National Transportation Safety Board
Aviation Accident Final Report

Location:	Bowie, TX	**Accident Number:**	CEN14FA438
Date & Time:	08/15/2014, 1535 CDT	**Registration:**	N127BC
Aircraft:	CESSNA 414	**Aircraft Damage:**	Destroyed
Defining Event:	Loss of control in flight	**Injuries:**	2 Fatal
Flight Conducted Under:	Part 91: General Aviation - Personal		

Analysis

The multi-engine airplane was about 500 ft above ground level (agl) and on a left base landing approach when a witness saw the airplane suddenly point straight down, begin spinning, and make three complete rotations before impacting terrain in a partially nose-down attitude. The airplane came to rest upright, and was mostly consumed by an immediate postimpact fire. A postaccident examination of the wreckage revealed no evidence of preimpact mechanical malfunctions or failures that would have precluded normal operation. A pilot operating another pipeline patrol airplane in the vicinity reported frequent severe-to-extreme turbulence about 1,000-2,000 ft above ground level. Data from an on-board GPS unit indicated that, while on the base leg of the airport traffic pattern for landing, the accident airplane's airspeed decayed 10 knots below the manufacturer's recommended approach speed for turbulent conditions.

An autopsy performed on the pilot found significant existing atherosclerotic disease (60 to 80 percent) and described evidence of an acute, premortem, nonocclusive thrombosis of the left anterior descending coronary artery. The medical examiner's conclusion stated it "appears the decedent likely suffered an acute cardiac event while piloting his aircraft" and "died primarily due to hypertensive and atherosclerotic cardiovascular disease and that his multiple blunt force injuries likely contributed to his death."

It is likely that the pilot was incapacitated due to the acute cardiac event and lost control of the airplane during the approach to land.

Probable Cause and Findings

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

The pilot's incapacitation in flight as the result of a an acute cardiac event, which resulted in a loss of control and collision with terrain.

Findings

Aircraft	Performance/control parameters - Not attained/maintained (Cause)
Personnel issues	Cardiovascular - Pilot (Cause)
Environmental issues	Turbulence - Effect on operation

Factual Information

History of Flight

Approach-VFR pattern final	Loss of control in flight (Defining event) Aerodynamic stall/spin
Uncontrolled descent	Collision with terr/obj (non-CFIT)
Post-impact	Explosion (post-impact) Fire/smoke (post-impact)

On August 15, 2014, about 1535 central daylight time, a Cessna 414 multi-engine airplane, N127BC, was destroyed after impacting terrain near Bowie Municipal Airport (0F2), Bowie, Texas. The pilot and passenger were fatally injured. The airplane was registered to and operated by the pilot. Day visual meteorological conditions (VMC) prevailed at the time of the accident and a flight plan had not been filed for the 14 Code of Federal Regulations Part 91 personal flight. The airplane had departed from La Porte Municipal Airport (T41), La Porte, Texas, at 1344 and was destined for 0F2.

The airplane was about 500 feet above ground level (agl) and on a left base for a south landing when a witness saw the airplane suddenly point straight down, begin spinning, and make three complete rotations before impacting the ground. Evidence at the scene showed the airplane had impacted in a nose down attitude, came to rest upright, and was mostly consumed by the immediate postimpact fire.

Pilot Information

Certificate:	Commercial	**Age:**	51, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	Unknown
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:**	03/05/2014
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	07/30/2014
Flight Time:	(Estimated) 1200 hours (Total, all aircraft), 15 hours (Total, this make and model)		

The pilot, age 51, held a Federal Aviation Administration (FAA) commercial pilot certificate with ratings in airplane single engine land, airplane multi-engine land, and instrument airplane. He also held an FAA third-class medical certificate, issued on March 5, 2014, which

included a restriction "must wear corrective lenses".

The pilot's personal logbooks were not available for examination by the NTSB during the course of the investigation. Based on a review of copies of partial pilot logbook entries, FAA documents, and statements from witnesses and other persons, the pilot's total flight experience on August 15, 2014, 2014, was estimated as about 1,200 hours in all aircraft, which included an estimated 15 hours of pilot experience in Cessna 414 airplanes, with all of those 15 hours accumulated in the previous 90 days.

A certificate of training showed that the pilot completed initial and recurrent training in a Cessna 414 airplane on July 30, 2014, and he then met the biennial flight review requirements 14 CFR 61.56.

Aircraft and Owner/Operator Information

Aircraft Make:	CESSNA	**Registration:**	N127BC
Model/Series:	414	**Aircraft Category:**	Airplane
Year of Manufacture:	1974	**Amateur Built:**	No
Airworthiness Certificate:	Normal	**Serial Number:**	414-0519
Landing Gear Type:	Retractable - Tricycle	**Seats:**	8
Date/Type of Last Inspection:	06/17/2014, Annual	**Certified Max Gross Wt.:**	6765 lbs
Time Since Last Inspection:		**Engines:**	2 Reciprocating
Airframe Total Time:	4256 Hours as of last inspection	**Engine Manufacturer:**	CONTINENTAL MOTORS
ELT:	C91 installed, not activated	**Engine Model/Series:**	TSIO-520-N
Registered Owner:	On file	**Rated Power:**	335 hp
Operator:	On file	**Operating Certificate(s) Held:**	None

The low-wing, retractable landing gear, pressurized, multi-engine airplane, manufacturer's serial number (s/n) 414-0519 was manufactured in 1974. It was powered by two, 335-horsepower Continental Motors TSIO-520 series turbo-charged engines and each engine drove a three-bladed, variable pitch, full-feathering, McCauley propeller.

The left engine was built in 1972 and was converted from a TSIO-520-K1A to a TSIO-520-N on September 17, 1997 via a RAM Aircraft conversion. The right engine was built in 1973 and was converted from a TSIO-520-K2A to a TSIO-520-NB on June 27, 1997 via a RAM Aircraft conversion in accordance with FAA approved Supplemental Type Certificate (STC) SA8424SW-D.

The airplane was equipped with Micro Aerodynamics vortex generators, which were installed

in June 1997, in accordance with FAA approved STC SA7984SW.

Complete aircraft maintenance logbooks could not be located during the course of the investigation. Based on the partial logbook entries available, FAA records, and other documents, the accident airplane had been returned to service following a satisfactory annual inspection on June 17, 2014, when the recorded aircraft total flight time was 4,256.4 hours. Logbook entries show that the left engine, s/n 217630-73K, then had a total of 4,300.2 hours, with 1,139.4 hours since left engine overhaul. Logbook entries show that the right engine, s/n 217929-73K, then had a total of 5,265.8 hours, with 783.0 hours since right engine overhaul. Total flight times after the annual inspection in June, 2014, could not be determined.

FAA records showed the airplane had been initially registered to the pilot on July 14, 2014.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	**Condition of Light:**	Day
Observation Facility, Elevation:	K0F2, 1100 ft msl	**Distance from Accident Site:**	1 Nautical Miles
Observation Time:	1535 CDT	**Direction from Accident Site:**	179°
Lowest Cloud Condition:	Clear	**Visibility**	10 Miles
Lowest Ceiling:		**Visibility (RVR):**	
Wind Speed/Gusts:	9 knots / 14 knots	**Turbulence Type Forecast/Actual:**	/ Clear Air
Wind Direction:	150°	**Turbulence Severity Forecast/Actual:**	/ Severe
Altimeter Setting:	29.92 inches Hg	**Temperature/Dew Point:**	35°C / 17°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	LA PORTE, TX (T41)	**Type of Flight Plan Filed:**	None
Destination:	Bowie, TX (0F2)	**Type of Clearance:**	None
Departure Time:	1344 CDT	**Type of Airspace:**	Class G

At 1535 the Automated Surface Observation System (AWOS) at 0F2 reported wind from 150 degrees at 9 knots gusting to 14 knots, wind direction 100 degrees variable 170 degrees, visibility 10 miles, sky clear, temperature 35 degrees Celsius (C), dew point temperature 17 degrees C, with an altimeter setting of 29.92 inches of mercury.

The AWOS indicated a variable wind at the time of the accident, which produced a tailwind condition for the airplane on a left base leg to runway 17, and would have resulted in a left crosswind component of about 14 knots during landing.

A witness operating a pipeline patrol airplane at about 2,000 feet agl in the vicinity at the time of the accident reported he had an in-flight air temperature of about 37 to 40 degrees C, and he

described severe to extreme turbulence in frequent strong low-level thermals, which created sudden downdrafts and resulted in his airplane suddenly losing altitude. He reported it was not just turbulence or thermals and associated sink. It was like the airplane "completely stopped flying and just fell straight down".

A National Weather Service (NWS) upper air sounding indicated a high estimated cloud base about 9,000 feet agl, immediately above a defined temperature inversion. The sounding indicated strong thermals through 9,000 feet due to the intense surface heating, and the warm core high pressure system dominating over the region. The lowest 1,000 feet was also noted to have a super-adiabatic lapse rate, which would have likely enhanced any thermal bubbles developing at low levels as reported by the pipeline patrol witness.

The NWS sounding wind profile also indicated the strongest wind was 15 knots from 140 degrees at 2,000 feet mean sea level (msl). The winds decreased above this level and there were no other strong vertical wind shears associated with any turbulence layers below 18,000 feet

Data from the National Oceanic and Atmospheric Administration showed that, at the accident location, at 1535, the altitude of the sun was about 56 degrees above the horizon and the azimuth of the sun was about 241 degrees. Sunset occurred at 2018.

Airport Information

Airport:	BOWIE MUNI (0F2)	**Runway Surface Type:**	Asphalt
Airport Elevation:	1100 ft	**Runway Surface Condition:**	Dry
Runway Used:	17	**IFR Approach:**	None
Runway Length/Width:	3603 ft / 60 ft	**VFR Approach/Landing:**	Full Stop; Traffic Pattern

The FAA Airport/Facility Directory, South Central U. S., indicated that 0F2 was a non-towered airport with a field elevation of 1,100 feet msl. The only runway was 17-35, which was an asphalt runway 3,603 feet long by 60 feet wide. Runway 17 was oriented to 174 degrees true and 167 degrees magnetic.

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:	1 Fatal	**Aircraft Fire:**	On-Ground
Ground Injuries:	N/A	**Aircraft Explosion:**	On-Ground
Total Injuries:	2 Fatal	**Latitude, Longitude:**	33.620556, -97.774167 (est)

The wreckage was located on a rural flat grassy pasture area about 1-mile north from 0F2 at an estimated terrain elevation of about 1,105 feet msl. A postimpact fire consumed major portions of the fuselage and wings and thermally damaged much of the vegetation within a diameter of about 100 feet.

Evidence at the scene showed the airplane impacted terrain in a partially nose-down attitude, coming to rest upright with the fuselage oriented on a magnetic heading of 135 degrees. Dirt ejecta was observed on a debris direction of about 150 degrees. The initial impact ground scars were located under the wreckage and no other ground scars were observed.

Emergency responders reported that the pilot was found in the left front cockpit seat and the passenger was found in the rear passenger cabin area, but the passenger's specific seat location could not be determined. Thermal damage to the lap belts and shoulder harness straps prevented a determination of safety belt restraint usage by either the pilot or the passenger.

The major components of the airplane remained attached. All flight control surfaces remained attached. The left wing remained intact. The right wing remained attached, but exhibited a forward bend in the leading edge along the lateral axis, outboard of the engine nacelle. The aft spar of the right wing separated outboard of the engine nacelle. Deformation in the nose structure indicated an impact crush angle of approximately 15 degrees nose down.

The nose gear and left and right main landing gear were all observed to be extended. The flaps were observed extended to about 35 degrees. Impact damage and thermal damage prevented a determination of the selected position of either the landing gear handle or the flap handle.

Flight control continuity was mostly confirmed for the rudder, elevators, and the left aileron. Flight control continuity was mostly confirmed for the right aileron except for a cable fracture in the inboard right wing area.

Both engines remained attached to the airframe. The left propeller remained attached to the propeller flange, and two of the three blades remained attached to the propeller hub. The third blade separated from the propeller hub, and was found underneath the engine. The separated blade was bent aft, and exhibited chord-wise and span-wise paint erosion. The two blades that remained attached displayed little visible damage. The right propeller remained attached to the propeller flange, and two of the three blades remained attached to the propeller hub. The third blade separated from the propeller hub, and was found beneath the engine. The separated blade was bent aft, and exhibited chord-wise and span-wise paint erosion. The two blades that remained attached displayed little visible damage.

Both cockpit throttle controls were observed in the closed position and the control levers were bent over the quadrant to the left. Both mixture controls were observed in the position of about 1/4 forward travel. The left engine propeller control was observed in the position of about 1/2 forward travel. The right engine propeller control was observed in the position of about 3/8 forward travel.

The left fuel selector handle was found in the left position and the left fuel selector valve was found between the left and off positions. The position of the right fuel selector handle could not

be determined. The right fuel selector valve was found in the right position. The left and right fuel strainer screens sustained thermal damage and the left and right fuel strainer bowls contained molten debris.

The on-scene examination of the wreckage revealed no evidence of preimpact mechanical malfunctions or failures that would have precluded normal operation.

Both engines and both propellers were removed from the wreckage and were further examined.

Communications

There was no record of any radio communications with N127BC. The Unicom radio frequency at 0F3 was not recorded.

Medical And Pathological Information

An autopsy was performed on the pilot by the Southwestern Institute of Forensic Sciences, Office of the Medical Examiner, in Dallas, Texas.

The autopsy found significant existing atherosclerotic disease (60 to 80 percent) and described evidence of an acute, premortem, non-occlusive thrombosis of the left anterior descending coronary artery.

The medical examiner's conclusion stated it "appears the decedent likely suffered an acute cardiac event while piloting his aircraft" and "died primarily due to hypertensive and atherosclerotic cardiovascular disease and that his multiple blunt force injuries likely contributed to his death."

Forensic toxicology was performed on specimens from the pilot by the FAA Civil Aerospace Medical Institute (CAMI), Oklahoma City, Oklahoma. The toxicology report stated that tests for carbon monoxide and for cyanide were not performed, ethanol was not detected in vitreous, and no listed drugs were detected in blood.

Tests And Research

The wreckage was moved to another location and examined.

Left engine

The engine exhibited impact damage and thermal damage from the postimpact fire. The induction filter was crushed and fire damaged. Numerous components of the induction system

were destroyed by the postimpact fire. The throttle valve was observed in the idle (closed) position. The left magneto mounting flange was fractured and the magneto was separated from the topside of the engine. The ignition harness remained attached to the magneto. Both magnetos were examined. The sparkplug electrodes displayed a normal wear pattern and little-to-no combustion deposits when compared to the Champion Aviation Service Manual (AV6-R).

The fuel pump flange was fractured and the fuel pump was displaced downward on the backside of the engine. The pump sustained impact and thermal damage. The aneroid bellows were separated from the pump and the valve shaft sustained deformation damage. The drive coupling was fractured with the fracture surface being deformed to one side.

The throttle body sustained fire damage that resulted in the separation of the metering unit from the body. The metering unit sustained thermal and deformation damage to the levers and shafts. The fuel inlet screen was removed and found to be free from any obstructions.

The fuel manifold remained secured to the topside of the engine and the cap was safety-wired to the housing. The fuel injector lines remained attached to the manifold valve. Disassembly of the fuel manifold valve revealed that the screen was clear, the diaphragm was in place, intact, and pliable, and the plunger was attached.

All of the injector nozzles were clear and free from obstructions. The upper deck reference line remained secured around the nozzles. The O-rings were in place and no anomalies were noted. The oil sump was flattened and displaced up into the bottom of the engine. The oil sump was punctured. The oil and scavenge pumps contained residual oil. No anomalies were noted with the pump gears. The oil pump housing displayed some circular scoring on the cap and a half-inch score mark on the housing wall. The oil pump housing contained charred oil that flaked off when touched. The oil filter was examined.

The cylinders were bore scoped during the on-scene portion of the examination with no anomalies noted. During the teardown examination the cylinders were removed and the cylinder barrels, cylinder heads, valves and valve seats were examined. The cylinder heads and valves displayed normal combustion deposits. The rocker arms and shaft were examined. The pistons were intact with normal combustion deposits noted on the piston faces. The piston pins were intact and showed no signs of operational distress. All of the piston rings were intact and lubricated.

The engine case halves were separated and inspected. The crankshaft, bearings, connecting rods, counterweights, camshafts and camshaft lobes were examined. The lifters, accessory gears, starter, starter adaptor, alternator, and propeller governor were examined. The turbocharger, turbo controller, waste gate, and overboost valve were examined.

Right engine

The engine exhibited impact damage and thermal damage from the postimpact fire. The induction filter was crushed. Numerous components of the induction system were destroyed by the postimpact fire. The throttle valve was observed in the idle (closed) position. Both magnetos were examined. The sparkplug electrodes displayed a normal wear pattern and little-to-no combustion deposits when compared to the Champion Aviation Service Manual (AV6-R).

The fuel pump remained secured to the backside of the engine, but sustained thermal damage that destroyed the aneroid housing and distorted much of the fuel pump housing. The drive coupling remained intact but was bent. The coupling insert area of the drive shaft was displaced. The metering unit sustained thermal and deformation damage to the levers and shafts. The fuel inlet fitting was destroyed. The inlet screen was examined and the soldered joints for the screen were melted away. The screen was covered in soot and re-solidified molten metal.

The fuel manifold remained secured to the topside of the engine and the cap was safety-wired to the housing. The fuel injector lines remained attached to the manifold valve. Disassembly of the fuel manifold valve revealed that the screen was clear, the diaphragm was in place, intact, and pliable, and the plunger was attached.

All of the injector nozzles were clear and free from obstructions. The upper deck reference line remained secured around the nozzles. The O-rings were in place and no anomalies were noted. The oil sump and oil filter were examined.

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Propellers

Both propellers had impact damage consistent with a low amount of rotational energy absorption. Although there was evidence of rotation at impact, with low engine power during the impact, the exact engine power levels could not be determined. Neither propeller had indications consistent with high power at impact.

Neither propeller had impact signature markings or component positions indicating the blades had been in the feathered blade angle range. Both propellers had several indications of operating near the low pitch to latch angle position at the time of impact. Neither propeller had evidence of damage to the latch arrowheads or the latch mechanism that would indicate latch engagement during at the time of impact. There was no evidence of any type of fatigue failure.

Blades on both propellers had blade bending, twisting, and overall propeller assembly damage typical of low engine power at impact.

The examination of the entire wreckage revealed no evidence of preimpact mechanical malfunctions or failures that would have precluded normal operation.

Electronic Devices

A Garmin GPSmap 696 handheld GPS device was removed from the wreckage and sent to the NTSB vehicle recorder laboratory in Washington, D.C. Data was successfully extracted from the GPSmap 696 and included 81 sessions from September 10, 2013, through August 15, 2014. The accident flight was identified and consisted of 878 data points starting from 1333:57 and ending at 1535:26 on August 15, 2014.

Data showed that, as the airplane neared 0F2, the northbound airplane began to descend about 1534:16 and turned left to enter a left base turn to land on runway 17 at 0F2. During the descent, the airplane's groundspeed gradually decreased. The aircraft's GPS altitude and groundspeed decreased from a GPS altitude of 2,249 feet msl and 132 knots at 1534:16 to its final recorded value of 1,528 feet msl and 80 knots at 1535:26, when the airplane had then continued its left turn from westbound to generally southwest bound,

A Hoskins CFS-2002 fuel flow indicator, an Apple iPhone 4S, and a Blackberry personal electronic device (PED) were removed from the wreckage and sent to the NTSB vehicle recorder laboratory in Washington, D.C. Thermal damage to the Hoskins CFS-2002 fuel flow indicator, Apple iPhone 4S, and Blackberry PED prevented a download of any data and no further work was performed.

Additional Information

According to the Cessna 414 Pilot's Operating Handbook and FAA approved Airplane Flight Manual and Flight Manual Supplements: the airplane had a clean configuration stall speed at zero degrees bank angle of 83 knots indicated airspeed (KIAS) and a landing configuration stall speed at zero degrees bank angle of 71 KIAS. The landing configuration stall speed at a bank angle of 40 degrees was listed as 81 KIAS.

According to 14 CFR 23.73 "Reference landing approach: (b) For normal ... category reciprocating engine-powered airplanes of more than 6,000 pounds maximum weight ... the reference landing approach speed, VREF, must not be less than ... 1.3 VSO".

According to the FAA Airplane Flying Handbook (Page 8-17) "TURBULENT AIR APPROACH AND LANDING "Power-on approaches at an airspeed slightly above the normal approach speed should be used for landing in turbulent air. This provides for more positive control of the airplane when strong horizontal wind gusts, or up and down drafts, are experienced. ... One procedure is to use the normal approach speed plus one-half of the wind gust factors ... An adequate amount of power should be used to maintain the proper airspeed and descent path throughout the approach, and the throttle retarded to idling position only after the main wheels contact the landing surface".

Administrative Information

Investigator In Charge (IIC):	Thomas Latson	**Adopted Date:**	01/26/2017
Additional Participating Persons:	Gavin M Hill; FAA North Texas FSDO; Irving, TX Cameron S Baker; FAA North Texas FSDO; Irving, TX Brian J Weber; Textron Aviation; Wichita, KS Nicole L Charnon; Continental Motors Inc; Mobile, AL Danny L Ball; McCauley Propeller Systems; Wichita, KS Rick Roper; RAM Aircraft, LP; Waco, TX		
Publish Date:	01/26/2017		
Note:	The NTSB traveled to the scene of this accident.		
Investigation Docket:	http://dms.ntsb.gov/pubdms/search/dockList.cfm?mKey=89889		