



# National Transportation Safety Board Aviation Accident Final Report

---

<b>Location:</b>	VILLA GROVE, CO	<b>Accident Number:</b>	DEN99FA157
<b>Date &amp; Time:</b>	09/01/1999, 0825 MDT	<b>Registration:</b>	N4366D
<b>Aircraft:</b>	Piper PA-28-181	<b>Aircraft Damage:</b>	Destroyed
<b>Defining Event:</b>		<b>Injuries:</b>	2 Fatal

**Flight Conducted Under:** Part 91: General Aviation - Instructional

---

## Analysis

An FBI pilot, along with two other special agents in separate airplanes, was receiving agency-sponsored mountain flying instruction. His instructor announced that they were going to practice box canyon turnarounds. Shortly thereafter, white smoke was seen coming from the side of the mountain. Evidence indicates the airplane struck tree tops while in a steep left descending turn in what was described as an extremely tight box canyon.

## Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The flight instructor's improper inflight decision to enter a narrow blind/box canyon, and his misjudgment of the vertical and lateral clearances. A factor was the downdrafts.

## Findings

---

Occurrence #1: IN FLIGHT COLLISION WITH TERRAIN/WATER  
Phase of Operation: MANEUVERING - TURN TO REVERSE DIRECTION

### Findings

1. (F) TERRAIN CONDITION - BLIND/BOX CANYON
2. (C) IN-FLIGHT PLANNING/DECISION - IMPROPER - PILOT IN COMMAND(CFI)
3. (C) ALTITUDE/CLEARANCE - MISJUDGED - PILOT IN COMMAND(CFI)
4. (F) WEATHER CONDITION - DOWNDRAFT

## Factual Information

### HISTORY OF FLIGHT

On September 1, 1999, approximately 0825 mountain daylight time, a Piper PA-28-181, N4366D, operated by Colorado Skyways, Inc., of Colorado Springs, Colorado, was destroyed when it collided with mountainous terrain and burned 10 miles northwest of Villa Grove, Colorado. The commercial rated flight instructor and the commercial rated pilot receiving instruction were fatally injured. Visual meteorological conditions prevailed for the instructional flight being conducted under Title 14 CFR Part 91, and a company VFR flight plan had been filed. The flight originated at Colorado Springs approximately 0730.

The investigation revealed that the Federal Bureau of Investigation had contracted with Colorado Skyways to train those special agents who were also pilots in mountain flying techniques. Each week during the months of August and September, training classes of three agents each were conducted (8 weeks, 24 agents). This was the third year Colorado Skyways had provided this training. The company has 10 airplanes in its fleet, including 6 Cessna 172s and a Piper PA-28-181, and employs 5 full time and 6 part time flight instructors. Since it also has a contract with the U.S. Air Force Academy to provide introductory flight training for cadets, only two Cessna 172s were available for FBI use. It was decided that the tallest agent would fly the Piper PA-28-181.

Three special agents arrived in Colorado Springs on Monday, August 30 to begin the fifth mountain flying class of 1999. The next day, they attended 4 hours of ground school that included a briefing for the next day's flight. FBI officials could find no evidence that the special agent had ever flown in a low wing airplane.

The following is based on interviews with the two surviving special agents and their flight instructors. The special agents arrived at the airport approximately 0700 on September 1, and, along with their flight instructors, preflighted and loaded their respective airplanes. One of the instructors obtained a computer printout of the forecast weather. Visual meteorological conditions were expected to prevail, with relatively light surface and winds aloft (7 knots at 9,000 feet, 14 knots at 12,000 feet). A company VFR flight plan was left at the front desk prior to departure.

The three airplanes took off from Colorado Springs Municipal Airport in loose formation approximately 0730, and flew southwestward at 7,500 feet msl (mean sea level), skirting Cheyenne Mountain and the Fort Carson restricted area (R-2601 A&B). The formation then turned and followed the Arkansas River and U.S. Highway 50 to Coaldale (see attached Denver Sectional Chart for the approximate route). The pilots stayed in contact with each other by communicating on CTAF (common traffic advisory frequency) 122.75 MHz.

At Coaldale, the airplanes turned west and entered Hayden Pass (summit 10,709 feet msl). As they approached the pass, standing lenticular clouds were noted to the northwest. It was decided that they would climb to a higher altitude, utilizing thermals for additional lift. N4366D, the Piper PA-28-181, crossed the pass first at an altitude of 11,800 feet msl, followed by N96319 and N97890 at 11,300 feet msl. The wind was said to be light and the air smooth. There were high scattered clouds. The time was between 0815 and 0820.

The formation turned north towards Salida, Colorado. The instructor aboard the lead airplane, the PA-28-181 (N4366D), announced that he and his student were going to practice box

canyon turnarounds. The other instructors followed suit and demonstrated to their students the emergency procedure for egress from a box canyon. As the maneuvers were being performed, white smoke was seen coming from the side of a mountain about 700 or 800 feet below its summit. Repeated radio calls to N4366D went unanswered. While one airplane circled the area, the other airplane flew to Salida to see if N4366D had landed there. It was determined it had not.

The pilot of a U.S. West helicopter overheard the radio conversation and offered his assistance. The helicopter was led to the site and made a low pass over the fire. The pilot reported seeing aircraft parts. He later described the canyon as being "tight." Shortly after 0900, a "Mayday" message was broadcast of frequency 121.5 MHz. An airliner heard the call, and passed the information to FAA's (Denver) air route traffic control center (ARTCC), who in turn notified search and rescue authorities.

According to the Saguache County Sheriff's Office, a report of a forest fire on Hunters Peak, south of Dorsey Creek, was logged at 0827. The first report of a possible aircraft accident was received at 0907. Sheriff's deputies also took two statements (attached as EXHIBITS to this report) from hunters in the area who purportedly saw an airplane and heard a crash. The times given did not coincide with the time of the accident.

The accident occurred during the hours of daylight at a location of 38 degrees, 23.551 minutes north latitude, and 105 degrees, 57.853 minutes west longitude, or 9.6 miles on a 145 degree bearing from the Salida airport.

#### PERSONNEL INFORMATION

The flight instructor and pilot-in-command was seated in the right front seat of the airplane. Born on July 12, 1942, he was 57 years old. He held a commercial pilot certificate with airplane single, multiengine, and instrument ratings. He also held a flight instructor certificate with airplane single engine and instrument ratings. His second class airman medical certificate, dated February 22, 1999, contained the limitation, "Holder shall wear corrective lenses." He also possessed documentation indicating he had received physiological (altitude chamber) training at Edwards Air Force Base, California, on August 13, 1996.

According to Colorado Skyways, the pilot relocated to Colorado Springs, from Riverside, California. He was interviewed in February and hired in April 1999. He received a Part 141 standardization check in a Cessna 172 on April 23, 1999. He received airplane checkouts in the Piper PA-28-181 on May 12, 1999, and the Cessna TR182 on June 3, 1999. His last biennial flight review was accomplished in May 1998, and his most recent instrument competency check was done in March 1999. Although his logbook was never located, company records indicate he had logged 2,858 total flight hours, of which 1,835 were as a flight instructor.

The pilot receiving instruction was seated in the left front seat of the airplane. Born on October 14, 1959, he was 39 years old. He held a commercial pilot certificate with airplane single engine land, rotorcraft-helicopter, and instrument ratings in both airplanes and helicopters. His second class airman medical certificate, dated March 23, 1999, contained no limitations or restrictions. Although his logbook was never located, FBI records indicate he had logged approximately 2,500 total flight hours, of which 1,883 hours were accrued in U.S. Army helicopters, and 617 hours were accrued in single engine civilian airplanes.

#### AIRCRAFT INFORMATION

N4366D, a model PA-28-181 (s/n 28-8490088), was manufactured by the Piper Aircraft Corporation in December 1984. It was equipped with a Textron Lycoming O-360-A4M engine (s/n L-27490-36A), rated at 180 horsepower, and a Sensenich 2-blade, all metal, fixed pitch propeller (m/n 76ERM8S5-0-60).

According to the airplane maintenance records, the last 100-hour, annual, and 50-hour inspections were accomplished on February 11, July 9, and August 20, 1999, respectively. At the time of the latter inspection, the airframe and engine had accrued a total time in service of 8,325.3 hours, and 7,751.2 hours (524.8 hours since major overhaul), respectively. The engine had been overhauled on November 21, 1997.

#### METEOROLOGICAL INFORMATION

Harriet Alexander Field, located 2 miles west of Salida, is about 10 miles northwest of the accident site. Although there is no weather observer or automated weather observation station at the airport, the city did install a device that records barometric pressure; temperature, dew point, and humidity; wind direction and velocity; computed wind chill; and precipitation rate and amount. Readings taken at the approximate time of the accident are attached to this report (see EXHIBITS). According to the National Weather Service, visual meteorological conditions prevailed throughout the state of Colorado.

While circling the wreckage, one of the Cessna pilots noted the smoke would rise, then bend and travel down the mountainside. He attributed this to "significant downdrafts."

The helicopter pilot said that the wind was from the southeast and as he entered the canyon, and he encountered "severe downdrafts" on the east or right side of the canyon. Asked what he meant by "severe," the pilot said he was flying at 60 knots and using 80 to 90 percent torque, and was still sinking 700 feet per minute. He also said the sun had been in his eyes.

#### WRECKAGE AND IMPACT INFORMATION

The on-scene investigation commenced on September 1 and terminated on September 2.

The airplane collided with 40-foot trees on the south wall of Hunters Peak at the 11,700-foot level (summit elevation approximately 12,600 feet). The swath angle at the tree tops was between 45 and 60 degrees. The site was a few hundred feet from the top of the tree line, and on a 45 degree slope that was strewn with rocks. Rescuers described the area as "a tight canyon." A 400 foot swath, aligned on a magnetic heading of 270 degrees, was cut through the trees and terminated at the separated engine. The main body of wreckage rotated 90 degrees and came to rest on a magnetic heading of 180 degrees. It was still smoldering when examined.

All major aircraft components were accounted for. The forward and center sections of the fuselage were destroyed by fire. The right wing was separated in two pieces. The inboard section was destroyed by fire and was partially in a molten state. The flap and landing gear remained attached. The outboard wing leading edge bore damage consistent with a tree impact. The aileron remained attached. The left wing was sheared off at the root, consistent with tree impact. Its landing gear was located about 500 feet downhill. Both the aileron and flap remained attached. The tail section was destroyed by fire. Nine threads were exposed on the stabilator trim drum. According to the New Piper Aircraft Corporation, 0 threads is equivalent to full nose down (tab up) trim position, 5 threads is equivalent to a neutral trim position, and 16 threads is equivalent to a full nose up (tab down) trim position. Control cable

continuity was established.

The propeller remained attached to the engine. Both blades were bent aft. One blade was curled forward slightly at the tip. Both blade leading edges were gouged, and bore chordwise scratches on the cambered surfaces.

#### MEDICAL AND PATHOLOGICAL INFORMATION

Autopsies were performed on both pilots (99A-346; 99A-347) by the El Paso County Coroner's Office, Dr. Deborah G. Johnson, prosector.

Toxicological screening was performed by FAA's Civil Aeromedical Institute (CAMI) in Oklahoma City, Oklahoma. According to CAMI's reports (9900222001, 9900222002), no carbon monoxide or cyanide were detected in blood specimens and no ethanol or drugs were detected in urine specimens. A carbon monoxide screen was not performed on the pilot receiving instruction.

#### TESTS AND RESEARCH

The wreckage was airlifted from the accident site and transported to the facilities of Beegles Aircraft Service, Greeley, Colorado, where, on October 20, 1999, the engine was disassembled and examined. The mixture lever was in the midrange position, and the throttle lever was beyond the broken idle stop position. Valve and gear train continuity was established. Crankshaft rotation produced compression in all four cylinders. Both magnetos sparked during hand rotation. Spark plug electrode wear was normal. The vacuum pump rotor, vanes, and coupler were intact.

#### ADDITIONAL DATA/INFORMATION

The two surviving instructors were asked to describe the egress procedures that are taught to students for turning around in box canyons. The first method involved a descending 60 degree bank, with about 10 degrees of flaps deployed. The second method was basically a chandelle, i.e. a 180 degree steep climbing turn. The third method was the "wing over," a crop duster maneuver used to reverse direction in a short distance. It involves pulling the nose of the airplane up to a steep angle then, just before the stall, applying full rudder to reverse direction.

The FBI interviewed one of its special agents who had flown with the accident instructor in N4366D during the previous course. He said the instructor asked him to perform a box canyon turnaround, and talked him through the first method described above. They dove out of the canyon approximately 100 to 200 feet above the ground following the sloping terrain away from the mountain. The instructor then talked him through the third method described above. He said the nose was pitched up 20 degrees to diminish airspeed, then left aileron and right rudder were used to reverse the direction. The maneuver failed and confused him. He asked the instructor to demonstrate the maneuver. Although the instructor was successful in performing the maneuver, the student was still confused because the control inputs seemed to invite a cross-control stall.

The instructor was described by coworkers and former students as being competent, conservative, and conscientious, but whose "situational awareness was a little weak." Asked to elaborate, it was pointed out that the accident had occurred in an extremely narrow canyon, described to be approximately 3/4-mile wide.

In addition to the Federal Aviation Administration, parties to the investigation included the

Federal Bureau of Investigation, the New Piper Aircraft Corporation, and Textron Lycoming. The wreckage was released to a representative of the insurance company on July 16, 1999.

### Pilot Information

<b>Certificate:</b>	Flight Instructor; Commercial	<b>Age:</b>	57, Male
<b>Airplane Rating(s):</b>	Multi-engine Land; Single-engine Land	<b>Seat Occupied:</b>	Right
<b>Other Aircraft Rating(s):</b>	None	<b>Restraint Used:</b>	
<b>Instrument Rating(s):</b>	Airplane	<b>Second Pilot Present:</b>	Yes
<b>Instructor Rating(s):</b>	Airplane Single-engine; Instrument Airplane	<b>Toxicology Performed:</b>	Yes
<b>Medical Certification:</b>	Class 2 Valid Medical--w/ waivers/lim.	<b>Last FAA Medical Exam:</b>	02/22/1999
<b>Occupational Pilot:</b>		<b>Last Flight Review or Equivalent:</b>	
<b>Flight Time:</b>	2858 hours (Total, all aircraft), 2581 hours (Pilot In Command, all aircraft)		

### Aircraft and Owner/Operator Information

<b>Aircraft Make:</b>	Piper	<b>Registration:</b>	N4366D
<b>Model/Series:</b>	PA-28-181 PA-28-181	<b>Aircraft Category:</b>	Airplane
<b>Year of Manufacture:</b>		<b>Amateur Built:</b>	No
<b>Airworthiness Certificate:</b>	Normal	<b>Serial Number:</b>	28-8490088
<b>Landing Gear Type:</b>	Tricycle	<b>Seats:</b>	4
<b>Date/Type of Last Inspection:</b>	07/09/1999, Annual	<b>Certified Max Gross Wt.:</b>	2550 lbs
<b>Time Since Last Inspection:</b>		<b>Engines:</b>	1 Reciprocating
<b>Airframe Total Time:</b>	8271 Hours	<b>Engine Manufacturer:</b>	Lycoming
<b>ELT:</b>	Installed, not activated	<b>Engine Model/Series:</b>	O-360-A4M
<b>Registered Owner:</b>	DEBALCO ENTERPRISES, INC	<b>Rated Power:</b>	180 hp
<b>Operator:</b>	COLORADO SKYWAYS	<b>Operating Certificate(s) Held:</b>	None
<b>Operator Does Business As:</b>	AEROLEASE COMPANY	<b>Operator Designator Code:</b>	

## Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	Day
Observation Facility, Elevation:	OV2, 7489 ft msl	Distance from Accident Site:	0 Nautical Miles
Observation Time:	0820 MDT	Direction from Accident Site:	0°
Lowest Cloud Condition:	Unknown / 0 ft agl	Visibility	0 Miles
Lowest Ceiling:	Unknown / 0 ft agl	Visibility (RVR):	0 ft
Wind Speed/Gusts:	2 knots /	Turbulence Type Forecast/Actual:	/
Wind Direction:	350°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	29 inches Hg	Temperature/Dew Point:	13° C / -4° C
Precipitation and Obscuration:			
Departure Point:	COLO. SPRINGS, CO (COS)	Type of Flight Plan Filed:	Company VFR
Destination:	SALIDA, CO (OV2)	Type of Clearance:	None
Departure Time:	0730 MDT	Type of Airspace:	Class G

## Wreckage and Impact Information

Crew Injuries:	2 Fatal	Aircraft Damage:	Destroyed
Passenger Injuries:	N/A	Aircraft Fire:	On-Ground
Ground Injuries:	N/A	Aircraft Explosion:	Unknown
Total Injuries:	2 Fatal	Latitude, Longitude:	

## Administrative Information

Investigator In Charge (IIC):	ARNOLD W SCOTT	Report Date:	11/02/2000
Additional Participating Persons:	MICHAEL F DAVEY; DENVER, CO		
Publish Date:			
Investigation Docket:	NTSB accident and incident dockets serve as permanent archival information for the NTSB's investigations. Dockets released prior to June 1, 2009 are publicly available from the NTSB's Record Management Division at <a href="mailto:pubinquiry@ntsb.gov">pubinquiry@ntsb.gov</a> , or at 800-877-6799. Dockets released after this date are available at <a href="http://dms.nts.gov/pubdms/">http://dms.nts.gov/pubdms/</a> .		

The National Transportation Safety Board (NTSB), established in 1967, is an independent federal agency mandated by Congress through the Independent Safety Board Act of 1974 to investigate transportation accidents, determine the probable causes of the accidents, issue safety recommendations, study transportation safety issues, and evaluate the safety effectiveness of government agencies involved in transportation. The NTSB makes public its actions and decisions through accident reports, safety studies, special investigation reports, safety recommendations, and statistical reviews.

The Independent Safety Board Act, as codified at 49 U.S.C. Section 1154(b), precludes the admission into evidence or use of any part of an NTSB report related to an incident or accident in a civil action for damages resulting from a matter mentioned in the report. A factual report that may be admissible under 49 U.S.C. § 1154(b) is available [here](#).