane wreckage, a subsequent laboratory examination revealed that it was not configured to record a historical flight track. Additionally, none of the recovered mobile phones contained any relevant information concerning the accident flight.

Engine crankshaft rotation confirmed internal continuity to each engine cylinder, the valve train, and accessory-section gearing. Compression and suction were noted at each cylinder as the engine crankshaft was rotated. The spark plug electrodes exhibited normal burn signatures and coloration. The engine fuel pump outlet line contained a trace amount of fuel. The carburetor exhibited damage consistent with impact. The right magneto provided spark on all leads when rotated with an electric drill. The left magneto was unable to be tested because of impact damage to the distributor cap. The propeller was found located in front of the main wreckage, separated from the engine crankshaft flange. Both propeller blades exhibited leading edge damage, S-shaped bending, and burnishing of the blade backs.

No preimpact anomalies were identified during the on-site investigation that would have prevented normal operation of the airplane.

Medical and Pathological Information

On June 10, 2013, an autopsy was performed on the pilot by the El Paso County Coroner, as authorized by the Saguache County Coroner. The cause of death was attributed to multiple blunt-force injuries to the head, neck, and torso. The FAA's Civil Aerospace Medical Institute (CAMI) located in Oklahoma City, Oklahoma, performed toxicology tests on samples obtained during the autopsy. The toxicological test results were negative for carbon monoxide and

ethanol. The toxicological testing identified Salicylate in urine. Salicylate is a metabolite of aspirin, a non-sedating analgesic.

Survival Aspects

The airplane was equipped with lap belts; however, the accident airplane was not equipped, nor was it required to be equipped, with shoulder belts. Although the pilot was restrained by his lap belt, he sustained head, neck, and torso injuries that were consistent with an unrestrained forward impact into the instrument panel.

Administrative Information

Investigator In Charge (IIC):	Fox, Andrew
Additional Participating Persons:	Thomas E Wiesner; Federal Aviation Administration, Denver FSDO; Denver, IL David Chavez; U.S. Dept. of the Interior, National Park Service; Mosca, CO John Butler; Lycoming Engines; Arlington, TX
Original Publish Date:	February 8, 2016
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=87127