



# Aviation Investigation Final Report

<b>Location:</b>	Gurdon, Arkansas	<b>Accident Number:</b>	CEN17FA071
<b>Date &amp; Time:</b>	January 5, 2017, 12:39 Local	<b>Registration:</b>	N972JK
<b>Aircraft:</b>	COLUMBIA AIRCRAFT MFG LC41 550FG	<b>Aircraft Damage:</b>	Destroyed
<b>Defining Event:</b>	Loss of control in flight	<b>Injuries:</b>	2 Fatal
<b>Flight Conducted Under:</b>	Part 91: General aviation - Personal		

## Analysis

The private pilot and pilot-rated passenger were conducting a cross-country flight in the airplane. The pilot's communications with air traffic control (ATC) were unremarkable until the pilot requested an instrument flight rules (IFR) clearance to climb to 25,000 ft mean sea level (msl) to do an "equipment test"; at that time, the airplane was at a cruise level of 17,500 ft msl. The controller granted the pilot's request, and radar showed that the airplane climbed to 25,000 ft, where it remained for about 3 minutes and 25 seconds. The pilot then requested to descend to 17,500 ft, and the airplane started to descend before the controller could issue a clearance. The controller then cleared the pilot to descend to 19,000 ft and asked the pilot if everything was alright. The pilot responded that the airplane was experiencing an "equipment issue" and requested to cancel the IFR clearance. The controller cleared the pilot to descend and maintain 17,000 ft and asked if he needed assistance. The pilot responded that he was "okay for now." About 1 minute later, the pilot declared an emergency. The controller requested the pilot to state the nature of the emergency, but the pilot's response was unintelligible. The controller attempted to contact the airplane without success. Radar data showed that the airplane descended more than 17,000 ft in 2 minutes 12 seconds, and radar contact with the airplane was lost when the airplane descended to an altitude of about 3,100 feet.

The airplane impacted terrain in an almost-vertical nose-down orientation, and a postimpact fire ensued. The recovered airframe pieces were examined, but, due to the severe airframe fragmentation, flight control continuity could only be established from the rudder surface to overload separations on the control cables leading to the cockpit. One of the two speedbrake modules was found deployed. The airplane's fuel, environmental, anti-icing, and oxygen systems and cockpit gauges and instruments could not be examined due to severe impact and fire damage. Examinations of the engine, propeller, and turbochargers revealed no anomalies that would have precluded normal operation, and propeller signatures were consistent with low power at the time of impact.

According to weather information, the airplane was most likely not in clouds during the descent from 25,000 to about 6,000 ft, so airplane icing was not likely. The airplane would likely have been in clouds below 6,000 ft, but the airplane likely remained in visual meteorological conditions during that part of the descent and entered instrument meteorological condition immediately before impacting the terrain. The pilot radioed that the airplane was having "an equipment issue," but, due to the severe impact and postcrash fire damage to the airplane's systems, neither the specific equipment issue nor the reason why the airplane descended rapidly could be determined.

The pilot had evidence of use of amphetamine. However, because the blood results are from heart blood and amphetamine undergoes significant post mortem redistribution which may increase central levels (such as heart levels) by 3-8 times, the blood level cannot be used to determine whether the pilot was using the drug medicinally or abusing it. Similarly, the urine drug level of 7 could have been the result of either medicinal use or abuse. While it is likely that the pilot had some psychoactive effects from his use of amphetamine at the time of the accident, whether or not it was impairing could not be determined from this investigation. The pilot rated passenger's toxicology testing demonstrated evidence of previous use of marijuana. However, no active/parent THC was identified in brain. Since THC is stored in brain and can remain there for long periods, this indicates the pilot rated passenger's use of THC was likely several days before. It is therefore unlikely that the pilot rated passenger was impaired by his use of marijuana during the flight. Overall, it is unlikely the pilot rated passenger was impaired by his use of marijuana at some point prior to the accident. The investigation was unable to determine if the pilot's use of amphetamine was medicinal or misuse and was unable to determine from the available information whether its likely psychoactive effects, present during the flight, were impairing.

## Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The loss of control in flight for reasons that could not be determined because of the severe impact and postcrash fire damage to the airplane and the lack of information about the airplane emergency that the pilot was experiencing.

### Findings

<b>Not determined</b>	(general) - Unknown/Not determined
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# Factual Information

## History of Flight

Enroute	Emergency descent initiated
Enroute	Loss of control in flight (Defining event)
Uncontrolled descent	Collision with terr/obj (non-CFIT)

On January 5, 2017, about 1239 central standard time, a Columbia Aircraft 400-LC41 airplane, N972JK, impacted terrain near Gurdon, Arkansas, after a rapid descent. The private pilot and the pilot-rated passenger were fatally injured. The airplane was destroyed from impact forces and postcrash fire. The airplane was registered to JMK3 Lands, LLC, and was operated by the pilot under the provisions of 14 *Code of Federal Regulations* Part 91. Visual meteorological conditions prevailed at the time of the accident. No flight plan had been filed before the cross-country personal flight. The flight originated from McKinney National Airport (TKI), McKinney, Texas, about 1145 with an intended destination of Macon County Airport (1A5), Franklin, North Carolina.

According to the air traffic control (ATC) transcript and radar information, the airplane was at a cruise altitude of 17,500 ft mean sea level (msl) when the pilot requested, at 1217:22, an instrument flight rules (IFR) clearance to climb to 25,000 feet msl to do an "equipment test," but he did not specify what equipment needed to be tested. The pilot also provided the controller with the required information for a "pop up" IFR clearance. Radar data showed that, about 1229, the airplane climbed to 25,000 ft; at 1232:21, the pilot requested to descend back to 17,500 ft. Radar data showed that the airplane had started to descend before the controller could clear the pilot to descend to 19,000 ft. At 1233:03 and 1233:17, the controller asked the pilot "is everything alright"? The pilot responded that the airplane was "having a little bit of an equipment issue" and requested to cancel the IFR clearance. The controller cleared the pilot to descend and maintain 17,000 ft and queried if he needed any assistance. The pilot responded that he was "okay right now." At 1236:39, the pilot declared an emergency, and the ATC controller requested the pilot to state the nature of the emergency. The pilot's response was unintelligible. The controller attempted to contact the airplane but received no response from the pilot. The controller asked other airplanes that were operating in the area to try to contact the pilot, but no responses were received.

Radar data showed that the airplane had rapidly descended from 20,400 ft at 1236:01 to 3,100 ft at 1238:13. No further radar returns were recorded, and no distress calls from the airplane were heard by ATC or other aircraft operating in the area. The airplane impacted terrain about 1239.

According to a report provided by the Clark County, Arkansas, Sheriff's Department, an ATC controller contacted the sheriff's department about an airplane in distress. The controller indicated that, at the time of the airplane's last known coordinates, the airplane was 5.6 miles east of Gurdon, Arkansas. The airplane wreckage was located shortly afterward by the pilot of and spotters in an Arkansas State Police helicopter.

## Pilot Information

Certificate:	Private	Age:	40,Male
Airplane Rating(s):	Single-engine land	Seat Occupied:	Left
Other Aircraft Rating(s):	None	Restraint Used:	Unknown
Instrument Rating(s):	None	Second Pilot Present:	Yes
Instructor Rating(s):	None	Toxicology Performed:	Yes
Medical Certification:	Class 3 Without waivers/limitations	Last FAA Medical Exam:	June 1, 2016
Occupational Pilot:	No	Last Flight Review or Equivalent:	
Flight Time:	(Estimated) 250 hours (Total, all aircraft), 100 hours (Total, this make and model), 1 hours (Last 24 hours, all aircraft)		

## Pilot-rated passenger Information

<b>Certificate:</b>	Private	<b>Age:</b>	36
<b>Airplane Rating(s):</b>	Single-engine land	<b>Seat Occupied:</b>	Right
<b>Other Aircraft Rating(s):</b>	None	<b>Restraint Used:</b>	Unknown
<b>Instrument Rating(s):</b>	Airplane	<b>Second Pilot Present:</b>	Yes
<b>Instructor Rating(s):</b>	None	<b>Toxicology Performed:</b>	Yes
<b>Medical Certification:</b>	Class 3 Without waivers/limitations	<b>Last FAA Medical Exam:</b>	September 16, 2016
<b>Occupational Pilot:</b>	No	<b>Last Flight Review or Equivalent:</b>	
<b>Flight Time:</b>	(Estimated) 450 hours (Total, all aircraft), 10 hours (Total, this make and model), 1 hours (Last 24 hours, all aircraft)		

According to FAA records, the pilot held a private pilot certificate issued on September 6, 2016, with an airplane single-engine land rating. His most recent third-class medical certificate was issued on June 1, 2016, with no limitations. The pilot's flight logbook was not available, but a family member estimated that he had about 250 hours of total flight experience and about 100 hours of flight experience in the accident airplane. Also, this family member stated that the pilot had recently bought a "full face" oxygen mask for the airplane and that he and the pilot-rated passenger had attended a high altitude/hypoxia training course about 3 weeks before the accident.

FAA records also showed that the pilot-rated passenger held a private pilot certificate issued on April 30, 2013, with airplane single-engine land and instrument airplane ratings. His most recent third-class medical certificate was issued on September 16, 2015, with no limitations. The pilot-rated passenger's flight logbook was not available, but a family member estimated that he had about 450 hours of total flight experience and about 10 hours of flight experience in the accident airplane.

## Aircraft and Owner/Operator Information

<b>Aircraft Make:</b>	COLUMBIA AIRCRAFT MFG	<b>Registration:</b>	N972JK
<b>Model/Series:</b>	LC41 550FG 550FG	<b>Aircraft Category:</b>	Airplane
<b>Year of Manufacture:</b>	2007	<b>Amateur Built:</b>	
<b>Airworthiness Certificate:</b>	Normal	<b>Serial Number:</b>	41800
<b>Landing Gear Type:</b>	Tricycle	<b>Seats:</b>	4
<b>Date/Type of Last Inspection:</b>	June 2, 2016 Annual	<b>Certified Max Gross Wt.:</b>	3600 lbs
<b>Time Since Last Inspection:</b>	93 Hrs	<b>Engines:</b>	1 Reciprocating
<b>Airframe Total Time:</b>	418 Hrs	<b>Engine Manufacturer:</b>	CONT MOTOR
<b>ELT:</b>	Installed, not activated	<b>Engine Model/Series:</b>	TSIO-550-C
<b>Registered Owner:</b>	On file	<b>Rated Power:</b>	300 Horsepower
<b>Operator:</b>	On file	<b>Operating Certificate(s) Held:</b>	None

The airplane, serial number 41800, was manufactured in 2007. Cessna acquired the type certificate for the airplane model from Columbia in 2009, and the airplane is sometimes referred to as a Cessna Columbia 400. A Continental Motors TSIO550C engine was installed on the airplane, and a Hartzell three-blade propeller was installed on the engine. The engine's and propeller's most recent 100-hour inspections were completed on June 2, 2016. The airplane was also equipped with an anti-ice system and an oxygen system.

According to a family member, the pilot purchased the airplane in August 2016. Before the accident flight, the airplane had accumulated 418 hours of flight time.

A review of the airplane's available maintenance records did not reveal any outstanding issues. According to the records, the airplane's most recent annual inspection was completed on June 6, 2016, at an airplane total time of 325.5 hours.

According to TKI fueling records, the airplane received 62 gallons of fuel at 1107 on the morning of the accident. TKI service records showed that the airplane had an oil change and oxygen system service that morning.

## Meteorological Information and Flight Plan

<b>Conditions at Accident Site:</b>	Visual (VMC)	<b>Condition of Light:</b>	Day
<b>Observation Facility, Elevation:</b>	ADF,181 ft msl	<b>Distance from Accident Site:</b>	15 Nautical Miles
<b>Observation Time:</b>	11:56 Local	<b>Direction from Accident Site:</b>	190°
<b>Lowest Cloud Condition:</b>	Clear	<b>Visibility</b>	10 miles
<b>Lowest Ceiling:</b>	Broken / 2400 ft AGL	<b>Visibility (RVR):</b>	
<b>Wind Speed/Gusts:</b>	7 knots / None	<b>Turbulence Type Forecast/Actual:</b>	Unknown / Unknown
<b>Wind Direction:</b>	360°	<b>Turbulence Severity Forecast/Actual:</b>	Unknown / Unknown
<b>Altimeter Setting:</b>	30.01 inches Hg	<b>Temperature/Dew Point:</b>	3°C / -2°C
<b>Precipitation and Obscuration:</b>			
<b>Departure Point:</b>	McKinney, TX (TKI )	<b>Type of Flight Plan Filed:</b>	VFR/IFR
<b>Destination:</b>	Franklin, NC (1A5 )	<b>Type of Clearance:</b>	IFR;VFR flight following
<b>Departure Time:</b>	11:45 Local	<b>Type of Airspace:</b>	Class E

A review of the weather information from of the accident indicated a layer of broken to overcast clouds over Texas into Arkansas. A review of the soundings and the local observation indicated favorable conditions for broken to overcast clouds between 2,000 and 6,000 ft.

Dexter B. Florence Memorial Airport, Arkadelphia, Arkansas, was the nearest weather reporting facility, located about 15 miles south of the accident site. The weather observation for 1256 indicated the following: wind from 360° at 7 knots; visibility 10 miles or more; ceiling broken at 2,400 ft above ground level (agl), overcast at 3,700 ft agl; temperature 3°C, dew point -2°C, altimeter 30.01 inches of mercury. Also, a review of the National Weather Service in-flight weather advisories near the accident site found none that were current for turbulence, icing, or instrument conditions below 24,000 ft.

## Wreckage and Impact Information

<b>Crew Injuries:</b>	1 Fatal	<b>Aircraft Damage:</b>	Destroyed
<b>Passenger Injuries:</b>	1 Fatal	<b>Aircraft Fire:</b>	On-ground
<b>Ground Injuries:</b>	N/A	<b>Aircraft Explosion:</b>	None
<b>Total Injuries:</b>	2 Fatal	<b>Latitude, Longitude:</b>	33.90942,-93.140174(est)

The airplane wreckage was found in swampy terrain that was densely vegetated with cypress trees. The wreckage was in a 4-ft-deep muddy, water-filled crater. Snowfall after the accident covered much of the wreckage. The cypress trees above the crater showed evidence of broken limbs at the top of the trees. The airplane was severely fragmented into small pieces, some of which were scattered beside the impact crater, and a postimpact fire had ensued. The wreckage evidence was consistent with a high-speed,

nearly vertical, nose-down impact. The engine was extracted from the crater along with the propeller, which was attached to the crankshaft propeller flange. The propeller spinner was crushed by impact forces but did not exhibit twisting witness characteristics.

The airplane wreckage, engine, and propeller were recovered from the accident site and transported to a secure location for further examination by the NTSB, Cessna, and Continental Motors.

## Airframe

The recovered airframe pieces were laid out to examine the flight controls. Due to the severe fragmentation, flight control continuity could only be established from the rudder surface to overload separations on the control cables leading to the cockpit. The aft elevator push-pull tube was found attached to the elevator torque tube, and the elevator surfaces were found separated from the torque tubes due to impact damage. The elevator trim tab was found in about a 16° tab down angle. One of the two speedbrake modules was deployed. The airframe fuel, environmental, anti-icing, and oxygen systems could not be examined due to the severe impact and postcrash fire damage. Cockpit gauges and instruments also could not be examined due to impact and postcrash fire damage.

## Engine

The ignition harness was impact damaged. The engine could be manually rotated, and crankshaft/camshaft continuity was confirmed. All valves opened and closed normally. Thumb compression was achieved on all cylinders. Mud and water were expelled from each cylinder when the engine was manually rotated.

All six cylinders remained attached at their respective mounts. Cylinder No. 1 exhibited a large crack between the induction port and the intake rocker box cover. Cooling fins were impact damaged. The rocker box covers exhibited minor impact damage but remained attached to each cylinder.

The engine-driven fuel pump remained intact and attached to its mount on the rear of the engine. The fuel hose fittings were damaged from the impact and had separated from the fuel pump. The fuel pump drive coupling was found intact. The fuel pump operated smoothly when manually rotated, and a small amount of fuel was expelled. The fuel manifold, throttle body, and metering unit were intact. Fuel lines from the fuel manifold to individual fuel injectors were damaged from the impact, and the fuel injectors remained intact in each cylinder head.

The induction tube for cylinder No. 1 separated during the engine recovery, and the induction tubes for the Nos. 2 through 6 cylinders remained attached with varying impact damage. The right and left after-cooler assemblies were not recovered. The right forward induction tube assembly was impact damaged, and the left forward induction tube had separated. The upper deck pressure air manifold tubes were impact damaged. The top and bottom spark plugs were removed and inspected, and each spark plug was contaminated with mud from the swamp water and oil. A lighted borescope inspection was accomplished, and all valves were found to be intact and in place.

The oil cooler was attached, but the mounting base was damaged. The oil sump exhibited upward crushing damage due to impact forces. The oil pick-up tube and screen were impact damaged. The oil



filter remained attached to its mount with the safety wire intact. The oil filter was removed and cut open, and the oil filter paper pleats showed no contamination.

The engine was transported to Continental Motors in Mobile, Alabama, for a teardown examination under the supervision of the NTSB and with Continental Motors personnel present. The teardown examination of the engine revealed no mechanical anomalies. For more information, see the engine teardown report in the docket for this accident.

The propeller and turbochargers were transported to Continental Motors for a teardown examination under the supervision of the NTSB and with Continental Motors and Hartzell Propeller personnel present.

The teardown of the propeller and its assembly revealed no mechanical anomalies that would have prevented or degraded normal propeller operation before impact. Preload plate impact marks indicated that the propeller was operating in the normal blade angle range at the time of impact. Blade bending and twisting were consistent with a low power setting and/or windmilling at a high airspeed at the time of impact.

The teardown of the turbochargers revealed no mechanical anomalies that would have prevented or degraded normal turbocharger operation before impact. The right turbocharger compressor housing was bent in a manner consistent with impact forces, and the impeller was impinging on the compressor wheel, preventing rotation. Contact/chatter/rub marks in the compressor housing were consistent with low-speed rotation before impact and a low power condition. All damage to both turbochargers was consistent with high impact forces.

For more information about the propeller and turbochargers, see the teardown report in the docket for this accident.

## **Medical and Pathological Information**

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The Arkansas State Crime Laboratory, Medical Examiner Division, Little Rock, Arkansas, performed an autopsy of the pilot and the pilot-rated passenger. The cause of death for both the pilot and the pilot-rated passenger was multiple injuries.

The FAA's Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma, performed toxicology testing of the pilot. No ethanol or carbon monoxide was detected. Amphetamines were detected in urine (6.97 µg/ml, µg/g) and blood specimens (0.42 µg/ml, µg/g). Amphetamine is a Schedule II controlled substance available by prescription in various forms for the treatment of attention deficit disorders and narcolepsy. It is also a common drug of abuse; peak levels in abuse are typically above 0.04 ug/ml in blood and above 10 ug/ml in urine. However, amphetamine undergoes significant post mortem redistribution which may increase central levels (such as heart levels) by 3-8 times.

Toxicology tests were also performed on the pilot-rated passenger. No ethanol was detected. Carbon monoxide tests were not performed. Tetrahydrocannabinol carboxylic acid (marijuana) was detected in



liver (0.0827 µg/ml, µg/g) and brain specimens (0.0022 µg/ml, µg/g). Tetrahydrocannabinol Carboxylic Acid (THC-COOH), the inactive metabolite of THC (the primary psychoactive component in marijuana) in liver and brain. However, no parent drug (THC) was identified in brain and the liver was unsuitable for further testing.

## Administrative Information

<b>Investigator In Charge (IIC):</b>	Lemishko, Alexander
<b>Additional Participating Persons:</b>	Danny Brickey; FAA FSDO; Little Rock, AR Mike Council; Continental Engines; Mobile, AL Ricardo Asensio; Cessna Aircraft; Wichita, KS
<b>Original Publish Date:</b>	March 18, 2019
<b>Last Revision Date:</b>	
<b>Investigation Class:</b>	<a href="#">Class</a>
<b>Note:</b>	The NTSB traveled to the scene of this accident.
<b>Investigation Docket:</b>	<a href="https://data.nts.gov/Docket?ProjectID=94572">https://data.nts.gov/Docket?ProjectID=94572</a>

The National Transportation Safety Board (NTSB) is an independent federal agency charged by Congress with investigating every civil aviation accident in the United States and significant events in other modes of transportation—railroad, transit, highway, marine, pipeline, and commercial space. We determine the probable causes of the accidents and events we investigate, and issue safety recommendations aimed at preventing future occurrences. In addition, we conduct transportation safety research studies and offer information and other assistance to family members and survivors for each accident or event we investigate. We also serve as the appellate authority for enforcement actions involving aviation and mariner certificates issued by the Federal Aviation Administration (FAA) and US Coast Guard, and we adjudicate appeals of civil penalty actions taken by the FAA.

The NTSB does not assign fault or blame for an accident or incident; rather, as specified by NTSB regulation, “accident/incident investigations are fact-finding proceedings with no formal issues and no adverse parties ... and are not conducted for the purpose of determining the rights or liabilities of any person” (Title 49 *Code of Federal Regulations* section 831.4). Assignment of fault or legal liability is not relevant to the NTSB’s statutory mission to improve transportation safety by investigating accidents and incidents and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report (Title 49 *United States Code* section 1154(b)). A factual report that may be admissible under 49 *United States Code* section 1154(b) is available [here](#).