



AVIATION



HIGHWAY



MARINE



RAILROAD



PIPELINE

Aviation Investigation Final Report

Location:	CHARLOTTE, North Carolina	Accident Number:	MIA99FA180
Date & Time:	June 14, 1999, 12:57 Local	Registration:	N421LL
Aircraft:	Cessna 421C	Aircraft Damage:	Destroyed
Defining Event:		Injuries:	4 Fatal
Flight Conducted Under:	Part 91: General aviation - Executive/Corporate		

Analysis

An aircraft mechanic stated one of the airplanes engines was making an unusual noise during takeoff. An Air Traffic Controller stated the flight used about 4,500 feet of runway before lifting off. About 1 minute after being cleared for takeoff, the pilot reported 'were coming around were losing a right engine'. The controller and a witness observed the airplane level off, sway to the left and right, and then descend. The pilot reported he was not going to make it. The airplane was lost from sight behind trees. Post crash examination of the airplane structure, flight controls, engines, and propellers showed no evidence of pre-crash failure or malfunction that would have prevented operation. The landing gear and wing flaps were found retracted. The left and right propellers were found in the low blade angle position and had similar damage. An NTSB sound study of ATC communications showed that at the time the pilot reported they were not going to make it, a propeller signature showed 1,297 rpm and another propeller signature of 2,160 rpm. The engine inoperative procedure contained in the Pilot Operating Handbook for the Cessna 421C, calls for the throttle on the inoperative engine to be closed, the mixture placed in idle cut-off, and the propeller feathered. The Pilot Operating Handbook also showed the airplane would normally use 2,000 feet of runway for takeoff under the accident conditions.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The failure of the pilot to shutdown the right engine and feather the propeller after a reported loss of power in the engine shortly after takeoff resulting in the airplane descending, colliding with trees and then the ground.

Findings

Occurrence #1: LOSS OF ENGINE POWER

Phase of Operation: TAKEOFF - INITIAL CLIMB

Findings

1. REASON FOR OCCURRENCE UNDETERMINED
 2. (C) ENGINE SHUTDOWN - NOT PERFORMED - PILOT IN COMMAND
 3. (C) PROPELLER FEATHERING - NOT PERFORMED - PILOT IN COMMAND
-

Occurrence #2: IN FLIGHT COLLISION WITH OBJECT

Phase of Operation: DESCENT - UNCONTROLLED

Findings

4. OBJECT - TREE(S)
-

Occurrence #3: IN FLIGHT COLLISION WITH TERRAIN/WATER

Phase of Operation: DESCENT - UNCONTROLLED

Findings

5. TERRAIN CONDITION - GROUND

Factual Information

HISTORY OF FLIGHT

On June 14, 1999, about 1257 eastern daylight time, a Cessna 421C, N421LL, registered to and operated by David Drye Company, LLC., crashed after the pilot reported a loss of power in the right engine, shortly after takeoff from Concord Regional Airport, Concord, North Carolina, while on a Title 14 CFR Part 91 corporate flight to Anderson, South Carolina. Visual meteorological conditions prevailed at the time and no flight plan was filed. The aircraft was destroyed and the commercial-rated pilot and three passengers received fatal injuries. The flight was originating at the time of the accident.

Recorded communications between the pilot of N421LL and air traffic controllers at the Concord Regional Airport, Air Traffic Control Tower, showed that at 1250:00, the pilot reported that the flight was going to Anderson, under visual flight rules, at 4,500 feet. The pilot was cleared to taxi to runway 20. At 1254:39, the pilot was cleared for takeoff on runway 20. At 1255:39, the pilot reported to controllers "were coming around, were losing a right engine". The controller cleared the pilot to land. At 1256:19, the pilot reported "don't think were going to make it". The controller responded and the pilot again stated, "I don't think were going to make it". The controller responded that they are sending out the emergency crews. The pilot responded "yeah". No further transmissions were received from the pilot. See transcript of communications.

The air traffic controller working in the Concord Regional Airport, Air Traffic Control Tower, stated the flight taxied to runway 20 for a visual flight rules departure. He cleared the flight for takeoff and observed the aircraft lift off the runway at approximately the 1,000-foot remaining marker. Shortly after takeoff, the pilot reported he had a right engine failure. The controller notified rescue personnel and cleared the flight to land. The flight leveled off the climb and continued straight ahead. The flight lost altitude and the pilot declared he was not going to make it back to the airport. The flight was then lost from site behind a shopping mall and he then observed black smoke.

A witness who was driving south on Interstate 85 stated he observed the airplane take-off from the Concord Regional Airport, which was on his right side. The airplane climbed normally to about 700 to 800 feet. The airplane then leveled off and swayed to the left and then back to the right. The airplane then swayed to the left again as it descended and then swayed to the right. He lost sight of the airplane as it crossed the shopping center and disappeared behind trees.

An aircraft mechanic who was in a hangar at the Concord Regional Airport stated he heard the airplane begin the take-off. As the airplane passed the hangar he was in, he heard a

sound that he says was like a loose or cracked cylinder head. He turned and saw the airplane in a slow rotation more than halfway down the runway. At that point he was called by another mechanic and did not watch the airplane further.

PERSONNEL INFORMATION

Federal Aviation Administration records showed the pilot held a FAA commercial pilot certificate last issued on December 29, 1982, with airplane single engine land, airplane multiengine land, and instrument airplane ratings. The pilot held a FAA airframe and powerplant mechanic certificate and an inspection authorization. The pilot held a second-class medical certificate, issued on July 8, 1998, with no limitations. The pilot reported on the application for this medical certificate that he had accumulated 7,360 total flight hours and had flown 30 flight hours in the previous 6 months.

The pilot received a Title 14 CFR Part 135 flight check in the Cessna 421C on March 23, 1999. The pilot's family and employer could not locate current logbook records for the pilot after the accident. The pilot reported on an insurance application in 1998, that he had 7,500 total flight hours with 6,000 total flight hours as pilot-in-command in multiengine aircraft. Records obtained from the pilot's employer showed that he attended a Cessna 421 recurrent course on June 21, 1996. See pilot records.

AIRCRAFT INFORMATION

The airplane was a Cessna Aircraft Company model 421C, serial number 421C0305, manufactured in July 1977. At the time of the accident the airplane had accumulated 5,145 total flight hours. The airplane was last inspected on September 3, 1998, 236 flight hours before the accident, when it received an annual inspection. The airplane received an altimeter, static system, and transponder test on October 15, 1997.

The left engine was a Teledyne Continental Motors model GTSIO-520-L, serial number L-604701. At the time of the accident the engine had accumulated 4,469 total flight hours and 1,083 flight hours since remanufacture on August 1, 1994. On December 16, 1998, 154 flight hours before the accident, the left engine was disassembled and the crankcase was changed. The engine received an oil and filter change on January 18, 1999, 124 flight hours before the accident.

The right engine was a Teledyne Continental Motors model GTSIO-520-L, serial number R-265007-R. At the time of the accident the engine had accumulated 1,081 flight hours since remanufacture on August 1, 1994. The engine total time is not known. The engine received an oil and filter change on January 18, 1999, 124 flight hours before the accident.

The left propeller was new when it was installed on the airplane on December 17, 1998, 152 flight hours before the accident. The right propeller was installed on the airplane, after overhaul, on September 3, 1998, 236 flight hours before the accident.

Federal Aviation Administration, Airworthiness Directive 75-23-08 R5, requires inspection of the engine exhaust systems on the Cessna 421C at 50 and 100-hour intervals. Logbook records show that the last compliance of this Airworthiness Directive was on September 3, 1998, 236 flight hours before the accident. See logbook records.

METEOROLOGICAL INFORMATION

The Concord Regional Airport, 1255, surface weather observation was clouds scattered at 5,000 feet, visibility 10 miles, temperature 90 degrees F, dew point temperature 63 degrees F, wind from 220 degrees at 8 knots.

WRECKAGE AND IMPACT INFORMATION

The airplane crashed in a wooded area behind a house located at 8115 Homewood Drive, Charlotte, North Carolina. The crash site coordinates are North 35 degrees 21.1 minutes and West 80 degrees 44.5 minutes. Examination of the crash site showed the airplane first collided with a tree at about 60 feet above the ground, about 250 feet from the initial ground impact point. The airplane then descended on about a 245 degree heading and impacted the ground right wing first, while in about a 30 bank angle. About 50 feet further, a 6-inch diameter tree was severed completely, about 2 feet above the ground, by the left propeller. Adjacent to this area was found a counter weight from the right propeller, the right main landing gear doors, and one blade from the right propeller. About 120 feet further was found the main wreckage, lying inverted, and both engines and the left propeller, which was separated from the engine propeller shaft. The right propeller hub and two blades remained attached to the right engine. A postcrash fire consumed the airplane and a large wooded area around the crash site.

Examination of the wreckage showed all components of the aircraft, which are necessary for flight, were located on or around the main wreckage. Examination of the flight control systems showed that all separation points in the cables was consistent with overstress separation or being cut during removal of the airplanes occupants. The aileron trim actuator was found at the 14-degree tab down position. The actuator was found separated. The elevator trim actuator was found in the 1-degree tab down position. The rudder trim actuator was found in the 5-degree tab right position. Three autopilot actuators were found. The roll actuator was found disengaged. The other two-autopilot actuators had impact and fire damage and it could not be determined what position they were in. The wing flaps were found retracted. All three landing gear were found retracted.

The engine controls in the cockpit were found with both mixture controls full forward, both propeller controls full forward, the left throttle at idle, and the right throttle full forward. The left and right engine mixture and throttle controls at the engine fuel controls were burned away. The left propeller governor control at the engine was found in the full rpm or takeoff position. The right propeller governor control at the engine had received impact damage and found near the propeller feather position. The engine tachometer was found with the needle for

both the left and right engines at zero rpm. The left fuel valve was found in the on position. The post crash fire destroyed the right fuel valve. Both fuel strainers were found free of contamination. The passenger cabin airspeed indicator was found indicating 100 knots.

Examination of the left and right engines was performed at the manufacturers facility. Examination of the left engine showed the engine had sustained impact and postcrash fire damage to the engine assembly and accessories. Disassembly examination showed the oil sump was dented on the bottom from impact. The interior of the sump was dry and dark colored due to the post crash fire. No metallic debris was present. The engine oil pump gears and cavities exhibited normal signatures. The crankshaft, camshaft, valve train, cylinders, and accessory drive gears showed no evidence of damage. The engine fuel system and ignition system were fire damaged and could not be examined. The left engine did not exhibit any condition that would have prevented it from operating.

Examination of the right engine showed the engine had sustained impact and postcrash fire damage to the engine assembly and accessories. Disassembly examination showed the oil sump was crushed upward from impact. The interior of the sump was dry and dark colored due to the post crash fire. Some metallic debris was present in the sump. The material was identified as needle bearing and steel cage material from the starter adapter needle bearing pilot. The oil sump pickup tube was found unobstructed. The engine oil pump gears and cavities exhibited scratches from hard particle passage during service.

The right engine crankshaft, camshaft, valve train, cylinders, and accessory drive gears showed no evidence of damage. The engine crankcase right half exhibited damage at the starter adapter shaft pilot bearing bore. The needle bearing was missing and the aluminum bore was wallowed out by the front of the starter adapter shaft gear. A copper material was observed oozing from the engine main bearings. This was found to be from the oil vernotherm valve in the oil cooler. The valve had melted releasing the copper substance into the crankcase oil galleries. The engine fuel system and ignition system were fire damaged and could not be examined. The right engine assembly did not exhibit any condition that would have prevented it from operating. See Teledyne Continental Motors Report.

Examination of the turbocharger systems from both engines was performed at the manufacturer's facility. Both wastegates were found in the open position. The turbochargers were damaged due to impact and exposure to fire. No evidence of rotation was found in either turbocharger. No pre-impact conditions were found which would have interfered with normal operation of either turbocharger or wastegate. See AlliedSignal Aerospace Report.

Examination of the left and right propellers was performed at the manufacturer's facilities. The results of the examination showed that the damage to both propellers was a result of ground impact damage and there was no evidence of precrash failure or malfunction of the propellers. Both propellers were rotating at ground impact and blade angles were within the low pitch range. Propeller damage for both propellers was similar indicating equivalent energy at ground impact. The feather stop mechanism for each propeller was not damaged

indicating they were not engaged at ground impact. See McCauley Propeller Report.

Examination of the propeller governors was performed at a propeller governor overhaul facility. The left propeller governor had the control arm shaft missing from impact damage. The left governor could not be tested and was disassembled. No findings that would prevent the left propeller governor from operating were found. The right propeller governor control arm was bent and the feather stop was missing due to impact damage. The right propeller governor was placed on a test stand and operated. No findings that would prevent the right propeller governor from operating were found. Posttest disassembly of the right propeller governor showed no evidence of precrash malfunction.

Examination of the left and right engine viscous torsional dampers was performed at the manufacturers facility and at the NTSB Materials Laboratory, Washington, D.C. The examinations showed that both dampers had external evidence of exposure to postcrash heat and fire. Both dampers demonstrated some capability to dampen torsional vibration when tested on a test apparatus. The left engine damper had the internal silicon fluid altered to a brown powder by the post crash fire. The right damper still contained silicone fluid. There was no indication that either damper was not functional at the time of the crash. See Vibratex, Inc. Report.

MEDICAL AND PATHOLOGICAL INFORMATION

The Office of the Chief Medical Examiner, Chapel Hill, North Carolina, performed postmortem examinations of the pilot and three passengers. The cause of death of the pilot was attributed to carbon monoxide poisoning following a plane crash. Toxicology tests were performed on specimens obtained from the pilot by the Office of the Chief Medical Examiner and the Federal Aviation Administration, Toxicology and Accident Research Laboratory, Oklahoma City, Oklahoma. The tests were negative for ethanol and drugs. The tests were positive for 34 percent and 40 percent carbon monoxide. See toxicology reports.

The cause of death of the three passengers was attributed to carbon monoxide poisoning and thermal burns. Toxicology tests were performed on specimens obtained from the three passengers by the Office of the Chief Medical Examiner. The tests on the passenger seated in seat 2A were negative for ethanol and positive for 20 percent carbon monoxide. The tests on the passenger seated in seat 2B were negative for ethanol and positive for 20 percent carbon monoxide. The tests on the passenger seated in seat 3A were negative for ethanol and positive for 10 percent carbon monoxide. See toxicology reports.

TESTS AND RESEARCH

The NTSB, Vehicle Recorders Division performed a sound spectrum study on recorded communications between the pilot of N421LL and air traffic controllers at the Concord Regional Airport. In the second to last transmission received from the pilot, the pilot states, "I don't think we're going to make it". The spectrum study shows a frequency signature occurring in non-voice areas. The first set of signals corresponds to a fundamental frequency of 108 Hz,

which yields a propeller speed of 2160 rpm on the Cessna 421C airplane. The second set of signals corresponds to a fundamental frequency of 65 Hz, which is equivalent to a propeller speed of 1297 rpm on the Cessna 421C. The maximum propeller speed, which is used for takeoff, is 2,235 rpm. See Sound Spectrum Study.

The air traffic controller that cleared the flight for takeoff stated the airplane rolled about 4,500 feet before lifting off. The Cessna model 421C Pilot's Operating Handbook showed that for the airplanes weight of about 7,000 pounds and the temperature of 90 degrees F, the airplane would have to roll about 2,000 feet before lifting off.

The engine inoperative procedure contained in the Pilot's Operating Handbook for the Cessna 421c, calls for the throttle of the inoperative engine to be closed, the mixture placed in the idle-cutoff position, and the propeller feathered.

ADDITIONAL INFORMATION

NTSB released the aircraft wreckage on June 15, 1999, to Edward Miller, David Drye Company. Components retained by NTSB for further testing were returned to the David Drye Company.

Additional parties to the NTSB investigation were Thomas Knopp, McCauley Propeller; Fred Fihe, Teledyne Continental Motors; Philip Hensley, Allied Signal; and David Schrantz, Vibrattech.

Pilot Information

Certificate:	Commercial	Age:	42, Male
Airplane Rating(s):	Single-engine land; Multi-engine land	Seat Occupied:	Left
Other Aircraft Rating(s):	None	Restraint Used:	
Instrument Rating(s):	Airplane	Second Pilot Present:	No
Instructor Rating(s):	None	Toxicology Performed:	Yes
Medical Certification:	Class 2 Valid Medical--no waivers/lim.	Last FAA Medical Exam:	July 8, 1998
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	
Flight Time:	7500 hours (Total, all aircraft), 3000 hours (Total, this make and model), 45 hours (Last 90 days, all aircraft), 20 hours (Last 30 days, all aircraft), 1 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	Registration:	N421LL
Model/Series:	421C 421C	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	
Airworthiness Certificate:	Normal	Serial Number:	421C-0305
Landing Gear Type:	Retractable - Tricycle	Seats:	7
Date/Type of Last Inspection:	September 3, 1998 Annual	Certified Max Gross Wt.:	7450 lbs
Time Since Last Inspection:	236 Hrs	Engines:	2 Reciprocating
Airframe Total Time:	5145 Hrs	Engine Manufacturer:	Continental
ELT:	Installed, not activated	Engine Model/Series:	GTSIO-520-L
Registered Owner:	DAVID DRYE COMPANY LLC	Rated Power:	375 Horsepower
Operator:		Operating Certificate(s) Held:	None
Operator Does Business As:		Operator Designator Code:	

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	Condition of Light:	Day
Observation Facility, Elevation:	JQF ,690 ft msl	Distance from Accident Site:	3 Nautical Miles
Observation Time:	12:55 Local	Direction from Accident Site:	40°
Lowest Cloud Condition:	Scattered / 5000 ft AGL	Visibility	10 miles
Lowest Ceiling:	None	Visibility (RVR):	
Wind Speed/Gusts:	8 knots / None	Turbulence Type Forecast/Actual:	/
Wind Direction:	220°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	30 inches Hg	Temperature/Dew Point:	32°C / 17°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	(JQF)	Type of Flight Plan Filed:	None
Destination:	ANDERSON (AND)	Type of Clearance:	VFR
Departure Time:	12:55 Local	Type of Airspace:	Class D

Airport Information

Airport:	CONCORD REGIONAL JQF	Runway Surface Type:	Asphalt
Airport Elevation:	690 ft msl	Runway Surface Condition:	Dry
Runway Used:	20	IFR Approach:	None
Runway Length/Width:	5500 ft / 100 ft	VFR Approach/Landing:	Forced landing

Wreckage and Impact Information

Crew Injuries:	1 Fatal	Aircraft Damage:	Destroyed
Passenger Injuries:	3 Fatal	Aircraft Fire:	On-ground
Ground Injuries:	N/A	Aircraft Explosion:	On-ground
Total Injuries:	4 Fatal	Latitude, Longitude:	35.319839,-80.74076(est)

Administrative Information

Investigator In Charge (IIC):	Kennedy, Jeffrey
Additional Participating Persons:	DON GARRETT; CHARLOTTE , NC BUCK WELCH; WICHITA , KS GEORGE HOLLINSWORTH; MOBILE , AL JIM THOMPSON; CONCORD , NC
Original Publish Date:	May 17, 2001
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.nts.gov/Docket?ProjectID=46587

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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](#).