Aviation Investigation Final Report

Location:	Big Timber, Montana	**Accident Number:**	SEA06FA126
Date & Time:	June 24, 2006, 14:20 Local	**Registration:**	N768H
Aircraft:	Pilatus PC-12/47	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	2 Fatal
Flight Conducted Under:	Part 91: General aviation - Instructional		

Analysis

The private pilot receiving instruction and his flight instructor departed on runway 06 with a headwind of 17 knots gusting to 23 knots. Witnesses said that the pilot had transmitted on Common Traffic Advisor Frequency the intention of practicing a loss of engine power after takeoff, and turning 180 degrees to return to the airport. Another witness said that the airplane pitched up 30 degrees while simultaneously banking hard to the right in an uncoordinated manner. He said that as the airplane rolled to the right, the nose of the airplane yawed down to nearly 45 degrees below the horizon. Subsequently, the airplane's wings rolled level, but the aircraft was still pitched nose down. He said the airplane appeared to be recovering from its dive. A witness said that the airplane appeared to be in a landing flare when he observed dirt and grass flying up behind the aircraft. He said the airplane's right wing tip and engine impacted terrain, and a fire ensued that consumed the airplane. Examination of the accident site revealed that the airplane's right wingtip hit a 10 inch in diameter rock and immediately impacted a wire fence 10 inches above the ground. Approximately 120 feet of triple wire fence continued with the airplane to the point of rest. No preimpact engine or airframe anomalies which might have affected the airplane's performance were identified. The weight and balance was computed for the accident airplane at the time of the accident and the center of gravity was determined to be approximately one inch forward of the forward limit.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The flight instructor's failure to maintain an adequate airspeed while maneuvering, which led to an inadvertent stall.

Findings

Occurrence #1: LOSS OF CONTROL - IN FLIGHT
Phase of Operation: MANEUVERING - TURN TO REVERSE DIRECTION

Findings
1. EMERGENCY PROCEDURE - SIMULATED
2. AIRCRAFT WEIGHT AND BALANCE - EXCEEDED - FLIGHTCREW
3. (C) AIRSPEED - NOT MAINTAINED - PILOT IN COMMAND(CFI)
4. (C) STALL/MUSH - INADVERTENT - PILOT IN COMMAND(CFI)

Occurrence #2: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: DESCENT - UNCONTROLLED

Findings
5. TERRAIN CONDITION - ROUGH/UNEVEN
6. OBJECT - FENCE

Factual Information

HISTORY OF FLIGHT

On June 24, 2006, at 1420 mountain daylight time, a Pilatus PC-12/47, N768H, was destroyed when it impacted terrain following a loss of aircraft control after takeoff from Big Timber Airport (6S0; elevation 4,492 feet), Big Timber, Montana. The airline transport pilot/flight instructor and private pilot receiving instruction were fatally injured. The private pilot/owner was operating the airplane under Title 14 CFR Part 91. Visual meteorological conditions prevailed for the local, instructional flight which was originating at the time of the accident. A flight plan had not been filed.

On the morning of the accident, the private pilot departed Big Timber, Montana, at an undetermined time. According to Billings, Montana, Air Traffic Control (ATC), the airplane landed at Billings at 0929. A witness at the Billings terminal observed the flight instructor and private pilot together at a table talking "for some time." At 1135, Billing's ATC cleared the airplane for takeoff, and the first radar contact was recorded at 1137. Billing's ATC reported that the airplane stayed in the traffic pattern for about 30 minutes before it headed north towards Lavina, Montana (elevation 3,490 feet). At approximately 1217, the airplane was observed, on radar, to make a "very rapid descent" towards the runway at Lavina, from approximately 12,000 feet. (Another PC-12 flight instructor said this event matched the profile of a practice emergency descent training, for example, cabin depressurization). ATC reported that radar contact was lost for approximately 3 minutes; when radar contact was reacquired, the aircraft was approximately 4 nautical miles (nm) west of the Lavina airport. ATC said that the aircraft continued southwest (towards Big Timber), and their last radar contact was at 1226.

Airport personnel at Big Timber reported "topping" the fuel tanks of the accident airplane with 173 gallons of Jet A fuel. The private pilot told ramp personnel at Big Timber that he was preparing to fly to Paine Field, Everett, Washington, with his family and his flight instructor. At approximately 1415, three witnesses flying over Big Timber heard the transmission, from the accident airplane on Common Traffic Advisory Frequency (CTAF), that they planned to do an engine failure on take-off with a planned 180 degree turn back to the field. Two of the witnesses watched the airplane depart on runway 06.

Another witness, driving north in the valley below the airport, said: "The aircraft began to increase its climb and simultaneously bank hard to the right with the nose up approximately 30 degrees while in the turn. The turn appeared to be uncoordinated, and the aircraft rolled to the right, as [the] right wing dipped aggressively. Most of the wing surface could be seen from my position. The nose of the aircraft yawed down to nearly -45 degrees, and while losing altitude the aircraft began to roll level but was still pitched down at a steep angle and accelerating."

The witness said "the aircraft seemed to be recovering, but the elevation of the adjacent ridge was rising rapidly in relation to the aircraft's direction. At the last few seconds, the aircraft was able to pitch up in what appeared to be a landing flare." He said that he saw dirt and grass flying up behind the aircraft just prior to the airplane's right wing tip and engine impacting terrain. Post impact fire consumed the airplane.

PERSONNEL INFORMATION

The flight instructor's most recent Federal Aviation Administration (FAA) flight medical exam (first class) was on August 8, 2005, and at that time he reported on his application that he had 3,200 hours of flight experience. He had previously been employed as a pilot for Pilatus Aircraft LTD, and he was currently assigned to the 931st Air Refueling Group, Air Force Reserve Command, McConnell Air Force Base, Kansas.

The private pilot receiving instruction reported on an insurance application for the accident airplane, dated June 10, 2006, that he had 725 hours of total flight experience and 140 hours in make and model. His last FAA flight medical was a third class, and it was performed on June 2, 2005. The private pilot owned and flew a Beechcraft Bonanza B36TC for three years, before he purchased the accident airplane in June 2006. He had successfully completed a Pilatus PC-12 Initial training with SimCom Training Centers, Scottsdale, Arizona, on July 3, 2004.

The private pilot had successfully taken a FAA mandated flight review, with another flight instructor, on March 20, 2006. That flight instructor said that the private pilot had requested flight training for his commercial certificate in his Bonanza; they flew 10 training flights from March 2006 thru May 2006. He said "the training was progressing smoothly." He said that he found the private pilot "to be a very careful and proficient pilot--he was always well prepared for each lesson." The flight instructor said this training included about 10 to 12 "power-off 180 degree accuracy approach and landing maneuvers from 1,000 feet AGL [above ground level]."

AIRCRAFT INFORMATION

The airplane was a pressurized, single engine, propeller-driven, eight seat airplane, which was manufactured by Pilatus Aircraft Ltd., in May 2006. The airplane had a maximum takeoff gross weight of 10,450 pounds. It was powered by a Pratt & Whitney Canada PT6A-67B, turbo shaft engine, which had a maximum takeoff rating of 1,200 horsepower. The airplane had approximately 41 hours of flight time at the time of the accident. The aircraft's maximum fuel capacity was 406 gallons; the engine's maximum takeoff fuel consumption rate was approximately 88 gallons per hour and high cruise fuel consumption rate was approximately 56 gallons per hour.

The airplane's Pilot Owner's Handbook states the following: that the normal takeoff in the airplane is accomplished with 15 degrees of flaps, rotates at 81 knots, and climbs out at best angle (Vx) of 110 knots or best rate (Vy) of 120 knots. Takeoff flaps take 17 to 20 seconds to

retract; this reduces dramatic pitch changes during climb out. The airplane's wing level stall speed (defined by pusher activation) changes during a 15 degree flap retraction from 76 knots to 91 knots. If the airplane is banked 45 degrees, with flaps up, the stall speed increases approximately 19 knots, to 110 Knots indicated.

The accident airplane was the improved PC-12, or the PC-12/47. According to the manufacturer, one of the changes made were the addition of aileron tabs, which reduced the control forces required to manipulate the ailerons. The private pilot had flown the airplane from Paine Field, Everett, Washington, on June 20, 2006, to Big Timber, Montana. He had family and another flight instructor onboard. That flight instructor said of the airplane, "it flew extremely well."

An aircraft manufacture's representative computed a weight and balance for the accident airplane at the time of the accident. He used the delivery documentation, full fuel minus 50 pounds for initial operations, 50 pounds for various personal and cargo items, and the 2 pilots (their weights were retrieved from their FAA medical data). The airplane was determined to be approximately one inch forward of its center of gravity limitation.

METEOROLOGICAL INFORMATION

At 1353, the weather conditions at Mission Field, Livingston, Montana (elevation 4,660 feet), 230 degrees for 20 nautical miles (nm) from the accident site, were as follows: wind 060 degrees at 17 knots, gusting to 23 knots; visibility 10 statue miles; cloud conditions clear; temperature 73 degrees Fahrenheit; dew point 43 degrees Fahrenheit; altimeter setting 30.41 inches.

AIRPORT INFORMATION

The Big Timber Airport, Big Timber, Montana, is not serviced by a control tower. The airport has two runways: 06-24 which is 5,287 feet long and 75 feet wide; 18-36 which is 4,000 feet long and 100 feet wide. Runway 06, the runway used by the accident aircraft, is asphalt, in good condition. The airport is serviced by a CTAF of 122.8 MHz.

WRECKAGE AND IMPACT INFORMATION

The airplane was found (N45 degrees, 48 minutes, 28 seconds; W109 degrees, 55 minutes, 54 seconds; elevation 4,309 feet) in an open field with rising terrain. The longitudinal orientation of the ground scar leading to the main wreckage was 205 degrees magnetic; it extended for approximately 1,200 feet. All of the airplane's major components were accounted for at the accident site.

The point of initial impact (POII) was with a 10 inch in diameter rock which had been dislodged from the ground. Next to it was a single lightning diverter strip, from the right wing tip radome. Approximately 5 to 10 feet further, a triple wire fence was impacted. One of the fence's steel t-

posts was laying on the ground, and it had been deformed to match the profile of a wing leading edge; no wires were attached to it. At POII plus 35 feet, a piece of the right wing's flap support arm was found, and 20 feet further was the right wing's pitot tube mast. At POII plus 77 feet, a 3 foot piece of the right outboard wing tip was located, which had been cleanly separated from the wing. This piece of wreckage included the radome housing, with a matching length of right aileron and servo tab.

On rising terrain, at 205 feet from POII, were 3 distinct swaths of cut/sheared grass, 10 to 45 feet in length, with multiple shallow ground scars aligned with the accident site. At POII plus 511 to 531 feet, several propeller slashes were identified, one of which contained yellow paint matching the propeller blade's tips. At approximately 25 feet and narrowing to 8 feet to the right of the propeller slashes, starting approximately 20 feet before the propeller slashes, was a 30 foot long ground scar. This was where the charred-ground initiated, and continued for approximately 600 feet to the remains of the fuselage. The first piece of the main spar was found at POII plus 546 feet.

The physical evidence at the accident site revealed that the airplane's right wing impacted a fence post approximately 10 inches above the ground, and approximately 120 feet of fence continued with the airplane. There were pieces/sections of wire fencing throughout the debris field and in the main fuselage burned wreckage.

Due to the airplane's impact and thermal damage, flight control continuity could not be confirmed. Most of the cockpit instrumentation, and flight and power controls were damaged beyond documentation. All four flap jackscrew actuators were confirmed to be in the fully retracted position. On June 27, 2006, at Belgrade, Montana, the engine was examined externally, and disassembled for internal examination. Additionally, the fuel control unit (FCU) and fuel pump were sent to Pratt & Whitney Canada for testing and disassembly, which took place on August 1, 2006. Subsequently, on September 22, 2006, Woodward Governor Company, Rockford, Illinois, tested and documented the FCU's Bellows assembly and CDP (compressor discharge pressure) rod guide assembly. No preimpact engine or airframe anomalies, which might have affected the airplane's performance, were identified.

MEDICAL AND PATHOLOGICAL INFORMATION

The Sweet Grass Coroner, from Big Timber, Montana, ordered autopsies to be performed on both pilots. They were completed on June 26, 2006, by Forensic Medicine and Pathology, PLLC, Billings, Montana.

The FAA's Civil Aeromedical Institute (CAMI) in Oklahoma City, Oklahoma, performed toxicology tests on both pilots with negative results.

ADDITIONAL INFORMATION

The aircraft wreckage was released to a representative of the owner's insurance company on

November 6, 2006.

Flight instructor Information

Certificate:	Airline transport; Commercial; Flight instructor; Private	**Age:**	31,Male
Airplane Rating(s):	Single-engine land; Single-engine sea; Multi-engine land	**Seat Occupied:**	Right
Other Aircraft Rating(s):	Glider	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	Airplane single-engine; Instrument airplane	**Toxicology Performed:**	Yes
Medical Certification:		**Last FAA Medical Exam:**	August 1, 2006
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	
Flight Time:	3200 hours (Total, all aircraft), 1 hours (Last 24 hours, all aircraft)		

Information

Certificate:	Private	**Age:**	54,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	Airplane single-engine	**Toxicology Performed:**	Yes
Medical Certification:		**Last FAA Medical Exam:**	June 1, 2005
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	March 1, 2006
Flight Time:	725 hours (Total, all aircraft), 140 hours (Total, this make and model), 1 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Pilatus	**Registration:**	N768H
Model/Series:	PC-12/47	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	716
Landing Gear Type:	Retractable - Tricycle	**Seats:**	8
Date/Type of Last Inspection:	June 1, 2006 Annual	**Certified Max Gross Wt.:**	10450 lbs
Time Since Last Inspection:		**Engines:**	1 Turbo prop
Airframe Total Time:	41 Hrs at time of accident	**Engine Manufacturer:**	Pratt & Whitney
ELT:	Installed, not activated	**Engine Model/Series:**	PT6A-67B
Registered Owner:	Jeffery M. Harbers	**Rated Power:**	1200 Horsepower
Operator:		**Operating Certificate(s) Held:**	None
Operator Does Business As:	JMH Capital LLC	**Operator Designator Code:**	

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	LVM,4660 ft msl	**Distance from Accident Site:**	20 Nautical Miles
Observation Time:	13:53 Local	**Direction from Accident Site:**	230°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	17 knots / 23 knots	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	60°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.4 inches Hg	**Temperature/Dew Point:**	23°C / 6°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Big Timber, MT (6SO)	**Type of Flight Plan Filed:**	None
Destination:	(6SO)	**Type of Clearance:**	None
Departure Time:	14:22 Local	**Type of Airspace:**	

Wreckage and Impact Information

Crew Injuries:	2 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:		**Aircraft Fire:**	On-ground
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 Fatal	**Latitude, Longitude:**	45.807498,-109.931663

Administrative Information

Investigator In Charge (IIC):	Struhsaker, James
Additional Participating Persons:	Tim W Markle; FAA FSDO; Helena, MT
Original Publish Date:	April 25, 2007
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=63973

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