Aviation Investigation Final Report

Location:	Lehman, Texas	**Accident Number:**	CEN14FA300
Date & Time:	June 18, 2014, 16:35 Local	**Registration:**	N2428Q
Aircraft:	Piper PA 46-310P	**Aircraft Damage:**	Substantial
Defining Event:	Windshear or thunderstorm	**Injuries:**	3 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The private pilot was conducting a personal flight during day, instrument flight rules (IFR) conditions. The pilot checked in with an air route traffic control center, and, after radar data showed multiple changes in altitude that were not in accordance with the assigned altitudes, an air traffic controller queried the pilot about the altitude changes. The pilot reported an autopilot problem and then later requested clearance to deviate around weather at a higher altitude. The airplane passed through several sectors and controllers, and it was understood that the pilot was aware of the adverse weather due to the deviation information in the flight strip. The air traffic controller did not provide additional adverse weather information and updates to the pilot, as required by a Federal Aviation Administration order; however, general broadcasts of this weather information were recorded on the frequency the pilot was using before the accident.

Multiple weather resources showed rapidly developing multicellular to supercell-type convective activity with cloud tops near 48,000 ft. Forecasts and advisories warned of potential strong to severe thunderstorms with the potential for moderate-to-severe turbulence, hail, lightning, heavy rains, and high wind. Radar data indicated that the pilot turned into the intense weather cells instead of away from them as he had requested.

The pilot declared a "mayday" and reported that he had lost visual reference and was in a spin. Damage to the airplane and witness marks on the ground were consistent with the airplane impacting in a level attitude and a flat spin. No mechanical anomalies were noted that would have precluded normal operation before the loss of control and impact with the ground. The investigation could not determine if there was an anomaly with the autopilot or if the rapidly developing thunderstorms and associated weather created a perception of an autopilot problem.

The autopsy identified coronary artery disease. Although the coronary artery disease could have led to an acute coronary syndrome with symptoms such as chest pain, shortness of breath, palpitations, or fainting, it was unlikely to have impaired the pilot's judgment following a preflight weather briefing or

while decision-making en route. Thus, there is no evidence that a medical condition contributed to the accident.

The toxicology testing of the pilot identified zolpidem in the pilot's blood and tetrahydrocannabinol and its metabolite in the pilot's cavity blood, which indicated that he was using two potentially impairing substances in the days to hours before the accident. It is unlikely that the pilot's use of zolpidem contributed to the accident; however, the investigation could not determine whether the pilot's use of marijuana contributed to the cause of the accident.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be:

The pilot's improper decision to enter an area of known adverse weather, which resulted in the loss of airplane control. Contributing to the accident was the air traffic controller's failure to provide critical weather information to the pilot to help him avoid the storm, as required by Federal Aviation Administration directives.

Findings

Aircraft	(general) - Not attained/maintained
Personnel issues	Aircraft control - Pilot
Personnel issues	Decision making/judgment - Pilot
Environmental issues	(general) - Effect on operation
Environmental issues	Thunderstorm - Effect on operation
Personnel issues	Use of medication/drugs - Pilot

Factual Information

History of Flight

Enroute	Windshear or thunderstorm (Defining event)
Enroute	Loss of control in flight
Uncontrolled descent	Collision with terr/obj (non-CFIT)

On June 18, 2014, about 1635 central daylight time, a Piper PA 46-310P airplane, N2428Q, crashed in an open field ½ mile east of Lehman, Texas. The private pilot and two passengers were fatally injured. The airplane was substantially damaged. The airplane was registered to Flying Lazy T, LLC., and operated by a private individual under the provisions of 14 Code of Federal Regulations (CFR) Part 91 as a personal flight. Both visual and instrument meteorological conditions existed for the flight, which operated on an instrument flight rules (IFR) flight plan. The cross country flight originated from Aspen-Pitkin County Airport/Sardy Field (KASE), Aspen, Colorado, at 1326 mountain daylight time, and was en route to Brenham Municipal Airport (11R), Brenham, Texas.

At 1517 central daylight time, N2428Q checked in with the Albuquerque Air Route Traffic Control Center (ZAB) controller at Flight Level (FL) 270. Between 1523 and 1526 N2428Q's altitude indicated 300 feet to 400 feet higher than the assigned altitude of FL270 four times. At 1530, the ZAB controller issued a Fort Worth Center Weather Advisory (CWA). Five minutes later, the controller transferred control of N2428Q to the next ZAB controller. N2428Q checked in with that controller at FL270.

At 1549, the controller issued convective SIGMET (Significant Meteorological Information) 86C for Texas. Between 1552 and 1607, N2428Q's altitude indicated 300 feet to 400 feet above and 400 feet below the assigned altitude of FL270 eight times. After each altitude deviation, N2428Q leveled at FL270. At 1554, after the second altitude deviation, the controller queried the pilot about the altitude changes. N2428Q reported that they were having autopilot issues. At 1556, during the altitude deviations, N2428Q requested and was authorized to deviate to the east of course for weather avoidance, but then deviated to the west.

About this time, a flight of two F/A-18s, call sign Cowboy 31, passed below N2428Q's flight track from west to east at FL250 and, according to the flight lead, encountered moderate clear icing and requested and were approved to descend to FL190.

At 1607 the ZAB controller transferred N2428Q to the next ZAB controller and from 1608 to 1617 N2428Q's altitude indicated 400 feet to 1,000 feet below the assigned altitude of FL270 three times. At 1615 the controller transferred N2428Q to the Fort Worth Air Route Traffic Control (ZFW) controller.

At 1617, N2428Q checked in with the ZFW controller at FL260 climbing to FL270 and advised the controller that he was in a turn for weather avoidance.

At 1630, N2428Q started a left turn and a climb. The ZFW controller asked N2428Q if he was going north for weather. The pilot responded that he "was trying to go through a window." As the pilot

continued his climb out of FL270, the controller asked the pilot if he needed a higher altitude of FL290. The pilot did not respond. The controller then advised N2428Q that radar showed that he was in the middle of moderate to extreme precipitation and asked the pilot if he needed a different altitude. The pilot did not respond. Thirty seconds later the controller again tried to establish communications with N2428Q without success. This was followed immediately by a single "mayday" transmission on the frequency. At 1632 the controller asked N2428Q to say altitude and the pilot responded with "nineteen."

There were several aircraft on the frequency in the vicinity of N2428Q. N656FP, an Eclipse jet en route from Albuquerque, New Mexico, to Shreveport, Louisiana, was at FL410. The pilot of N656FP heard the situation developing on the frequency and, after the mayday call, asked the ZFW controller if they had heard it. The ZFW controller acknowledged with "N28Q, go ahead" after which someone on the frequency stated "oh, they just called a mayday to you." American Airlines flight 1536, also in the area at the time, reported that they had also heard the mayday call. In the meantime, the controller continued to try to reestablish communication with N2428Q and asked Alaska Airlines flight 670 if they would try to contact N2428Q.

At 1635, N2428Q reported that he was spinning. N656FP, in an effort to assist, asked the pilot of N2428Q if he could see the ground or the horizon, but did not receive a response. The ZFW controller asked N2428Q if he could see the ground but did not get a response. A transmission from one of the pilots in the vicinity transmitted that the last call from N2428Q was that he was spinning and had said something about not being able to see the ground or horizon.

American Airlines flight 2394 advised the ZFW controller that they had also heard N2428Q report that he was spinning. In response to a query from the controller, the pilot of American Airlines flight 2461 stated that he had heard N2428Q's transmissions but the words were so short that it was unclear what was said. United Airlines flight 1604 volunteered that they had heard N2428Q say he was spinning and that he had lost sight of the ground or horizon.

At 1638, another attempt by the ZFW controller to reestablish communications with N2428Q was unsuccessful. (Additional details and figures are available in the Air Traffic Control Factual Report available in the public docket.)

The wreckage was located in an open field by the land owner.

According to a witness in the area at the time of the accident, there was a severe thunderstorm in the immediate vicinity of the accident. The witness described high winds, heavy rain, and low visibility.

Pilot Information

Certificate:	Private	**Age:**	61,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 26, 2013
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	March 31, 2008
Flight Time:	(Estimated) 2258.3 hours (Total, all aircraft), 188.1 hours (Total, this make and model)		

The pilot, age 61, held a private pilot certificate with an airplane single engine land and instrument airplane ratings. His most recent third class airman medical certificate was issued on November 26, 2013. At that time, the pilot reported no chronic medical conditions and no medications. The certificate contained the limitation "Must wear lenses for distant, have glasses for near vision. Holder shall possess glasses for near/intermediate vision." At the time of medical certificate application, the pilot estimated his total time as 2,500 hours, 30 of which had been logged in the previous 6 months.

On August 3, 2006, the Federal Aviation Administration (FAA) issued a Notice of Proposed Certificate Action to the pilot due to a suspension of driving privileges in the state of Colorado in 2004. The pilot did not report this suspension on his medical certificate application and argued that he had refused a breath test. His lawyer had argued the driving under the influence case down to "driving while impaired" and the pilot stated that his driver's license had not been suspended or revoked. On June 18, 2007, the FAA issued an Order of Revocation, immediately revoking the pilot's third class medical certificate. It was re-issued six months later.

The pilot applied for and received his instrument airplane rating on March 31, 2008. At the time of application he reported 754.6 hours of cross-country time as pilot in command and 70 hours of simulated/actual instrument time. Prior to this application, he had previously applied for, and been disapproved for the same rating. The record did not indicate which areas were deficient but did state all areas of operation were to be retested.

One pilot logbook was located in the wreckage of the airplane. The logbook contained flight log entries dated between September 4, 2011, and January 5, 2014. No flights were logged between January 5, 2014, and the date of the accident. All of the flights contained in the flight log were conducted in the accident airplane.

The pilot noted in his logbook if he had flown an instrument approach and he would log his total flight time; however, his landings and his instrument flight times were not annotated for each flight. The pilot had carried over a total time of 2,241.8 hours on the last page of the flight log. The total flight time logged on the last page was 16.6 hours. The last instrument approach annotated in his logbook was on August 12, 2013 – a Localizer DME 15 approach into ASE. He also annotated an instrument checkride on March 15, 2012. There were no endorsements in the back of the logbook, nor did any of the entries contain notes indicating a flight review or instrument competency check had been completed.

Investigators were unable to determine if the pilot met the flight review or currency requirements as outlined in 14 CFR Part 61.56 Flight Review and Part 61.57 Recent flight experience: Pilot in command.

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	**Registration:**	N2428Q
Model/Series:	PA 46-310P	**Aircraft Category:**	Airplane
Year of Manufacture:	1985	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	46-8508088
Landing Gear Type:	Retractable - Tricycle	**Seats:**	6
Date/Type of Last Inspection:	November 1, 2013 Annual	**Certified Max Gross Wt.:**	4101 lbs
Time Since Last Inspection:	64 Hrs	**Engines:**	1 Turbo prop
Airframe Total Time:	4799.9 Hrs at time of accident	**Engine Manufacturer:**	P&W
ELT:	Installed	**Engine Model/Series:**	PT6A-34
Registered Owner:	On file	**Rated Power:**	1337 Lbs thrust
Operator:	On file	**Operating Certificate(s) Held:**	None

The accident airplane, a Piper PA 46-310P (serial number 46-8508088), was manufactured in 1985. It was registered with the FAA on a standard airworthiness certificate for normal operations. The airplane was originally certified by Piper with a Lycoming 350 horsepower reciprocating engine. A Pratt & Whitney PT6A-34 engine, with maximum continuous engine torque of 1,337 foot-pounds, powered the airplane at the time of the accident. The engine was equipped with a Hartzell (model HC-E4N-3I) 4-blade, variable pitch propeller.

The airplane was maintained under an annual inspection program. A review of the maintenance records indicated that an annual inspection had been completed on November 1, 2013, at an airframe total time of 4,735.5 hours (Hobbs 1,711.0 hours). The airplane had flown 64.4 hours between the last inspection and the accident and had a total airframe time of 4,799.9 hours.

The airplane had been equipped with the Supplemental Type Certificate ST00541SE in 1999. In the limitations section of the JetProp LLC Pilot Operating Handbook, flight above FL 270 was not approved. In addition, the altimeters in the airplane were only certified to 25,000 feet.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	KLBB,3282 ft msl	**Distance from Accident Site:**	50 Nautical Miles
Observation Time:	15:53 Local	**Direction from Accident Site:**	90°
Lowest Cloud Condition:	Few / 6000 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	8 knots / None	**Turbulence Type Forecast/Actual:**	/ None
Wind Direction:	160°	**Turbulence Severity Forecast/Actual:**	/ N/A
Altimeter Setting:	29.9 inches Hg	**Temperature/Dew Point:**	32°C / 17°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Aspen, CO (KASE)	**Type of Flight Plan Filed:**	IFR
Destination:	Brenham, TX (11R)	**Type of Clearance:**	IFR
Departure Time:	13:26 Local	**Type of Airspace:**	Class A

The synoptic or large scale migratory weather systems influencing the accident area were documented using standard National Weather Service (NWS) charts issued by the National Center for Environmental Prediction (NCEP) and the Weather Prediction Center (WPC).

Surface Analysis

The south central section of the NWS Surface Analysis Chart for 1600 on June 18, 2014, centered over Texas depicted a low pressure system over Colorado at 1000-hectopascals (hPa) along a stationary front, with a dry line that extended southward from the low across southeast Colorado and into eastern New Mexico. Ahead or east of the dry line, the chart depicted a relatively warm moist airmass that flowed northward from the Gulf of Mexico into northwestern Texas. The station models over the Texas Panhandle depicted southerly wind, partly cloudy skies, with temperatures in the 90's degrees Fahrenheit (F), and dew point temperatures above 60° F. Over New Mexico behind the dry line temperatures were also in the 90's with dew point temperatures below 40° F. The accident site was located in an area of general confluent wind flow ahead of the dry line.

Weather Radar

The National Center for Atmospheric Research (NCAR) - Research Application Laboratory (RAL) regional radar mosaic image for 1635 depicted several bands of intense radar echoes oriented in a general north-northeast to south-southwest bands across western Texas. The accident site was located in the immediate vicinity of one of the intense echoes. Additional scattered echoes continued to the south-southwestward into southeastern New Mexico and extreme southwestern Texas.

The NOAA National Climatic Data Center (NCDC) National radar reflectivity mosaic image for the same period of 1635 depicted a large organized area of echoes directly over Lehman, Texas, and immediately south, which were associated with an area of strong to severe multicellular to supercell-

type thunderstorms.

NWS Convective Outlook

The NWS Storm Prediction Center (SPC) Convective Outlook chart issued at 1440 indicated that general thunderstorm activity was expected over the general route of flight with a slight risk of severe thunderstorms over northwestern Texas.

Surface Observations

The closest official NWS reporting location to the accident site was from Lubbock Preston Smith International Airport (KLBB), Lubbock, Texas approximately 50 miles east of the accident site at an elevation of 3,282 feet. The airport had an Automated Surface Observation System (ASOS) and was augmented by certified NWS weather observer during the period. The following conditions were reported near the time of the accident.

Lubbock Preston Smith International Airport (KLBB) weather observation at 1553, wind from 160° at 8 knots, visibility unrestricted at 10 miles, a few clouds at 6,000 feet agl, scattered 18,000 feet, scattered at 30,000 feet, temperature 32° Celsius (C), dew point temperature 17° C, altimeter 29.91 inches of mercury (Hg). Remarks: automated observation system, sea level pressure 1006.7-hPa, cumulonimbus clouds (CB) distant south and southwest through northwest, moving northeast slowly, towering cumulus clouds (TCU) distant northeast, altocumulus castellanus (ACC) distant northwest, temperature 32.2° C, dew point 16.7° C, 3-hour pressure tendency fallen 1.6-hPa.

The observations indicated that while visual meteorological conditions prevailed at the surface at the airport, high based thunderstorms were reported in the distance or beyond 10 miles and intermittently at the station after the accident in which a peak wind gust of 33 knots was reported associated with a thunderstorm. While the peak wind was below the classification of a severe thunderstorm, it still suggested a strong outflow from the storm. There was also a period of blowing dust reported, also indicative of strong outflow winds and/or potential microburst activity. There was also a high frequency of lightning activity reported during the period with the cumulonimbus clouds, which varied from occasional, to frequent, and after the accident was reported as continuous lightning activity.

Upper Air Data

The closest upper air sounding or rawinsonde observation (RAOB) was from the NWS Amarillo (KAMA) Weather Service Forecast Office (WSFO), located approximately 107 miles northeast of the accident site. The 1900 sounding depicted a warm low-level environment with a surface temperature of 86.7° F (30.4° C), and a dew point temperature of 59.7° F (15.4° C), with a relative humidity of 40%. The sounding indicated expected bases of the clouds between 7,500 to 8,000 feet agl, with expected convective cloud tops to approximately 45,000 feet, with the tropopause at 46,300 feet. The freezing level was identified at 15,414 feet and supported icing in clouds above that level.

The stability parameters indicated a very unstable atmosphere. The Severe Weather Threat Index indicated a moderate risk of severe thunderstorm development. The maximum vertical velocity of the potential updrafts was calculated at 142 knots. The sounding also supported hail, heavy rain, and/or

downbursts with the thunderstorms across the region. The sounding stability indices indicated a moderate to strong risk of severe multicellular type thunderstorm development across the region.

The sounding wind profile depicted southerly winds from the surface through 19,000 feet with wind veering to the southwest with height with increasing wind speeds. A low level jet stream was identified at 4,850 feet agl with wind from 185° at 20 knots, with the level of maximum wind at 225° at 65 knots located below the tropopause at 43,990 feet. The 18,000 feet wind was from 213° at 25 knots with the mean storm motion from 243° at 19 knots. At the accident airplane's cruising altitude of 27,000 feet the wind was identified from 240° at 32 knots, with a temperature of -25° C. The sounding supported potential clear to mixed icing at 27,000 feet, especially with the convective updrafts which would have likely increased the icing potential at altitude.

Satellite Data

The Geostationary Operational Environmental Satellite number 13 (GOES-13) infrared image for 1630 at 4X magnification with a standard MB temperature enhancement curve illustrated cloud tops associated with deep convection and high cirriform clouds. Also added to the image was the frontal and dry line boundaries identified at 1600 by the NWS. The last radar contact was identified on the southwestern side of a band of cumulonimbus clouds with a radiative cloud top near 36,000 feet based on the KAMA sounding. Higher cloud tops were identified 6 miles north near 41,000 feet. The anvil tops of the cumulonimbus cloud extended northeastward and merged into another large cumulonimbus cloud system, which extended across most of the northern portion of the panhandle of Texas.

The GOES-13 visible images at 4X magnification at times 1545, 1615, 1625, 1630, 1637, 1645, 1655, and 1700 depicted the rapid development and growth of the cumulonimbus cloud during the period, and movement to the east-northeastward. The vertical extensive cumulonimbus cloud heights were also evident by the shadows under and immediately east of the clouds, and also depicted several overshooting cloud tops with the anvils.

In-Flight Weather Advisories

The NWS issued Severe Weather Forecast Alert (AWW) number 323 at 1447 and was valid through 2200 for severe thunderstorms over portions of Oklahoma and western Texas. The area was identified from 65 miles east and west of a line from 12 miles east-northeast of Lubbock, Texas, to 39 miles east of Liberal (KLBL), Kansas. The area was issued for a few severe thunderstorms with hail to 2 inches, extreme turbulence, and surface wind gusts to 60 knots. A few of the cumulonimbus clouds had a potential of maximum tops to 55,000 feet. The mean storm motion was from 240° at 20 knots.

The NWS also issued Convective SIGMETs that impacted the route of flight at 1455, 1555, and 1655. They called for areas of severe thunderstorms moving from the southwest at 15 knots, cloud tops to FL450, hail 1.5 inches in diameter, and wind gusts to 50 knots. The updated Convective SIGMET at 1555 increased the hail diameter to 2 inches and wind gusts to 60 knots.

The Albuquerque Air Route Traffic Control Center (KZAB) controller at 1530 broadcasted the issuance of KZFW CWA 201 and at 1549 Convective SIGMET 83C on the frequency and advised users to obtain further information on the nearest Hazardous Inflight Weather Advisory Service (HIWAS) broadcast.

No other information relating to the nature of the hazard or the location of the advisories were provided, or mention of the weather watch 323 was made at that time..

At 1556, the Albuquerque controller advised on frequency that Convective SIGMET 86C was current and advised users to tune to HIWAS for further details. The airplane was equipped with the ability to access the recorded information; however, it is unknown if the accident airplane obtained the details of the advisory. CWA 202 was issued prior to the accident at 1630 and was not broadcasted by air traffic control until after the accident.

Immediately after the accident at 1655 Convective SIGMET 90C was issued over the accident site for a line of severe thunderstorms.

An extensive Meteorology Report with additional details and figures, illustrating the flight track and weather radar imagery, is available in the public docket for this report. The weather radar imagery (WSR-88D) shows the accident airplane deviating into a rapidly developing severe thunderstorm, when the altitude deviations and MAYDAY call are made.

Preflight Weather Briefing

The pilot's personal iPad was located in his luggage, in the wreckage of the airplane. The location suggested that it was not being used at the time of the accident or during the accident flight. The Safari application was the only open application. Within this there were two active tabs – one for Intellicast and the second for Airport Information. The first tab selected to Intellicast illustrated weather radar information for San Antonio, Texas, Abilene, Texas, and Dyees Air Force Base. The second tab illustrated airport information for Brenham Municipal Airport.

The accident pilot contacted Lockheed Martin Automated Flight Services Station (AFSS) at 1309 mountain daylight time on June 18, 2014. He filed an IFR flight plan from ASE to 11R, planning to depart at 1338 with an estimated time en route of 3 hours and 30 minutes. He was provided an abbreviated weather briefing which consisted of the destination METAR (routine aviation weather report), convective SIGMENT information, PIREPS (Pilot Reports), NOTAMS, and AIRMETS.

During the abbreviated weather briefing, the briefer discussed the dry line with moisture from the Gulf of Mexico flowing northward and the expected precipitation. The pilot of N2428Q acknowledged he was familiar with the expected conditions. During this period the briefer provided Convective SIGMET 76C, which related to a developing line of thunderstorms over southern Texas near the destination in the Houston area with the storms moving northward. At the time of the briefing no advisories for thunderstorms were current over western Texas or in the vicinity of the accident site, and the briefing did not mention or comment on the risk of severe thunderstorms expected during the period or forecast.

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:**	34.140502,-99.299072(est)

The main wreckage came to rest in an open field, oriented on an approximate heading of 270 degrees at an elevation of 3,770 feet. The main wreckage included the fuselage, empennage, both wings, and the engine and propeller assembly. There were no ground scars or debris field leading to the main wreckage.

The fuselage was buckled, wrinkled, and crushed in several directions along the entire span of the fuselage. The forward right side of the fuselage was torn and bent due to emergency responder activity. The floor of the fuselage, from the forward cabin, aft to the rear cabin seats and luggage area, was crushed up and wrinkled. All of the seats in the airplane remained attached. The internal ceiling and sidewall paneling in the fuselage separated partially and was scattered on the inside of the cabin.

The instrument panel in the forward cabin was crushed down and broken. Multiple switches and several instruments had separated from the panel and were impact damaged. Many of the engine instruments, the suction gauge, and fuel quantity instruments read zero. Readings from any of the digital displays and instruments were not recovered on scene. The following readings from the analog instruments and gauges were observed:

Pilot's side encoding altimeter – 3,670 feet
Pilot's side airspeed – zero
Turn coordinator – left wing down, 5 degrees, ball just left of center
Pilot's side artificial horizon – nose up 20 degrees, 5 degrees left wing down
Kollsman window – 29.90
Vertical speed indicator – 500 foot climb

Copilot's side altimeter – 3,220 feet
Kollsman window – 29.80
Copilot's side vertical speed indicator – 1,200 foot climb
Directional gyro – 135 degrees
Copilot's side airspeed – zero
Artificial horizon – 20 degrees nose down.
Turn coordinator – left wing down 5 degrees, wings level, ball just left of center

The landing gear actuator handle was selected to the down or extended position. The flap selector handle was selected to 20 degrees of flaps. In the throttle quadrant, the fuel was on, the propeller control was positioned at mid-range, and the throttle control was towards reverse. The friction lock was at midrange. The Hobbs meter showed a reading of 1,775.4 hours.

The right wing remained attached at the fuselage. The outboard portion of the wing separated partially at

the production splice. The entire wing was bent and wrinkled. The de-ice boot was torn at the separation point but was otherwise unremarkable. The right flap was bent and wrinkled and separated partially at the outboard hinge. The flap appeared to be extended 20 degrees. The right aileron was deflected up and was bent. One flight control cable for the right aileron was broken in tension at the wing separation point. The second flight control cable was continuous from the aileron inboard to the wing root. The pushrod at the aileron control was broken, consistent with impact damage.

The right main landing gear remained attached to the wing. The hydraulic actuator was extended, consistent with the landing gear being extended. The right main landing gear strut was down and imbedded in the ground. The right main landing gear wheel assembly separated from the strut and came to rest under the trailing edge of the right flap.

The left wing remained attached to the fuselage. The de-ice boot was unremarkable. The wing was bent, buckled, and wrinkled along the entire span. The flap appeared to be extended approximately 20 degrees and remained attached to the wing. The left aileron remained attached to the wing but was bent and broken at the outboard hinge point. The flight controls were continuous but difficult to move, due to impact damage.

The empennage included the horizontal and vertical stabilizers, the elevator, and the rudder. The empennage separated at the rear pressure bulkhead, just forward of the vertical stabilizer leading edge. The fiberglass on the lower airfoil of the vertical stabilizer was torn. The leading edge of the stabilizer was otherwise unremarkable.

The rudder control was deflected to the right and the lower portion of the control was bent up and wrinkled. The control was jammed and difficult to move, due to impact damage. The control cables to the rudder were continuous.

The horizontal stabilizer was wrinkled along the leading edge. The de-ice boots were unremarkable. A witness mark, consistent with the bottom portion of the rudder control was located on the trailing edge of the right horizontal stabilizer, directly beneath the rudder control. The trim tab on the elevator was deflected up. The control cables to the elevator were continuous.

The engine remained attached to the fuselage. The fuselage forward of the cabin, up to the engine, was buckled up and wrinkled. The engine cowling was broken and torn. The engine was impact damaged and exhibited slight bending and twisting along the entire span of the engine.

The propeller assembly remained attached to the engine. Two blades separated from the engine and were imbedded in the soft ground directly beneath the engine. Both blades separated near the hub and were bent and exhibited polishing on the face of the blade and along the leading edge. Two other blades remained attached to the engine and were labeled "A" and "B" for identification purposes. Blade A was bowed more than 90 degrees and exhibited leading edge polishing and polishing and scratching along the face of the blade. Blade B was embedded in the ground and was bowed.

Medical and Pathological Information

According to the autopsy performed by South Plains Forensic Pathology, the cause of death was multiple blunt force trauma. The autopsy also identified an enlarged heart which weighed 440 grams (average for a 203 pound man is 375 grams with a range of 284-495 grams). In addition, there was coronary artery disease with an area of 80% stenosis in the first diagonal coronary artery. No other significant natural disease was identified.

Toxicology testing performed at the request of the pathologist by NMS laboratories found no ethanol but identified caffeine and 2.2 ng/ml of tetrahydrocannabinol (THC), the active ingredient in marijuana, in the pilot's blood.

Toxicology testing performed by the FAA's Bioaeronautical Research Laboratory found no ethanol but identified 1.9 ng/ml of tetrahydrocannabinol (THC) and 2.4 ng/ml of its inactive metabolite, tetrahydrocannabinol carboxylic acid (THC-OOH), in the pilot's blood as well as desmethylsildenafil, the metabolite of sildenafil (a prescription medication used to treat erectile dysfunction, also named Viagra), and zolpidem (a prescription sleep aid, marketed with the name Ambien) in the pilot's cavity blood. Urine testing identified desmethylsildenafil, ibuprofen (an over the counter analgesic commonly called Motrin and Advil), ranitidine (an over the counter medication used to treat heartburn, commonly known as Zantac), tetrahydrocannabinol carboxylic acid (117.4 ng/ml), and zolpidem. The report from the lab further noted that neither tetrahydrocannabinol nor tetrahydrocannabinol carboxylic acid were identified in brain tissue.

Tests and Research

Airframe

Shop air at 30 psi was applied at the center air port in the empennage and the elevator de-ice boots and the rudder de-ice boot inflated without issue. Shop air at 40 psi was applied to the right wing and movement of the outboard de-ice section was observed. The left wing was impact damaged. Shop air at 50 psi was applied and the de-ice boots inflated to the second crimp in the wing. Impact damage precluded testing the remainder of the left wing de-ice boot.

Propeller Blades

The propeller blades that separated from the airplane and were under the wreckage were labeled "C" and "D" for identification purposes only. Both blades were bent, twisted, bowed, and exhibited leading edge polishing and scratching and polishing along the front and back of the blade.

Servos, Flight Computers, & Indicators

The flight computer, radios, rate gyro, and autopilot servos were removed from the airplane and sent to Honeywell for further examination and bench testing.

The pictorial navigation indicator and flight command indicator were impact damaged and could not be functionally tested. The directional gyro was functionally tested without anomaly.

The crystal in the flight computer was impact damaged preventing functional testing. Once the crystal was replaced the pitch and roll command, servo drive, and pitch trim functions were satisfactory. The altitude hold would not engage due to impact damage on the circuit board. The yaw computer and rate gyro passed functional testing.

The yaw servo was tested without anomaly. The pitch servo was impact damaged. Once the shaft and bracket were straightened the unit tested without anomaly. The roll servo was impact damaged with a displaced spring bar. Once the bar was repositioned, the unit tested without anomaly. The trim servo was impact damaged and did not pass functional tests for manual and auto trim.

The roll, yaw, and trim servo mounts were examined and tested. The roll servo mount tested within limits. The yaw servo mount tested one pound beyond limits. The trim servo tested one pound beyond limits.

The altitude preselector was impact damaged and could not be functionally tested. Non-volatile memory recovered from the unit indicated the last altitude selected was 27,000 feet with a vertical speed descent of 500 feet per minute.

Additional Information

Thunderstorm Advisory Circular

The FAA Advisory Circular AC 00 – 24C "Thunderstorms" dated January 30, 2013, provided a basic review of thunderstorms and general guidance avoidance policy. The advisory circular described basic thunderstorm development, life cycle, organization or types of storms; from single cell, multicellular storms or clusters, to squall lines, and supercell type thunderstorms. A supercell is a single long-lived thunderstorm which is responsible for nearly all of the significant tornadoes produced in the United States and for most of the hailstones larger than golf ball-size.

The advisory circular also discussed thunderstorm terminology such as the use of the Convective Outlook (AC) and the perceived level of threat for convection and severe thunderstorms, and the general hazards within and near thunderstorms. Also included in the updated advisory circular with the use of ground-based weather radar, echo intensity or reflectivity, and the use of data link into the cockpit, as well as airborne weather radar and its primary limitation of attenuation and the need for proper tilt management. Avoidance of any heavy to extreme intensity echoes or one identified as severe by at least 20 miles was also emphasized.

Administrative Information

Investigator In Charge (IIC):	Rodi, Jennifer
Additional Participating Persons:	Daniel J Vengen; Federal Aviation Administration; Lubbock, TX Charlie Little; Piper Aircraft, Inc.; FL Marc Gratton; Pratt & Whitney Canada Corp; Longueil Karena F Marinas; NATCA; Los Angeles, CA Bill Gill; Honeywell International, Inc.; Olathe, KS Larry Johnson; Federal Aviation Administration; Washington, DC
Original Publish Date:	June 22, 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=89472