Aviation Investigation Final Report

Location:	Plainview, Texas	**Accident Number:**	CEN15FA245
Date & Time:	May 29, 2015, 21:15 Local	**Registration:**	N221D
Aircraft:	Beech A36	**Aircraft Damage:**	Destroyed
Defining Event:	Loss of control in flight	**Injuries:**	3 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

Before attempting to take off, the commercial pilot received weather information indicating that a severe thunderstorm was approaching the airport. Further, two witnesses reported seeing the storm approaching. Several witnesses reported seeing the airplane take off, make a left turn, and then head straight down. GPS data indicated that, after the airplane took off, it banked left, reached about 80 ft above ground level, and then descended and impacted terrain. One of the witnesses stated that they could not believe anybody would take off in the approaching storm. Another witness reported that she was "watching the storm clouds" and heard an engine at "full throttle" and then looked over and saw the airplane "traveling very fast" toward the ground.

Examination of the airplane revealed no evidence of mechanical malfunctions or failures that would have precluded normal operation. A postaccident review of weather information established that a gust front associated with a squall line of an approaching severe thunderstorm was over the airport at the time of the accident. This weather situation was likely producing a combination of the following weather phenomenon near the accident site at the time of the accident; strong gusting winds, turbulence, low-level wind shear, reduced visibility due to blowing dust, heavy rain, hail, and lightning. The flight encountered these hazardous conditions during initial climb, which likely made the airplane difficult for the pilot to control and resulted in his loss of airplane control shortly after takeoff. Given the pilot had the current weather information and should have been able to see the approaching storm, he should not have taken off in such conditions. The pilot's decision to take off with such hazardous weather conditions present resulted in the accident.

Probable Cause and Findings

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

The pilot's decision to take off ahead of an approaching severe thunderstorm, which resulted in an encounter with hazardous weather conditions that led to a loss of airplane control.

Findings

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

Factual Information

History of Flight

Takeoff	Loss of control in flight (Defining event)

On May 29, 2015, about 2115 central standard time, a Beechcraft A-36 airplane, N221D, impacted terrain shortly after takeoff from Hale County Airport (PVW), Plainview, Texas. The pilot and two passengers were fatally injured, and the airplane was destroyed. The flight was being operated as a 14 *Code of Federal Regulations* Part 91 personal flight. Night visual meteorological conditions existed at the accident site at the time of the accident, and an instrument flight rules (IFR) flight plan had been filed. The flight departed PVW destined for Boerne Stage Field Airport, Boerne, Texas.

A handheld GPS was retrieved from the accident site, Figure 1 depicts its downloaded data. It was revealed that the flight departed from runway 22 about 2119, banked left, and then reached about 80 ft above ground level (agl) at a groundspeed of 86 knots before the recording stopped less than 1 minute later. See Figure 5 for a wreckage diagram. Several witnesses reported seeing the airplane take off to the southwest, make a sharp left turn, and then head straight down. One of the witnesses stated that they could not believe anybody would take off in the approaching storm. Another witness reported that she was "watching the storm clouds" and heard an engine at "full throttle" and then looked over and saw the airplane "traveling very fast" toward the ground.

Figure 1: Google Earth overlay showing the accident flight path.

Pilot Information

Certificate:	Commercial	**Age:**	46
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 2 Without waivers/limitations	**Last FAA Medical Exam:**	October 13, 2014
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	950 hours (Total, all aircraft)		

The pilot held a commercial pilot certificate with airplane single-engine land and instrument ratings. No pilot logbooks were made available for review. The pilot's most recent Federal Aviation Administration (FAA) second-class medical certificate was issued on October 13, 2014, with no limitations. On his medical certificate application, the pilot reported that he had about 950 total hours of flight time.

Aircraft and Owner/Operator Information

Aircraft Make:	Beech	**Registration:**	N221D
Model/Series:	A36 UNDESIGNAT	**Aircraft Category:**	Airplane
Year of Manufacture:	1977	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	E-927
Landing Gear Type:	Retractable - Tricycle	**Seats:**	6
Date/Type of Last Inspection:	December 3, 2014 Annual	**Certified Max Gross Wt.:**	3651 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	6705 Hrs as of last inspection	**Engine Manufacturer:**	Continental Motors
ELT:		**Engine Model/Series:**	IO-550-B-RA
Registered Owner:	On file	**Rated Power:**	300 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

According to FAA records, the six-seat airplane, serial number E927, was issued its original airworthiness certificate on September 30, 1976, and was registered to the pilot on April 13, 2011. According to aircraft maintenance records, the last annual inspection was completed on December 3, 2014, at a recorded tachometer time of 6,705.4 hours.

The engine was originally a Continental Motors IO-520-BB. The engine was converted to an IO-550-B-

RA engine, serial number 578094, by RAM Aircraft under Supplemental Type Certificate SE10746SC-D when it was overhauled on August 11, 2011, at an engine total time of 2,471.7. The last logbook entry, dated February 18, 2015, indicated that the engine had accrued 621 hours since the overhaul and conversion.

Maintenance records indicated that the airplane was retrofitted with an Aspen Avionics EFD1000, which replaced all the primary flight instruments. The airplane was also equipped with a Garmin 430W, which combined GPS, navigation and communication information.

Maintenance records revealed that the airplane sustained paint damage in September 2014 after being flown into inclement weather. The pilot's damage report stated that he "flew into a building storm not visible or on XM weather."

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Night
Observation Facility, Elevation:	KPVW,3374 ft msl	**Distance from Accident Site:**	0 Nautical Miles
Observation Time:	01:55 Local	**Direction from Accident Site:**	320°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	4 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	100°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.04 inches Hg	**Temperature/Dew Point:**	21°C / 17°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Plainview, TX (PVW)	**Type of Flight Plan Filed:**	IFR
Destination:	SAN ANTONIO, TX (5C1)	**Type of Clearance:**	None
Departure Time:	21:15 Local	**Type of Airspace:**	

At 2058:58, the pilot filed an IFR flight plan on, and received weather information from ForeFlight.com. The weather information included conditions at the destination airport; the latest TAF; the latest METARs, SIGMETs, and AIRMETs along the flight route; notices to airmen; current severe thunderstorm watch and warning information; area forecasts; the convective outlook; PIREPs, and winds aloft information. Portions of that information are discussed below. For more weather information, see the Weather Study in the public docket for this accident.

The closest official weather station was PVW, located 1 mile from the accident site at an elevation of 3,374 ft msl.

At 2055, the PVW Automated Weather Observing System (AWOS) reported wind from 100° at 4 knots, 10 miles visibility, clear skies below 12,000 ft agl, temperature 21°C, dew point 17°C, and an altimeter setting of 30.05 inches of mercury (inHg). Remarks: automated station with a precipitation discriminator, lightning distant (defined as beyond 10 miles but less than 30 miles from the center of the airport) west, temperature 21.1°C, dew point 16.6°C.

At 2115, the PVW AWOS reported calm wind, 10 miles visibility, clear skies below 12,000 ft agl, temperature 21°C, dew point 16°C, and an altimeter setting of 30.09 inHg. Remarks: automated station with a precipitation discriminator, lightning distant west and northwest, temperature 21.1°C, dew point 16.0°C.

At 2135, the PVW AWOS reported wind from 300° at 26 knots with gusts to 36 knots, 10 miles visibility, light rain, scattered clouds at 4,500 ft agl, scattered clouds at 6,000 ft agl, a broken ceiling at 6,500 ft agl, temperature 16°C, dew point 11°C, and an altimeter setting of 30.17 inHg. Remarks: automated station with a precipitation discriminator, lightning distant southwest through northwest, temperature 15.5°C, dew point 11.0°C.

The observations from PVW indicated visual flight rules ceilings at the surface at the time of the accident with no visibility restrictions. The sun set at 2051, and civil twilight ended at 2119, the approaching storm was visible as noted by a witness to the accident.

PVW was the closest site with a National Weather Service (NWS) TAF. The TAF valid at the time of the accident, which was issued at 1820 and was valid for a 24-hour period beginning at 1900, indicated the following:

Wind from 060° at 10 knots, greater than 6 miles visibility, scattered clouds at 5,000 ft agl, and a broken ceiling at 25,000 ft agl. Temporary conditions of variable wind at 25 knots with gusts to 45 knots, 2 miles visibility, thunderstorms and heavy rain, and a broken ceiling of cumulonimbus clouds at 3,000 ft agl were forecast between 2100 and 0100.

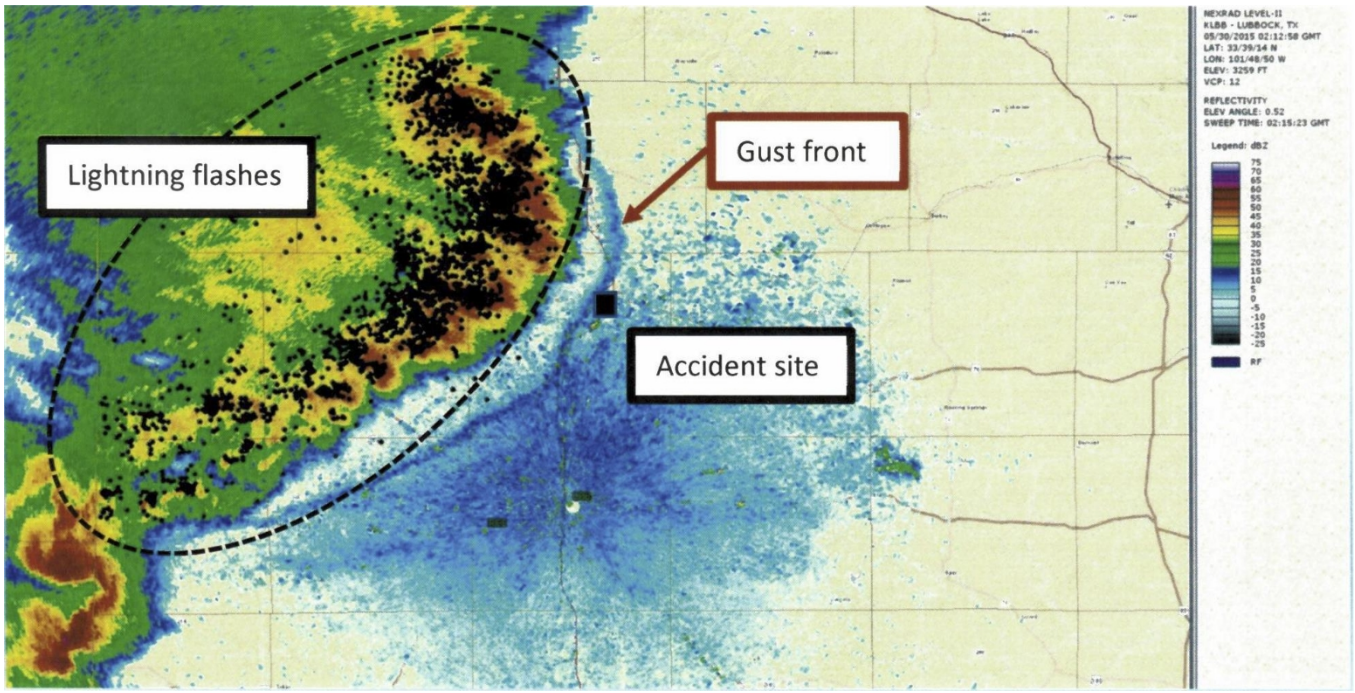

Figure 2: KLBB WSR-88D reflectivity for the 0.5° elevation scan initiated at 2115 CDT with the lightning data.

The closest NWS Weather Surveillance Radar-1988, Doppler (WSR-88D) was from Lubbock Preston Smith International Airport (LBB), Lubbock, Texas, which was located 31 miles south of the accident site at an elevation of 3,282 ft. Figure 2 shows the LBB WSR-88D base reflectivity images for the 0.5° elevation scans initiated at 2115. The image shows lightning flashes and strikes associated with a squall line, which are indicated by small black dots, north and west of the accident site between 2100 and 2115. The figure shows the gust front's location, depicted by a red line. The gust front was moving eastward over the accident site at the accident time.

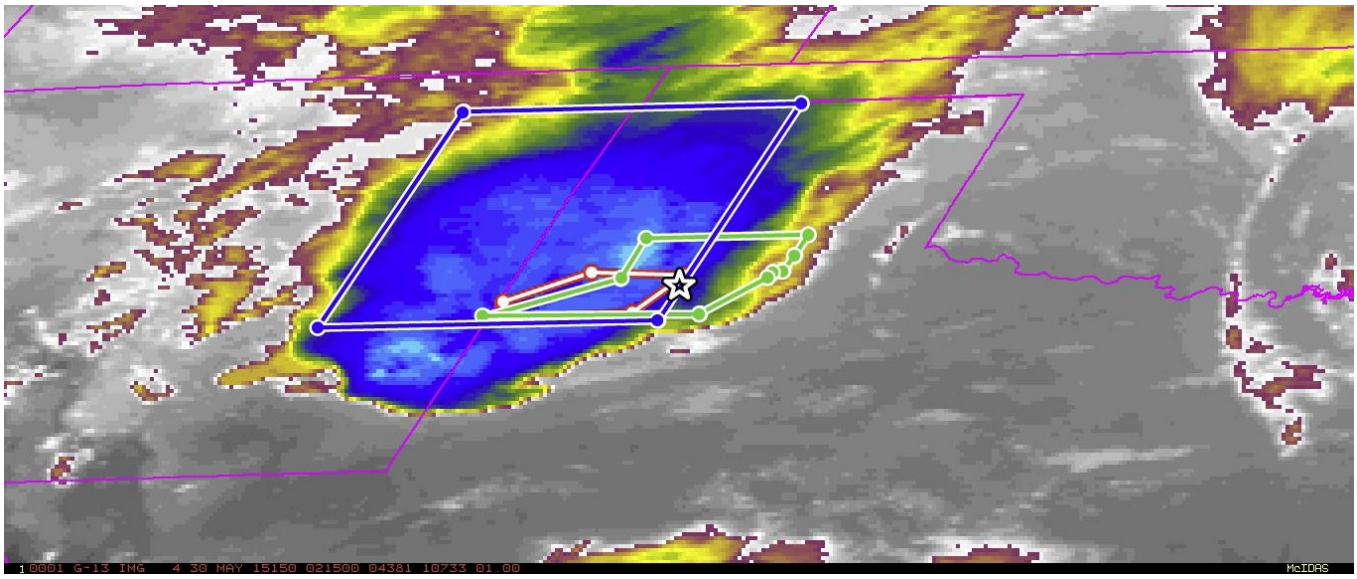

Figure 3: Severe thunderstorm warnings (red and green) and severe thunderstorm watch (blue) valid at the accident time.

The first severe thunderstorm warning that included the accident site was issued at 2046 by the NWS Office in Lubbock, Texas. Another severe thunderstorm warning, which was valid for the accident site at the accident time, was issued at 2113; and a severe thunderstorm watch was issued at 1545 and was valid through 2300. Figure 3 shows the 2046 severe thunderstorm warning area outlined in red, the 2113 severe thunderstorm warning area outlined in green, and the severe thunderstorm watch area outlined in blue. The accident site is marked by the star in figure 3. The severe thunderstorm warnings reported 60 mph wind gusts and hail.

FAA Advisory Circular AC 00-24C, "Thunderstorms," issued in February 2013, is a training guide for pilots on thunderstorm hazards. Figure 4 shows a cross-section of a squall line thunderstorm from AC 00-24B depicting a shelf cloud, gust front, and its related cold air outflow. A gust front typically causes a sudden wind shift and increase in wind speed along with potentially moderate-to-severe turbulence up to 1,000 ft and occasionally to 3,000 ft agl. A sudden wind shift and gusty winds associated with a gust front can be seen at both PVW and LBB, when the gust front moves across those airports. Multiple

surges of cold dense air are typical results in individual strong gusts. Gust fronts often extend up to 15 miles from the main precipitation core of the thunderstorm.

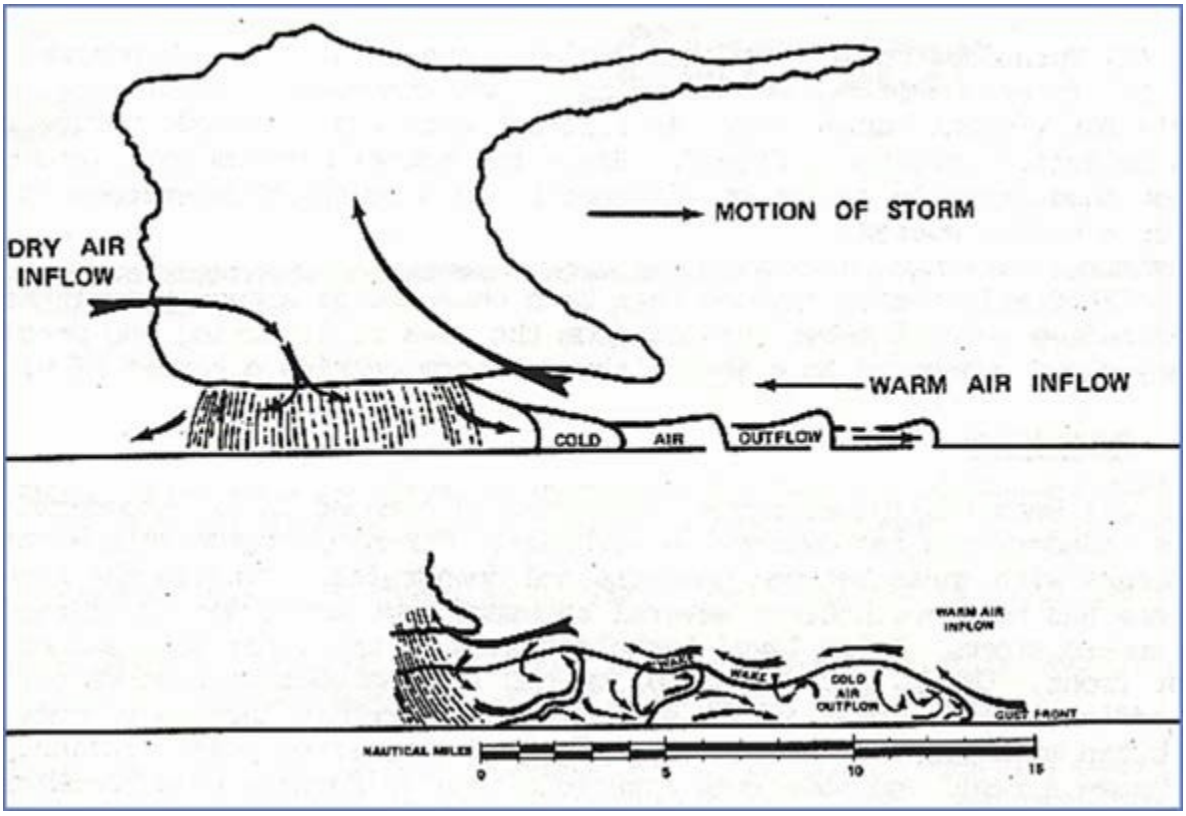

Figure 4: Cross section of a thunderstorm showing the cold air outflow and gust front.

Airport Information

Airport:	HALE COUNTY PVW	**Runway Surface Type:**	Asphalt
Airport Elevation:	3374 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	22	**IFR Approach:**	None
Runway Length/Width:	5997 ft / 100 ft	**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:	2 Fatal	**Aircraft Fire:**	On-ground
Ground Injuries:	N/A	**Aircraft Explosion:**	On-ground
Total Injuries:	3 Fatal	**Latitude, Longitude:**	34.165554,-101.715553

The main wreckage was located in a flat, grass field about 1,100 ft southeast of runway 04/22. The airplane came to rest on a magnetic heading of 130º at an elevation of 3,609 ft. A postimpact fire had ensued.

Figure 5: Wreckage Diagram

Airframe

The airplane impacted terrain in about a 20°-nose-down attitude. Ground scars were consistent with a near vertical impact. The ground scars were also consistent with the landing gear being extended at the initial impact; however, fire damage precluded determination of the landing gear actuator position. A propeller blade fractured at impact and separated from the crankshaft, and the hub separated from the engine's propeller flange. The remainder of the airframe continued to travel on a southeasterly heading and impacted the ground about 100 ft from the initial impact.

As viewed from the initial impact point looking south, the main cabin door separated from the fuselage and came to rest left of, and about 162 ft from, the main wreckage. The separated nose landing gear was found near the initial impact point and 152 ft from the main wreckage. The separated left main landing gear (MLG) was found left of the main debris path and about 74 ft from the main wreckage. The separated right MLG was found right of the main debris path and about 90 ft from the main wreckage. The postimpact fire consumed major portions of the fuselage, empennage, and wings.

The flap actuator housings were consumed by the postimpact fire, which precluded their measurement.

Engine

The engine was examined on-scene by the National Transportation Safety Board investigator-in-charge and an engine manufacturer representative. The engine crankcase remained intact; however, the engine sustained extensive thermal damage due to the postimpact fire. The crankshaft was rotated by hand, and continuity was established between the crankshaft, camshaft, connecting rods, and associated components. All six cylinders were examined using a borescope, and no anomalies were noted. All cylinders produced compression when the crankshaft was rotated, and all rocker arms and valves operated normally.

The right and left magnetos rotated by hand and produced a spark on all six posts during impulse coupling operation. The ignition harness sustained significant impact and thermal damage; however, the ignition harness produced a spark on the upper spark plugs for the Nos. 1, 3, and 5 cylinders. The remaining ignition leads could not produce a spark, consistent with thermal damage. All spark plugs displayed normal operating and wear signatures.

Thermal damage was noted on all the fuel and oil system components. There was no evidence of mechanical malfunctions or failures that would have precluded normal operation.

The separated propeller sustained significant impact damage. All the propeller blades displayed leading-edge polishing, chordwise scratches, leading-edge gouging, and twisting deformation consistent with being under power at the time of impact.

Medical and Pathological Information

The South Plains Forensic Pathology, P.A., Lubbock, Texas, conducted an autopsy of the pilot. The cause of death for the pilot was attributed to "blunt force injuries of head, neck, torso and extremities."

The FAA Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma, performed toxicology testing on specimens from the pilot. The toxicology results were negative for all tests.

Administrative Information

Investigator In Charge (IIC):	Liedler, Courtney
Additional Participating Persons:	Craig M Patterson; FAA FSDO; Lubbock, TX Kurt Gibson; Continental Motors Inc; Mobile, AL Brian J Weber; Textron Aviation; Wichita, KS
Original Publish Date:	July 5, 2017
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=91269