Aviation Investigation Final Report

Location:	Benicia, California	**Accident Number:**	WPR17FA200
Date & Time:	September 9, 2017, 14:13 Local	**Registration:**	N7215J
Aircraft:	RAYTHEON AIRCRAFT COMPANY G36	**Aircraft Damage:**	Substantial
Defining Event:	Aerodynamic stall/spin	**Injuries:**	2 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The private pilot and passenger departed for a personal cross-country flight. Radar data indicated that the flight track after takeoff was consistent with the course to the destination airport. During the first few minutes of flight, the radar data indicated that the airplane was in a climb. However, during the last 2 minutes of flight, as the airplane neared its level-off altitude, the airplane's speed had decreased and was approaching the stall speed, which was between 68 and 73 knots, depending on the airplane's bank. The calibrated airspeed was calculated to be about 62 knots at the last radar return. At that time, the airplane had entered a right turn and was rapidly descending. The airplane impacted terrain about 9 miles from the departure airport.

Postaccident examination of the airframe and engine revealed no anomalies that would have precluded normal operation. Signatures at the accident site and the damage to the airplane indicated a near vertical impact, which was consistent with an aerodynamic stall.

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 adequate airspeed which caused the airplane to exceed its critical angle of attack and led to an aerodynamic stall.

Findings

Personnel issues	Aircraft control - Pilot
Aircraft	Airspeed - Not attained/maintained
Aircraft	Angle of attack - Not attained/maintained
Personnel issues	Total experience w/ equipment - Pilot

Factual Information

History of Flight

Initial climb	Aerodynamic stall/spin (Defining event)
Uncontrolled descent	Collision with terr/obj (non-CFIT)

On September 9, 2017, about 1413 Pacific daylight time, a Raytheon Aircraft Company G36 airplane, N7215J, sustained substantial damage when it impacted terrain in Benicia, California about 9 miles northwest of the Buchanan Field Airport (CCR), Concord, California. The private pilot and passenger were fatally injured. The airplane was registered to Vallee Development Corporation and the pilot was operating the airplane as a Title 14 *Code of Federal Regulations* Part 91 personal flight. Visual meteorological conditions prevailed at the time of the accident, and no flight plan had been filed for the cross-country flight. The flight originated from CCR about 1406 and was destined for California Redwood Coast-Humboldt County Airport, Arcata-Eureka, California.

Radar data revealed that the airplane departed from CCR on a northwest heading, which was consistent with its intended destination. The first few minutes of the data showed the airplane in a climb. The surface winds in the area were about 330° at 12 knots, which would give the airplane about a 12-knot headwind during climb out. The airplane continued the climb to a maximum altitude of about 2,500 ft mean sea level (msl).

The last two minutes of the data revealed that the airplane's ground speed began to decrease as the airplane was nearing its level off altitude. During the last 15 seconds of data, the airplane's ground speed further decreased. At 1412:29, when the airplane was at an altitude of 2,400 ft msl, the ground speed was 69 knots; at 1412:32, the airplane was still at an altitude of 2,400 ft msl, but the ground speed had decreased to 56 knots. At 1412:42, the time of the last data return, the airplane's ground speed was 55 knots and the airplane's altitude had decreased by 600 ft to 1,800 ft msl, at a descent rate of about 3,600 ft per minute. In addition, the radar data showed that the airplane had entered a sharp right turn.

The Federal Aviation Administration (FAA) issued an alert notification for the airplane at 1926 after a family member reported that the airplane was overdue. A search ensued, and the Civil Air Patrol located the airplane wreckage the next morning near the top of a hillside in Benicia, California.

Pilot Information

Certificate:	Private	**Age:**	67,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	3-point
Instrument Rating(s):	None	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 3 Without waivers/limitations	**Last FAA Medical Exam:**	May 6, 2017
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	(Estimated) 528 hours (Total, all aircraft), 2.7 hours (Total, this make and model)		

Passenger Information

Certificate:		**Age:**	43,Male
Airplane Rating(s):		**Seat Occupied:**	Right
Other Aircraft Rating(s):		**Restraint Used:**	3-point
Instrument Rating(s):		**Second Pilot Present:**	No
Instructor Rating(s):		**Toxicology Performed:**	No
Medical Certification:		**Last FAA Medical Exam:**	
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:			

The pilot held a private pilot certificate with an airplane single-engine land rating. The pilot had received a high-performance airplane endorsement on March 18, 2003, and a complex airplane endorsement on May 8, 2015. He also held a third-class airman medical certificate issued on May 6, 2017, with no limitations. A review of the pilot's logbook revealed that he had accumulated about 528 hours of total flight experience. Most of the pilot's flight time was logged in Piper PA-28 and Cessna C-182 airplanes. He had logged 3 flights, for a total duration of 2.7 hours, in the accident airplane. The three flights occurred in July 2017, with the accident pilot operating as the pilot-in-command and no dual time was logged that may have indicated flight training.

The passenger held a student pilot certificate and a third-class medical certificate dated February 21, 2003. The passenger did not reapply for the medical certificate after it expired and did not receive a pilot's license.

Aircraft and Owner/Operator Information

Aircraft Make:	RAYTHEON AIRCRAFT COMPANY	**Registration:**	N7215J
Model/Series:	G36 NO SERIES	**Aircraft Category:**	Airplane
Year of Manufacture:	2006	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	E-3715
Landing Gear Type:	Retractable - Tricycle	**Seats:**	
Date/Type of Last Inspection:	December 3, 2016 Annual	**Certified Max Gross Wt.:**	4000 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	1535.6 Hrs as of last inspection	**Engine Manufacturer:**	Continental
ELT:	C91A installed, not activated	**Engine Model/Series:**	IO-550B-39B
Registered Owner:	On file	**Rated Power:**	300 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

The Raytheon Aircraft Company G36 was a six-seat, low-wing, retractable-gear airplane, that was manufactured in 2006. The G36 is a variant of the Beechcraft Bonanza 36 airplane.

The airplane was powered by a Continental IO-550-B39B engine with a three-bladed constant speed propeller. The engine was modified with a Tornado Alley Turbo, turbonormalizer system (under Supplemental Type Certificate SA5223NM), which was installed on September 19, 2008. The airplane's maintenance records showed that the most recent airframe annual inspection was completed on December 3, 2016, with a Hobbs meter time of about 1,536 hours. The most recent engine inspection occurred on August 14, 2017; at that time, the Hobbs meter time was about 1,600 hours.

According to the *Beechcraft Model G36 Bonanza Pilot's Operating Handbook and FAA Approved Airplane Flight Manual,* the airplane's stall speed at an airplane weight of 3,600 pounds and flaps up, was 68 knots indicated airspeed (KIAS) at a 0° bank angle, and 73 KIAS at a 30° bank angle. Using calibrated airspeed reflected about the same stall speeds in the chart.

The *Airplane Flight Manual Supplement -550*, for airplanes with engines that have the turbonomalizer system installed, increased the airplane's takeoff gross weight to 4,000 pounds. The manual supplement stated that the performance of airplanes equipped with the turbonormalizer system "is equal to or better than the performance listed in the original flight manual." The manual supplement also stated that when operating the airplane at the increased weights authorized, the pilot should expect a decreased rate of climb of up to 13% and to increased stall speeds of up to 7%.

The airplane's most recent weight and balance form was not located during the investigation, and the airplane's weight and balance at the time of the accident could not be determined. Paperwork submitted to the FAA's Aircraft Registration Branch in April 2017, when the pilot purchased the airplane, showed that the airplane's maximum gross weight was 4,000 pounds, and that the useful load was 1,209 pounds.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	CCR,26 ft msl	**Distance from Accident Site:**	9 Nautical Miles
Observation Time:	13:53 Local	**Direction from Accident Site:**	155°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	12 knots /	**Turbulence Type Forecast/Actual:**	/ None
Wind Direction:	330°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.95 inches Hg	**Temperature/Dew Point:**	30°C / 17°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	CONCORD, CA (CCR)	**Type of Flight Plan Filed:**	None
Destination:	ARCATA/EUREKA, CA (ACV)	**Type of Clearance:**	None
Departure Time:	14:06 Local	**Type of Airspace:**	Unknown

The 1353 weather observation at CCR, (about 20 minutes before the accident occurred) indicated the following conditions: wind 330° at 12 knots, visibility 10 statute miles, sky clear, temperature 30°C, dew point 17°C, and an altimeter setting of 29.96 inches of mercury.

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 Fatal	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 Fatal	**Latitude, Longitude:**	38.106666,-122.126113(est)

The airplane came to rest on top of a mesa on flat terrain with dense vegetation at an elevation of about 587 ft msl. The fuselage was in an upright position on a magnetic heading of about 125°. Most of the fuselage and engine were contained within an area that measured about 8 ft long, 4 ft wide, and 1 ft deep. The engine was partially buried in the ground. All major structural components of the airplane were located within the wreckage debris area.

The airplane damage and ground signatures were consistent with a wings-level, nose-down, high angle-impact with terrain.

The airplane's wings remained attached to the fuselage but sustained significant compression damage. The leading edges of both wings were crushed aft to the spar. The left and right leading- edge skins, and

the main fuel bladders, were ruptured and their fragments were scattered about 170 ft in front of the airplane. The front and bottom portions of the wing tip tanks sustained compression damage corresponding to about a 60° nose-down impact angle. The landing gear and flaps were retracted.

Flight control cable continuity was confirmed from all flight control surfaces to the forward floor assembly area. The elevator trim remained attached to the respective sprocket, and the left and right actuators indicated a position of about 2° to 3° tab up.

The empennage and cabin roof had been removed by first responders. The empennage was separated from the fuselage about 2 ft forward of the vertical stabilizer. The rudder and elevators were attached at all their respective attachment points.

The engine sustained impact damage and was separated from its mounts. The propeller separated at the crankshaft, just aft of the propeller flange, and was located near the engine in the wreckage debris area. Two of the three blades were bent aft about mid-span and two of the three blades exhibited twisting. A hole was observed in the right section of the crankcase between cylinders Nos. 1 and 3 that was consistent with impact forces. All of the accessories mounted on the rear of the engine sustained damage.

The airframe and engine were further examined at the Plain Parts facility in Pleasant Grove, California. The examination revealed no evidence of preimpact mechanical malfunctions or failures that would have precluded normal operation.

Medical and Pathological Information

An autopsy of the pilot was performed by the Solano County Sherriff's Office, Fairfield, California. The autopsy determined that the pilot's cause of death was "multiple blunt force injuries."

Toxicology testing was performed on the pilot and passenger at the FAA Forensic Sciences Laboratory. The results for the pilot and the passenger were negative for tested drugs. The testing identified ethanol and propanol in the pilot's muscle and liver samples. The testing also identified ethanol in the passenger's brain and muscle samples.

The ethanol detected in the pilot's muscle and liver samples had differing concentrations. Additionally, the presence of propanol, an alcohol produced postmortem along with ethanol and other alcohols, in the pilot's sample's suggested that some or all of the alcohol present was from sources other than consumption. The small amounts of ethanol detected in the passenger's samples also suggested that some or all of the alcohol present was from sources other than consumption.

Additional Information

According to the FAA's *Handbook of Aeronautical Knowledge*, "true airspeed (TAS) is calibrated airspeed (CAS) corrected for nonstandard altitude and temperature…therefore, for a given CAS, TAS increases as altitude increases. A pilot can find TAS by two methods. The most accurate method is the use of a flight computer…A second method, which is a rule of thumb, provides the approximately TAS. Simply add 2 percent to the CAS for each 1,000 ft of altitude." The handbook also states that the groundspeed is "the actual speed of the airplane over the ground. It is TAS adjusted for wind. Groundspeed decreases with a headwind and increases with a tailwind."

On the accident flight the groundspeed on the last radar return, at an altitude about 2,500 ft, was 55 knots. Adjusting the groundspeed for about a 12-knot headwind would make the TAS about 67 knots. A calculation using the atmospheric pressure, temperature, and airplane's speed, revealed that the CAS was about 5 knots slower than the TAS. Therefore, CAS was estimated to be about 62 knots at the last return.

The FAA's *Airplane Flying Handbook,* states "transition to a complex airplane, or high-performance airplane, can be demanding for most pilots without previous experience. Increased performance and complexity both require additional planning, judgement, and piloting skills. Transition to these type airplanes, therefore, should be accomplished in a systematic manner through a structured course of flight training by a qualified flight instructor."

Six SD data cards associated with a Garmin G1000 system were located at the accident site. The cards were provided to the NTSB's Vehicle Recorders Division for potential data download. In addition, an engine temperature sensor found at the accident site was provided to the Vehicle Recorders Division to determine if the sensor contained non-volatile memory and could be a source of engine data for the investigation. Some of the SD cards could be read, but they contained data that were not pertinent to the investigation. The engine sensor was not capable of recording data.

Administrative Information

Investigator In Charge (IIC):	Nixon, Albert
Additional Participating Persons:	Mathew DeSeelhorst; Federal Aviation Adminstration; Oakland, CA Michael Council; Continental Motors; Mobile, AL Peter Basile; Textron Aviation; Wichita, KS
Original Publish Date:	November 6, 2019
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=95972