Aviation Investigation Final Report

Location:	Ventura, California	**Accident Number:**	WPR17FA117
Date & Time:	June 1, 2017, 11:55 Local	**Registration:**	N3683C
Aircraft:	Cessna 180	**Aircraft Damage:**	Destroyed
Defining Event:	Aircraft structural failure	**Injuries:**	1 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The private pilot was conducting a local, personal flight over mountainous terrain. Several witnesses near the accident site reported that they heard a loud sound. Two witnesses stated that before hearing the loud sound, it sounded like the engine was powering up. Another witness stated that after hearing the loud sound, he looked up and saw the airplane spinning towards the ground, and that the engine and both wings had separated from the airplane.

During postaccident examination of the airplane, no pre-existing cracks or anomalies with the horizontal stabilizers, elevators, or wing structures were found. Additionally, the airplane was likely operated within the weight and balance limitations. Further, no preaccident anomalies with the flight controls were found that would have precluded normal airplane control. Damage noted at the wing and empennage separation points indicated that all cables were intact before the breakup. However, damage and deformation were observed on the right horizontal stabilizer and elevator that was consistent with a significant download that exceeded the capabilities of the structure. The wings had separated from the airplane, and the fractures and deformations were consistent with a negative overload failure of the wings.

Examination of the left horizontal stabilizer and elevator could not conclusively determine the cause of the damage and deformation but indicated that it was likely caused by a partial downward failure. The loads required to fail the horizontal stabilizers and elevators could not have been generated by normal flight or control movements. Such failures would have required the pilot to abruptly pull back on the yoke and move the elevator to a trailing-edge-up position, at speeds higher than the airplane's maneuvering speed. A review of the radar data returns indicated that before the in-flight breakup, the airplane was accelerating and had reached a speed that was higher than its maneuvering speed.

Given the radar data and wreckage examinations, it is likely that the pilot performed an abrupt and substantial pull up maneuver, while flying the airplane above maneuvering speed, which caused a downward failure of the right horizontal stabilizer and partial downward failure of the left horizontal

stabilizer, which resulted in the airplane rapidly pitching nose down. Subsequently, the wings were overloaded in the negative direction and fragmented due to the abnormal aerodynamic loads. It could not be determined why the pilot would suddenly pull up; no radar returns or structural damage indicative of airplanes or birds were detected in the area. Further, a review of the weather information revealed that no significant weather or turbulence was reported or forecast in the accident area around the time 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 abrupt and substantial pullup maneuver while flying the airplane above the maneuvering speed, which resulted in an in-flight breakup. The reason for the pilot's maneuver could not be determined based on the available evidence.

Findings

Aircraft	Climb capability - Capability exceeded
Aircraft	Airspeed - Capability exceeded
Aircraft	Pitch control - Capability exceeded
Aircraft	Horizontal stabilizer - Capability exceeded
Aircraft	Elevators - Capability exceeded
Aircraft	Spar (on wing) - Capability exceeded
Personnel issues	Aircraft control - Pilot
Not determined	(general) - Unknown/Not determined

Factual Information

History of Flight

Enroute	Abrupt maneuver
Enroute	Aircraft structural failure (Defining event)
Uncontrolled descent	Collision with terr/obj (non-CFIT)

On June 1, 2017, about 1155 Pacific daylight time, a Cessna 180 airplane, N3683C, experienced an in-flight breakup and was destroyed when it impacted terrain about 7 miles west-northwest of Ventura, California. The private pilot was fatally injured. The airplane was registered to the pilot who was operating it as a Title 14 *Code of Federal Regulations* Part 91, local personal flight. Visual meteorological conditions existed along the flight route, and no flight plan had been filed. The flight departed Santa Paula Airport, Santa Paula, California, about 1110.

Several witnesses near the accident site reported hearing a loud sound. Two witnesses stated that before hearing the loud sound, it sounded like the engine was powering up. Another witness stated that after hearing the loud sound, he looked up and saw the airplane spinning towards the ground, and that the engine and both wings had separated from the airplane. He added that, when he first saw the airplane, the tail section was still attached to the main cabin.

Pilot Information

Certificate:	Private	**Age:**	52,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 With waivers/limitations	**Last FAA Medical Exam:**	May 11, 2016
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	(Estimated) 1100 hours (Total, all aircraft)		

The pilot held a private pilot certificate with an airplane single-engine land rating. The pilot was issued a Federal Aviation Administration (FAA) third-class airman medical certificate on May 11, 2016, with the limitation that he must wear corrective lenses.

The pilot reported on the application for this medical certificate that he had accumulated 1,100 total hours of flight experience and had logged 50 flight hours in the 6 months before the examination. The pilot's logbook was not located during the investigation.

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	**Registration:**	N3683C
Model/Series:	180 UNDESIGNAT	**Aircraft Category:**	Airplane
Year of Manufacture:	1954	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	31182
Landing Gear Type:	Tailwheel	**Seats:**	
Date/Type of Last Inspection:	May 14, 2017 Annual	**Certified Max Gross Wt.:**	2550 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	4566.1 Hrs as of last inspection	**Engine Manufacturer:**	CONT MOTOR
ELT:	C91 installed, activated, did not aid in locating accident	**Engine Model/Series:**	O-470 SERIES
Registered Owner:	On file	**Rated Power:**	230 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

The high-wing, fixed gear, all metal airplane, was manufactured in 1954. It was powered by a 230 horsepower Continental O-470-S series engine that drove a two-bladed McCauley 2A34C66-NP constant speed propeller.

A review of maintenance logbooks revealed that the airplane's most recent annual inspection was completed on May 14, 2017, at a total time of 4,566.1 hours. In January 2005, the outboard right wing and right elevator were repaired due to damage from a ground event. In November 2016, the horizontal stabilizer was rebuilt, the right elevator repaired, and the pitch trim actuators were replaced with new units.

The Airplane Owner's Manual (AOM) listed the maximum load factor as +3.8 g and the minimum load factor as -1.5 g. Additionally, it listed the maximum structural cruising speed as 160 mph (139 knots) and the maneuvering speed (Va) as 122 mph (106 knots). Full flight control application at any speed greater than Va could result in g-loads that exceeded the design limits.

Weight and Balance

The distribution of the airplane's contents throughout the debris field prevented an accurate weight and balance assessment, and the airplane's most recent weight and balance records were not located. Therefore, an estimated weight and balance calculation was conducted. According to the AOM, the airplane had a factory basic weight of 1,520 lbs. The FAA's airman certification system reported that the pilot's weight was 185 lbs. Assuming a total fuel load of 55 gallons, the airplane would have been about several hundred pounds below its maximum gross weight of 2,550 lbs and within CG limits, at the time of the accident.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	KOXR,36 ft msl	**Distance from Accident Site:**	10 Nautical Miles
Observation Time:	11:51 Local	**Direction from Accident Site:**	137°
Lowest Cloud Condition:	Scattered / 2300 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	7 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	240°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.88 inches Hg	**Temperature/Dew Point:**	19°C / 13°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	SANTA PAULA, CA (SZP)	**Type of Flight Plan Filed:**	None
Destination:	SANTA PAULA, CA (SZP)	**Type of Clearance:**	None
Departure Time:	11:10 Local	**Type of Airspace:**	Class G

The 1151 weather observation at Oxnard Airport, Oxnard, California, located about 10 miles southeast of the accident site, reported wind 240° at 7 knots, visibility 10 statute miles, scattered clouds at 2,300 ft, temperature 19º C, dew point 13º C, and an altimeter setting of 29.89 inches of mercury.

A review of the weather information revealed that no significant weather or turbulence was reported or forecast in the accident area around the time of the accident. The local weather surveillance radars for the 1 hour before and after the accident, detected no weather echoes over the area for that period.

An AIRMET, valid at the time of the accident, was issued for instrument flight rules conditions along the western coast of the United States with cloud ceilings below 1,000 ft above ground level and visibility below 3 miles and mist. No AIRMET Tango advisories for turbulence, or low-level wind shear, or SIGMETS, were valid in the area at the time of the accident.

The wind speed at the accident area around the time of the accident was estimated to be from the southwest between 5 and 8 knots from the surface to about 2,000 ft mean sea level (msl). However, wind modeling estimated a high probability of moderate or greater turbulence between 2,300 ft msl and 3,300 ft msl.

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Fatal	**Latitude, Longitude:**	34.318054,-119.340278(est)

The airplane impacted mountainous terrain, at an elevation of about 1,015 ft msl, and the debris was scattered throughout an oil field. The main wreckage was located on a mountaintop, in a cleared area where oil extraction equipment and associated facilities were located. The main wreckage consisted of the fuselage starting from the nose and ending just short of the vertical stabilizer. The main fuselage had come to rest upright between two parallel sets of power lines. One power line was fractured and ran underneath the fuselage.

Most of the recovered debris was located within about ½ mile south of the main wreckage. Some smaller, lighter pieces of wreckage were recovered farther south. The part found farthest from the main wreckage was a section of the right wing, which was found about 1.5 miles south of the main wreckage. All major components of the airplane were recovered in the debris field.

The inboard left wing was found about 295 ft southeast of the fuselage. The empennage, which had separated from the airplane as a unit and included the horizontal stabilizers, vertical stabilizer, left elevator, rudder, and tailwheel, was found about 455 ft south-southeast of the fuselage; the right wing was located about 420 ft south-southeast of the fuselage. Fragments of both wings and the engine, elevator counterweights, right elevator, and cabin door were also found along the debris path.

The engine and propeller had separated from the airplane and were found embedded in an asphalt road about 510 ft southwest of the fuselage. The engine case had fractured through the engine mounts, and the engine case fractures all had a dull, grainy appearance, consistent with ductile overload.

Examination of the engine revealed no evidence of any preimpact malfunctions or failures that would have precluded normal operation.

No damage or paint transfer marks were observed on the wreckage, indicating that the airplane likely did not collide with a foreign object. An area of paint transfer was observed on the right side of the vertical stabilizer, that matched the color of other airplane parts, which was consistent with it being struck by these other airplane parts during the in-flight break up.

Structures Examination

Both wings separated during the in-flight break up. The forward spars of each wing were examined in detail because they are most affected by the wing bending loads. The fractures and deformations were determined to be consistent with a negative overload failure of the wings. Further fragmentation of the wings was due to abnormal aerodynamic loads. No corrosion or pre-existing cracking was observed on any of the spar fracture surfaces.

Examination of the empennage revealed that the right horizontal stabilizer sustained damage and was deformed down and aft, and the leading edge was twisted down about 90°. Additionally, the right horizontal stabilizer's spars were fractured, and the upper and lower surfaces were buckled diagonally in line with the deformation. The right elevator had separated but exhibited similar downward deformation. The damage and deformation of the right stabilizer and elevator were consistent with a significant down load that exceeded the capabilities of the structures.

Examination of the left horizontal stabilizer revealed that it was deformed upward about 20°. The left horizontal stabilizer's spars were fractured, and the upper and lower surfaces were buckled diagonally in line with the deformation. The left elevator remained attached, and it sustained deformation damage that was in line with the left horizonal stabilizer. Examination of the left horizontal stabilizer and elevator could not conclusively determine the cause of the damage and deformation but indicated that it likely was caused by a partial downward failure.

Control continuity was established to all primary flight controls and the pitch trim. Damage noted at the wing and empennage separation points indicated that all control cables were intact before the breakup. All fractured flight control cables had a splayed, broom-strawed appearance, consistent with tension overload.

The pitch trim's design enabled the entire stabilizer to be trimmed to meet different load and speed conditions. The pitch trim actuators remained installed in the tail and could be actuated normally. The pitch trim chain remained engaged with the sprockets on the lower end of the actuators. The trim wheel position for takeoff was to be at an incidence angle of -3°. Further, the cockpit pitch trim wheel was observed to be slightly forward of the takeoff position, well within the trim range indicator.

Medical and Pathological Information

The Ventura County Medical Examiner's Office, Ventura, California, conducted an autopsy on the pilot. The medical examiner determined that the cause of death was "blunt force injuries."

The FAA's Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma, performed toxicological testing on the pilot. Testing was negative for ethanol and all tested for drugs.

Tests and Research

Airplane Performance

An airplane performance study that was conducted using radar data that started at 1152:42. A review of the data revealed that the airplane was flying a relatively steady southwesterly (between 230° and 240°), which continued for the next 2 minutes 49 seconds. However, the airplane gained speed towards the end

of the data. Starting at 1153:55, the groundspeed increased from 82 to 127 knots, in 67 seconds. The calculated calibrated airspeeds were less than the maximum structural cruising speed of 139 knots, but higher than the maneuvering speed of 106 knots. Any large control surface deflection during this time would have put the airframe at risk for structural overstress.

The calculated groundspeed was consistent with flight until 1155:31, at which time the groundspeeds dropped significantly, and the calculated flight track deviated considerably. The final primary radar returns were not indicative of the continued flight path; given this evidence, the loss of groundspeed, and the debris field, they were likely radar returns from individual pieces of broken up airplane. No other radar returns were noted near the accident site.

Administrative Information

Investigator In Charge (IIC):	Nixon, Albert
Additional Participating Persons:	Frank Motter; Federal Aviation Administration; Van Nuys, CA Andrew Hall; Textron Aviation; Wichita, KS Kurt Gibson; Continental Motors; Mobile, AL
Original Publish Date:	May 29, 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=95280