



National Transportation Safety Board Aviation Accident Final Report

Location:	Hampton Roads, Virginia	Accident Number:	ERA14LA006
Date & Time:	October 10, 2013, 12:09 Local	Registration:	N4TK
Aircraft:	Cessna 340A	Aircraft Damage:	Destroyed
Defining Event:	Loss of control in flight	Injuries:	4 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The instrument-rated pilot was on a cross-country flight. According to air traffic control records, an air traffic controller provided the pilot vectors to an intersection to fly a GPS approach. Federal Aviation Administration radar data showed that the airplane tracked off course of the assigned intersection by 6 nautical miles and descended 800 ft below its assigned altitude before correcting toward the initial approach fix. The airplane then crossed the final approach fix 400 ft below the minimum crossing altitude and then continued to descend to the minimum descent altitude, at which point, the pilot performed a missed approach. The missed approach procedure would have required the airplane to make a climbing right turn to 2,500 ft mean sea level (msl) while navigating southwest back to the intersection; however, radar data showed that the airplane flew southeast and ascended and descended several times before leveling off at 2,800 ft msl. The airplane then entered a right 360-degree turn and almost completed another circle before it descended into terrain. Examination of the wreckage revealed no evidence of any preimpact mechanical malfunctions or failures.

During the altitude and heading deviations just before impact, the pilot reported to an air traffic controller that adverse weather was causing the airplane to lose "tremendous" amounts of altitude; however, weather radar did not indicate any convective activity or heavy rain at the airplane's location. The recorded weather at the destination airport about the time of the accident included a cloud ceiling of 400 ft above ground level and visibility of 3 miles.

Although the pilot reported over 4,000 total hours on his most recent medical application, the investigation could not corroborate those reported hours or document any recent or overall actual instrument experience. In addition, it could not be determined whether the pilot had experience using the onboard GPS system, which had been installed on the airplane about 6 months before the accident; however, the accident flight track is indicative of the pilot not using the GPS effectively, possibly due to a lack of proficiency or familiarity with the equipment.

The restricted visibility and precipitation and maneuvering during the missed approach would have been conducive to the development of spatial disorientation, and the variable flightpath off the intended course was consistent with the pilot losing airplane control due to spatial disorientation.

Toxicological tests detected ethanol and other volatiles in the pilot's muscle indicative of postmortem production.

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 airplane control due to spatial disorientation in low-visibility conditions while maneuvering during a missed approach. Contributing to the accident was the pilot's ineffective use of the onboard GPS equipment.

Findings

Personnel issues	Spatial disorientation - Pilot
Personnel issues	Aircraft control - Pilot
Aircraft	(general) - Not attained/maintained
Personnel issues	Use of equip/system - Pilot
Personnel issues	Knowledge of equipment - Pilot

Factual Information

History of Flight

Approach-IFR missed approach	Loss of control in flight (Defining event)
Uncontrolled descent	Collision with terr/obj (non-CFIT)

On October 10, 2013, about 1209 eastern daylight time, a Cessna 340A, N4TK, collided with the ground while maneuvering in the vicinity of Hampton Roads Executive Airport (PVG), Norfolk, Virginia. The commercial pilot and three passengers were fatally injured. The airplane was located in a marsh area and was destroyed by impact forces. The airplane was registered to and operated by the pilot under the provisions of 14 Code of Federal Regulations Part 91 as a personal flight. Instrument meteorological conditions (IMC) prevailed and an instrument flight rules (IFR) flight plan was filed. The flight originated from Fort Lauderdale Executive (FXE), Fort Lauderdale, Florida, about 0743. This accident occurred during a government shutdown, and the National Transportation Safety Board and Federal Aviation Administration (FAA) did not travel to examine the wreckage at the accident scene.

According air traffic control (ATC) radio communication information and radar data provided by the Federal Aviation Administration, about 1144 the flight was cleared for the GPS RWY 10 instrument approach at PVG. During the arrival segment of the approach the flight tracked off course by 6 nm, paralleling the direction of the final approach course, before correcting and proceeding toward the initial approach fix.

The airplane crossed PEFOC, the final approach fix, at 1,200 feet msl. The published minimum altitude for crossing PEFOC was 1,600 feet msl. The published minimum descent altitude (MDA) for the approach when utilizing only lateral GPS guidance was 420 feet msl. The pilot flew the approach and descended the airplane to the approximate MDA according to radar data.

The flight reached the missed approach point and, based on weather radar data, began the missed approach and flew southeast, into an area showing no precipitation. The published missed approach procedure was a climbing right turn to 2,500 feet while navigating direct to PSALM, which was located generally southwest of the airport. Radar data showed the flight's altitude varied drastically during the initial part of the missed approach.

At 12:04:59, the flight began a descent from 1,100 feet to 700 feet msl; then made an abrupt right turn and began to climb. At 12:05:31, the flight started a decent from 1,600 feet to 1,000 feet and turned about 45 degrees back to the left, away from the correct direction. During this time, ATC attempted to contact the pilot four times, and received no response. The flight continued on an approximate 155-degree magnetic track, and gradually climbed to 2,700 feet msl. At 12:07:13 the flight began to turn to the right and began descending, and descended from 2,700 feet to 1,600 feet msl. During the descent, the flight's ground speed increased from 151 to 214 knots. The flight then abruptly climbed, and the ground speed decreased from 214 knots to 140 knots, before leveling at 2,800 feet msl. The ground speed continued decreasing to 107 knots, and about that time the pilot radioed ATC and requested an airport with greater than "500 feet visibility."

The controller provided weather information for the Norfolk International Airport (ORF), Norfolk, Virginia, which was 12 nm northeast of the pilot's position. During this transmission, the airplane's rate of descent, ground speed, and rate of turn all increased. When ATC personnel queried the pilot about whether to go to ORF, the pilot responded, "Standby, we're fighting some bad weather, and it's causing us to lose altitude tremendously."

At 12:09:08, the flight maintained a constant rate of turn, from about a track of about 030 to 231 degrees. Between 12:08:26 and 12:09:08, the airplane's ground speed increased from 107 knots to 225 knots. Radar data showed the final descent from 2,800 feet to 1,200 feet msl, which was the last radar return from the flight.

Pilot Information

Certificate:	Commercial	Age:	61
Airplane Rating(s):	Single-engine land; Multi-engine land	Seat Occupied:	Unknown
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 2 With waivers/limitations	Last FAA Medical Exam:	June 3, 2013
Occupational Pilot:	No	Last Flight Review or Equivalent:	
Flight Time:	(Estimated) 5541 hours (Total, all aircraft), 600 hours (Total, this make and model), 1260 hours (Pilot In Command, all aircraft), 40 hours (Last 90 days, all aircraft)		

The pilot, age 61, held a commercial pilot certificate, and according to his most recent application for an FAA medical certificate, dated June 3, 2013, he reported a total of 4,256 flight hours. The pilot was issued a second-class medical certificate with limitations requiring the use of corrective lenses. A review of partial copies of the pilot's logbook revealed that he had accumulated a total of 6.4 flight hours as of September 21, 2013. No flight hour totals from previous logbooks were carried forward into the logbook examined, and none of the pilot's previous logbooks were recovered.

According to the logbook, on September 13, 2013, the pilot received a "sign off" from a certificated flight instructor in the accident airplane. During a telephone interview, the flight instructor stated that the pilot handled the airplane "well," and that pilot had previous flight experience the accident airplane make and model. The flight instructor finally noted that their flight did not include instrument procedures and that the pilot did not have previous experience operating the airplane's Garmin GTN-750 GPS.

The pilot's instrument currency could not be established due to the limited amount of information contained within the recovered logbook. In a telephone conversation with a representative of the pilot's insurance carrier, the representative noted that the pilot had provided some information about his flight experience in an insurance policy application dated September 11, 2013. On that application the pilot reported a total time of 5,541 hours, 3,076 hours multi-engine, 600 hours in the accident airplane make

and model, and 40 hours in the last 90 days.

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	Registration:	N4TK
Model/Series:	340A A	Aircraft Category:	Airplane
Year of Manufacture:	1979	Amateur Built:	
Airworthiness Certificate:	Normal	Serial Number:	340A0777
Landing Gear Type:	Retractable - Tricycle	Seats:	6
Date/Type of Last Inspection:	April 30, 2013 Annual	Certified Max Gross Wt.:	5990 lbs
Time Since Last Inspection:		Engines:	2 Reciprocating
Airframe Total Time:	4045.2 Hrs as of last inspection	Engine Manufacturer:	CONT MOTOR
ELT:	C91A installed, not activated	Engine Model/Series:	TSIO-520 SER
Registered Owner:		Rated Power:	
Operator:		Operating Certificate(s) Held:	None

The twin-engine airplane was manufactured in 1979, and was powered by two Continental model TSIO-520 series engines equipped with Hartzell PHC-C3YF-2UF propellers. Review maintenance records showed an annual inspection was completed on April 30, 2013, at a recorded airframe total time of 4,045.20 hours. The altimeters, automatic pressure altitude reporting equipment, ATC transponder and static pressure system were all tested on May 17, 2012, and were found compliant with regulations that governed the units. The airplane was equipped with a Garmin GTN-750 navigation system that was also installed at the time of the inspection.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument (IMC)	Condition of Light:	Day
Observation Facility, Elevation:	PVG, 23 ft msl	Distance from Accident Site:	5 Nautical Miles
Observation Time:	11:55 Local	Direction from Accident Site:	160°
Lowest Cloud Condition:	Unknown	Visibility	5 miles
Lowest Ceiling:	Overcast / 500 ft AGL	Visibility (RVR):	
Wind Speed/Gusts:	8 knots /	Turbulence Type Forecast/Actual:	/
Wind Direction:	360°	Turbulence Severity Forecast/Actual:	/ Moderate
Altimeter Setting:	29.92 inches Hg	Temperature/Dew Point:	18° C / 18° C
Precipitation and Obscuration:	Moderate - Showers - Rain		
Departure Point:	Fort Lauderdale, FL (FXE)	Type of Flight Plan Filed:	IFR
Destination:	Hampton Roads, VA (PVG)	Type of Clearance:	IFR
Departure Time:	07:43 Local	Type of Airspace:	

The recorded weather at the Chesapeake Regional Airport (CPK), Norfolk, Virginia, located 4.21 miles from the accident site at an elevation of 19 feet, at 1155, included calm wind, 7 statute miles visibility, light rain, a broken ceiling at 600 feet above ground level (agl), overcast skies at 1,100 feet agl, temperature of 21 degrees Celsius (C), dew point temperature of 20 degrees C, and an altimeter setting of 29.88 inches of mercury.

The conditions at 1235 included calm wind, 5 statute miles visibility, light rain, an overcast ceiling at 600 feet agl, temperature of 21 degrees C, dew point temperature of 21 degrees C, and an altimeter setting of 29.87 inches of mercury.

The PVG reported weather conditions at 1135 located 6.58 miles from the accident site at an elevation of 28 feet, included wind from 360 degrees at 8 knots, varying in direction between 320 and 020 degrees, 3 statute miles visibility, an overcast ceiling at 400 feet agl, temperature of 19 degrees C, dew point temperature of 18 degrees C, and an altimeter setting of 29.92 inches of mercury.

The PVG reported weather conditions at 1235 were winds from 360 degrees at 7 knots with gusts to 17 knots, wind variable between 330 and 030 degrees, 9 miles visibility, an overcast ceiling at 500 feet agl, temperature of 18 degrees C, dew point temperature of 17 degrees C, and an altimeter setting of 29.91 inches of mercury.

A Meteorological Impact Statement (MIS) was issued at 0932 and was valid for the accident site at the accident time. The MIS warned of IFR ceilings, visibilities between 1 and 5 miles, rain, and mist for Virginia. It also warned of light to moderate turbulence below FL420 with thunderstorms along the Virginia and North Carolina coast

Airmen's Meteorological Information Tango and Sierra issued at 1045, and valid at the accident time, forecasted IMC for the accident site with ceilings below 1,000 feet, visibilities below 3 statute miles in precipitation and mist, and moderate turbulence below 8,000 feet.

ORF, located 14 miles northeast of the accident site, was the closest location with a terminal area forecast (TAF). The TAF issued at 0735 forecast for the time period from 1100, winds 040 degrees at 18 knots with gust 26 knots, 5 miles visibility, light rain and fog, overcast 600 feet agl; from 1400, wind from 060 at 14 knots with 21 knot gust, 5 miles visibility, drizzle and fog, overcast 900 feet agl; and from 1700, wind from 020 at 10 knots with 18 knots gust, 5 miles visibility, drizzle and fog, broken at 900 feet agl and overcast at 1,500 feet agl.

There was no record of the pilot having received a preflight weather briefing from a Lockheed Martin Flight Service facility, nor was there a record of the pilot having received a briefing through the Direct User Access Terminal Service.

Airport Information

Airport:	Hampton Roads PVG	Runway Surface Type:	
Airport Elevation:	23 ft msl	Runway Surface Condition:	
Runway Used:		IFR Approach:	Circling;ILS
Runway Length/Width:		VFR Approach/Landing:	None

Wreckage and Impact Information

Crew Injuries:	1 Fatal	Aircraft Damage:	Destroyed
Passenger Injuries:	3 Fatal	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	4 Fatal	Latitude, Longitude:	36.780277,-76.44889(est)

According to first responders, the airplane came to rest on a northeast heading. The wreckage debris field was about 150 feet long. At the end of the debris field, there was an impact crater 8 feet wide, 30 feet long, and about 4 feet deep. All flight control surfaces, controls, and cable hardware were observed at the wreckage site and were impact-damaged.

An examination of the airframe revealed that all of the trim settings were unreliable due to impact damage. The rudder remained attached to the vertical stabilizer and the rudder trim tab remained attached to the rudder. The left elevator was separated from the horizontal stabilizer. The right elevator remained attached to the horizontal stabilizer and the elevator trim tab remained attached to the elevator. The left aileron was separated into two sections, with the trim tab attached. The right aileron was separated into three sections.

Examination of the fuel system revealed that only one fuel selector valve was found loose in the wreckage and it was in the "OFF" position and the strainer screen was free of debris. The fuel caps for both wing tip tanks and both aux fuel tanks were observed in place and latched. The aircraft was equipped with a left and right wing locker fuel tanks, and the wing locker tank fuel caps were not recovered.

Examination of the left engine revealed that all of the cylinders were impact-damaged. The engine crankshaft was rotated by hand, and all cylinders displayed thumb compression. All cylinders were examined using a borescope and displayed varying amounts of mud impaction and normal operating signatures. The three blade, variable pitch propeller remained attached to the propeller flange; however, the propeller flange had sheered from the crankshaft. The spinner remained attached to the propeller and displayed signatures of impact damage. All three of the blades remained within the propeller hub and were locked in place. Two of the three blades displayed varying amounts of tip curling; the third blade displayed minor bending of the tip. All three of the propeller blades had minor bending deformation.

Examination of the right engine revealed all cylinders were impact-damaged. All cylinders were examined using a borescope, and the cylinders displayed normal operating signatures. The crankcase displayed impact damage concentrated to the bottom portion of the crankcase. The crankshaft was unable to be rotated by hand, and it was noted that the crankshaft had shifted towards the rear of the case. There were no anomalies noted with the crankcase. The three blade, variable pitch propeller remained attached to the propeller flange; however, the propeller flange had broken free from the crankshaft. The propeller displayed damage consistent with impact damage and the spring and spring housing had separated from the propeller hub. All three blades remained within the propeller hub; however, all three blades were loose in the hub. One blade's tip had broken free from the rest of the blade; the blade also displayed twisting deformation. One blade was bent approximately 90-degrees and displayed tip curling. The third blade displayed minor bending and tip curling deformation.

Additional Information

Spatial Disorientation

The FAA publication Medical Facts for Pilots (AM-400-03/1), described several vestibular illusions associated with the operation of aircraft in low visibility conditions. Somatogyral illusions, those involving the semicircular canals of the vestibular system, were generally placed into one of four categories, one of which was the "graveyard spiral." According to the text, the 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 latitude.

" 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."

Medical and Pathological Information

An autopsy was performed on the pilot on December 15, 2013, by the Commonwealth of Virginia, Office of the Chief Medical Examiner, Norfolk, Virginia.

Forensic toxicology was performed on specimens from the pilot by the FAA Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma. The toxicology report stated no drugs were detected in the muscle. Ethanol in concentrations of 73 (mg/dL, mg/hg), N-Butanol and N-Propanol were detected in the muscle.

Administrative Information

Investigator In Charge (IIC):	Alleyne, Eric
Additional Participating Persons:	Micheal L Dows; FAA; Richmond, VA Kurt Gibson; Continental Motors; Mobile, AL Andrew Hall; Textron Aviation; Wichita, KS
Original Publish Date:	January 5, 2016
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.nts.gov/Docket?ProjectID=88245

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The Independent Safety Board Act, as codified at 49 U.S.C. Section 1154(b), precludes the admission into evidence or use of any part of an NTSB report related to an incident or accident in a civil action for damages resulting from a matter mentioned in the report. A factual report that may be admissible under 49 U.S.C. § 1154(b) is available [here](#).