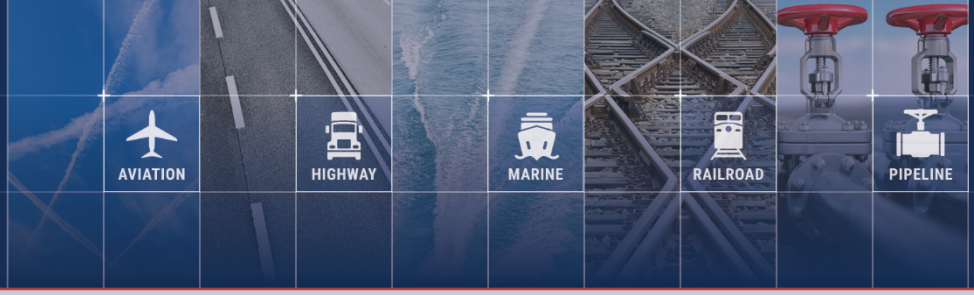

Aviation Investigation Final Report

Location:	Tolar, Texas	**Accident Number:**	CEN10FA392
Date & Time:	July 13, 2010, 21:30 Local	**Registration:**	N5827S
Aircraft:	Beech 35C33	**Aircraft Damage:**	Substantial
Defining Event:	Loss of control in flight	**Injuries:**	3 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot and the two passengers departed on a cross country flight on a dark, moonless night over a rural area. Approximately 10 minutes after they departed, the airplane was observed in a descending spiral over a hay field. The last 50 seconds of recorded GPS data and the witness's description of the maneuvers before the crash, were consistent with the pilot experiencing a vestibular illusion, which resulted in a spiral from which he was unable to recover. Although toxicology testing detected very low levels of a marijuana metabolite in the blood, it was consistent only with use of the substance in the days or weeks preceding the accident, and not suggestive of impairment at the time of the accident. A postaccident examination of the airplane and the engine revealed no preimpact mechanical deficiencies.

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 control of the airplane while maneuvering at night over a rural area, due to spatial disorientation.

Findings

Personnel issues	(general) - Pilot
Personnel issues	Vestibular function - Pilot
Environmental issues	Dark - Contributed to outcome

Factual Information

History of Flight

Enroute-cruise	Loss of control in flight (Defining event)

HISTORY OF FLIGHT

On July 13, 2010, approximately 2130 central daylight time, N5827S, a single-engine Beechcraft BE-35-C33, sustained substantial damage after colliding with terrain in Tolar, Texas. The commercial rated pilot and the two passengers were fatally injured. The airplane was registered to and operated by the pilot. Night visual meteorological conditions prevailed for the flight that departed Clark Municipal Airport (SEP), Stephenville, Texas, around 2120, destined for Arlington Municipal Airport (GKY), Arlington, Texas. No flight plan was filed for the personal flight conducted under 14 Code of Federal Regulations Part 91.

Prior to departure, the pilot purchased 29.8 gallons of fuel. Then, he and the two passengers departed Arlington around 1920 and flew to Stephenville to have dinner at a barbecue restaurant located near the airport. They were on their way home when the accident occurred.

A review of radar data revealed a target emitting a visual flight rules Mode C beacon code traveling on a northeasterly heading from the Stephenville Airport between 2125 and 2128 at an average altitude of 3,400 feet before the data ended at 2128:36. The last radar return was received at 32 degrees, 20 minutes north latitude and 097 degrees, 55 minutes west longitude at an altitude of 3,400 feet.

A Garmin GPSMAP 295 hand held unit was found in the wreckage and was sent to the Safety Board's flight recorder laboratory in Washington DC where it was successfully downloaded. The unit contained flights between June 26, 2010 and July 13, 2010. The last two flights, which included the flight from Arlington to Stephenville and the return flight back to Arlington, were reviewed.

The flight departed Arlington approximately 1920 and flew a relatively direct flight to Stephenville. The airplane did not circle over any areas, and the only maneuvering observed was when it entered the traffic pattern at the Stephenville Airport and landed approximately 1957.

The airplane departed Stephenville approximately 2120 and proceeded northeast toward Arlington. Between 2125:53 and 2128:03, the airplane maintained an approximate heading of 066 degrees and an average altitude of 3,700 feet. At 2128:03, the airplane entered a right turn to 073 degrees that lasted approximately 11 seconds. At 2128:14, the airplane turned turn left to 049 degrees before entering another right turn at 2128:21. This time, the airplane continued

to turn right and descend before the GPS stopped recording for unknown reasons at 2128:53. The last return was received at 32 degrees 20 minutes north latitude and 097 degrees, 54 minutes west longitude, at an altitude of 3,251 feet on a heading of 312 degrees.

A witness, who was standing in his front yard, saw the airplane flying low (about 600 feet above the ground) over trees located on the backside of his property. He said it was 2130 and it was very dark outside, but the airplane had its lights turned on. He could tell it was circling over the hay field adjacent to the treeline in a clockwise direction before it widened out the turn and suddenly "nose dived" straight into the ground. The witness said the airplane's wings were almost vertical to the ground right before impact and the engine sounded as if the pilot was pumping the throttle.

According to the United States Naval Observatory, only 5 percent of the Moon's visibile disk was illuminated. The end of civil twilight was 2108.

PERSONNEL INFORMATION

The pilot held a commercial certificate for airplane single and multi-engine land, and instrument airplane. He also held a certified flight instructor rating for airplane single and multi-engine land, and instrument airplane. His last Federal Aviation Administration (FAA) second class medical was issued on November 3, 2005. The pilot's personal logbook(s) were never located. However, the pilot was employed as a full-time flight instructor and his employer reported that he had accumulated approximately 1,830 total flight hours. It could not be determined how much flight time the pilot had in the accident airplane or how much (or how recent) his experience was flying at night.

METEOROLOGICAL INFORMATION

Weather reported at Granbury Regional Airport (GDJ), Granbury, Texas, about 7 miles northeast of the accident site, at 2144, was reported as wind from 130 degrees at 7 knots, visibility 10 miles, clear skies, temperature 31 degrees Celsius, dewpoint 23 degrees Celsius, and a barometric pressure setting of 29.88 inches of Mercury.

WRECKAGE AND IMPACT INFORMATION

An on-scene examination of the airplane was conducted on July 14, 2010. The airplane impacted terrain in a 100 acre hay field on a southerly heading approximately 32 degrees, 20 minutes north latitude and 97 degrees, 54 minutes west longitude. The distance from the first impact mark to the furthest piece of wreckage was approximately 200 feet. The tall coastal grass (hay) was fuel stained from the initial impact point to the main wreckage. The first impact mark was an approximately four-foot-long by one-foot-wide ground scar that had pieces of green navigational lens embedded in the dirt. Just forward of this ground scar was an approximately 20-foot-long ground scar that had a three-foot by seven-foot-wide impact crater at the very end. Scattered forward of the crater and along the wreckage path were the

propeller, both wing tips, the main cabin door, sections of the right wing, and the top of the engine cowling. Just forward of this debris field was the main wreckage, which consisted of the fuselage and the left wing. Forward of the main wreckage were all four seats, part of the throw-over yoke, and the engine. There was no evidence of a post-impact fire.

Examination of the airplane revealed that all major flight control surfaces were accounted for at the accident site. Continuity was established for all flight control surfaces to the main cabin area. The flaps and the landing gear were fully retracted. And, the elevator trim tab was found positioned to a 10 degrees nose down trim position. The cockpit area was compromised from impact and was partially folded over and twisted together with the firewall. Examination of the fractured control column revealed that it was locked into the left front seat position. The tachometer needle was stopped at 2100 RPM. According to the first responders, the pilot was seated in the left seat, the non-rated passenger was in the front right seat, and the pilot-rated passenger was in the right rear seat.

The fuel selector was found set to the right wing tank, and the sump screen was coated with a fine dirt-like debris. The airframe electric boost pump functioned normally when power was applied and light blue fuel was found in the chamber.

The left wing remained attached to the airframe, but exhibited leading edge impact damage near the fuel cap. The fuel bladder was breached but some fuel seeped out when the tank's fuel strainer was compressed. The left wing tip was also damaged and had separated from the wing. The right wing sustained heavy impact damage and had fractured into several sections. The entire tail section remained attached to the airframe and exhibited only minor damage.

The engine was examined on July 15, 2010, under the supervision of the Investigator-in-Charge. The engine had separated from the airframe and came to rest inverted about 100 feet forward of the main wreckage. The left magneto separated from the engine and was not located. The right magneto remained attached to the engine. The damaged leads were removed and spark was produced to each terminal when manually rotated. The top and bottom spark plugs were removed and all appeared light gray in color except the number 3 and number 5 top plugs, which were oil soaked. The fuel control unit had also separated from the airframe and sustained some impact damage. The fuel screen exhibited a small amount of lint and was dry. The fuel metering unit was intact. The top cap was removed and the screen was absent of debris. The engine driven fuel pump was removed from the engine and disassembled. The internal gears and the coupling were intact. The fuel nozzles were removed and all of them were clear except the number 2 and number 5 nozzle.

The oil sump was breached from impact damage, but some oil remained in the pan. There were no metal particles in the oil. The oil pump and internal gears were not damaged. The oil filter was removed from the engine and examination of the element revealed it was absent of debris. The crankshaft could not be rotated due to impact damage, so the cylinders were removed. Examination of the crankshaft, camshaft, each cylinder, and all of the internal mechanics of the engine did not reveal any pre-impact anomalies.

MEDICAL AND PATHOLOGICAL INFORMATION

An autopsy was conducted on the pilot by the Office of the Chief Medical Examiner, Tarrant County Medical Examiner's District, Tarrant County, Texas, on July 14, 2010. The cause of death was determined to be "massive blunt trauma of head, chest, and abdomen due to a light aircraft crash."

Toxicological testing was conducted on the pilot by the FAA Toxicology Accident Research Laboratory, Oklahoma City, Oklahoma. He tested positive for the following:

0.0064 (ug/ml, ug/g) Tetrahydrocannabinol (Marihuana) detected in Lung
0.0016 (ug/ml, ug/g) Tetrahydrocannabinol Carboxylic Acid (Marihuana) detected in Blood
Tetrahydrocannabinol Carboxylic Acid (Marihuana) detected in Lung
0.0238 (ug/ml, ug/g) Tetrahydrocannabinol Carboxylic Acid (Marihuana) detected in Urine

ADDITIONAL INFORMATION

According to FAA Publication AM-400-03/1, Medical Facts for Pilots, a Graveyard Spiral is associated with a return to level flight following an intentional or unintentional prolonged bank turn. For example, a pilot who enters a banking turn to the left will initially have a sensation of a turn in the same direction. If the left turn continues (~20 seconds or more), the pilot will experience the sensation that the airplane is no longer turning to the left. At this point, if the pilot attempts to level the wings this action will produce a sensation that the airplane is turning and banking in the opposite direction (to the right). If the pilot believes the illusion of a right turn (which can be very compelling), he/she will reenter the original left turn in an attempt to counteract the sensation of a right turn. Unfortunately, while this is happening, the airplane is still turning to the left and losing altitude. Pulling the control yoke/stick and applying power while turning would not be a good idea–because it would only make the left turn tighter. If the pilot fails to recognize the illusion and does not level the wings, the airplane will continue turning left and losing altitude until it impacts the ground.

Pilot Information

Certificate:	Commercial; Flight instructor	**Age:**	26,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	Airplane single-engine; Instrument airplane	**Toxicology Performed:**	Yes
Medical Certification:	Class 2 Without waivers/limitations	**Last FAA Medical Exam:**	November 3, 2005
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	
Flight Time:	1830 hours (Total, all aircraft)		

Other flight crew Information

Certificate:	Commercial; Flight engineer	**Age:**	22,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Right
Other Aircraft Rating(s):		**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	Airplane multi-engine; Airplane single-engine; Instrument airplane	**Toxicology Performed:**	Yes
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	December 4, 2007
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	
Flight Time:			

Aircraft and Owner/Operator Information

Aircraft Make:	Beech	**Registration:**	N5827S
Model/Series:	35C33	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal; Utility	**Serial Number:**	CD-815
Landing Gear Type:	Retractable - Tricycle	**Seats:**	4
Date/Type of Last Inspection:		**Certified Max Gross Wt.:**	
Time Since Last Inspection:		**Engines:**	1 Turbo prop
Airframe Total Time:		**Engine Manufacturer:**	
ELT:	Installed, not activated	**Engine Model/Series:**	
Registered Owner:	Casey Brinegar	**Rated Power:**	
Operator:	Casey Brinegar	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Night/dark
Observation Facility, Elevation:	GDJ,778 ft msl	**Distance from Accident Site:**	7 Nautical Miles
Observation Time:	21:44 Local	**Direction from Accident Site:**	213°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	7 knots / None	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	130°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.87 inches Hg	**Temperature/Dew Point:**	31°C / 23°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Stephenville, TX (SEP)	**Type of Flight Plan Filed:**	None
Destination:	Arlington, TX (GKY)	**Type of Clearance:**	None
Departure Time:	21:20 Local	**Type of Airspace:**	

Airport Information

Airport:	None None	**Runway Surface Type:**	
Airport Elevation:		**Runway Surface Condition:**	
Runway Used:		**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	Unknown

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:	2 Fatal	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	3 Fatal	**Latitude, Longitude:**	32.340557,-97.904441(est)

Administrative Information

Investigator In Charge (IIC):	Yeager, Leah
Additional Participating Persons:	Richard Cobb; FAA Fort Worth FSDO; Fort Worth, TX John Kent; TCM; Mobile, AL
Original Publish Date:	May 11, 2011
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=76612