National Transportation Safety Board
Aviation Accident Final Report

Location:	Oakland Park, Florida	**Accident Number:**	ERA09FA248
Date & Time:	April 17, 2009, 11:15 Local	**Registration:**	N1935G
Aircraft:	Cessna 421B	**Aircraft Damage:**	Substantial
Defining Event:	Powerplant sys/comp malf/fail	**Injuries:**	1 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

Prior to the accident flight witnesses observed the pilot "haphazardly" pouring oil into the right engine. The pilot then ran the engines at mid-range power for approximately 20 minutes. The airplane subsequently taxied out of the ramp area and departed. Fire was observed emanating from the right engine after rotation. The airplane continued in a shallow climb from the runway, flying low, with the right engine on fire. The airplane then banked right to return to the airport and descended into a residential area. Examination of the right engine revealed an exhaust leak at the No. 4 cylinder exhaust riser flange. Additionally, one of the flange boltholes was elongated, most likely from the resulting vibration. The fuel nozzle and B-nut were secure in the No. 4 cylinder; however, its respective fuel line was separated about 8 inches from the nozzle. No determination could be made as to when the fuel line separated (preimpact or postimpact) due to the impact and postcrash fire damage. Examination of the right engine turbocharger revealed that the compressor wheel exhibited uniform deposits of an aluminum alloy mixture, consistent with ingestion during operation, and most likely from the melting of the aluminum fresh air duct. Additionally, the right propeller was found near the low pitch position, which was contrary to the owner's manual emergency procedure to secure the engine and feather the propeller in the event of an engine fire.

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 aircraft control and secure the right engine during an emergency return to the airport after takeoff. Contributing to the accident was an in-flight fire of the right engine for undetermined reasons.

Findings

Personnel issues	Aircraft control - Pilot
Aircraft	(general) - Not attained/maintained
Aircraft	(general) - Incorrect use/operation
Aircraft	(general) - Malfunction

Factual Information

HISTORY OF FLIGHT

On April 17, 2009, about 1115 eastern daylight time, a Cessna 421B, N1935G, owned and operated by the commercial pilot, was substantially damaged during impact with a residence in Oakland Park, Florida, following an engine fire during takeoff from Fort Lauderdale Executive Airport (FXE), Fort Lauderdale, Florida. The certificated commercial pilot was killed. The personal flight was conducted under the provisions of 14 Code of Federal Regulations Part 91. Visual meteorological conditions prevailed and an instrument flight rules (IFR) flight plan was filed for the planned flight to Fernandina Beach Municipal Airport (55J), Fernandina Beach, Florida.

According to a friend of the pilot, who had also flown the accident airplane on many occasions, the airplane was based in Costa Rica. The pilot lived in Costa Rica, but spent 2 or 3 weeks every year in the Fort Lauderdale area. Prior to the accident flight, the pilot flew the airplane from Costa Rica to FXE, where it remained parked for 2 days. During that time, the airplane was fueled with approximately 75 gallons of 100 low lead aviation gasoline. The pilot was flying to 55J with the intention of selling the airplane to a buyer in the Jacksonville area.

Several employees at a fixed based operator (FBO), located at FXE, observed the pilot before and during the accident flight. One employee spoke to the pilot when he first arrived at FXE on April 15, 2009. The employee commented about a "For Sale" sign on the pilot's airplane, and the pilot replied that his family thought he was getting too old to fly and would not fly with him anymore, so he wanted to sell his airplane.

Two other employees spoke with the pilot just prior to the accident flight. They reported that the pilot seemed annoyed that his airplane had been parked "way out in the boneyard" and he was pouring oil into the right engine "rather haphazardly." They and several other employees then saw the pilot run the engines at mid-range power for approximately 20 minutes, with his head down, as if he was reading something. The airplane subsequently taxied out of the ramp area and departed on runway 8. Another employee observed fire emanating from the right engine after rotation.

Several witnesses near the accident site observed the airplane in a shallow climb from runway 8, flying low, with the right engine on fire. Some of the witnesses reported that the flames were yellow in color and no smoke was observed. One witness reported yellow flames and black smoke. The airplane then banked right and descended into a residential area.

PERSONNEL INFORMATION

The pilot, age 80, held a commercial pilot certificate, with ratings for airplane multiengine land and instrument airplane. He held a private pilot certificate, with ratings for airplane single-engine land, airplane single-engine sea, and glider. His most recent Federal Aviation Administration (FAA) second-class medical certificate was issued on December 18, 2007. At that time, the pilot reported a total flight experience of 23,000 hours. The pilot's wife reported

that he had approximately 5,000 hours of flight experience in the accident airplane, and he had flown about 25 hours during the 90-day period preceding the accident.

AIRCRAFT INFORMATION

The six-seat, low-wing, retractable-gear airplane, serial number 421B-0836, was manufactured in 1974. It was powered by two Continental GTSIO 520-H, 375-horsepower engines, equipped with McCauley propellers. Maintenance logbooks were located in the airplane, and had been partially consumed by fire. Review of the logbooks revealed that the airplane's most recent annual inspection was completed on May 22, 2008.

According to an FAA inspector, no maintenance work was performed on the airplane during its most recent stay at FXE.

METEOROLOGICAL INFORMATION

The reported weather at FXE, at 1053, was: wind from 060 degrees at 15 knots; visibility 10 miles; scattered clouds at 3,300 and 4,500 feet; temperature 24 degrees Celsius; dew point 16 degrees Celsius; altimeter 30.17 inches of mercury.

COMMUNICATIONS

Review of data obtained from the FAA revealed that the pilot contacted FXE Clearance Delivery about 1052, to request his IFR clearance. The pilot received a clearance, which included the "Fort Lauderdale One" departure with "ARKES transition." After several attempts to clarify and correctly readback the clearance, the pilot elected to depart under visual flight rules (VFR) instead. The controller then issued a "maintain VFR" instruction with a departure frequency and transponder code, which the pilot readback correctly.

The pilot contacted FXE ground control about 1100 and received instructions to taxi to runway 8. The pilot then contacted FXE local control about 1106 and was issued a takeoff clearance. About 1 minute later, the pilot radioed FXE local control and reported, "I'm having some trouble here, I'm going to have to come around and land." The local controller acknowledged the pilot's transmission and instructed the pilot to enter a right downwind for runway 8, followed by a clearance to land on any runway. No further transmissions were received from the accident airplane.

WRECKAGE AND IMPACT INFORMATION

The wreckage was located in a residence, and examined at the scene on April 17 and 18, 2009. All major components of the airplane were accounted for at the scene. A debris path originated at the rear of the residence, where freshly cut tree branches were observed. The branches were cut at an approximate 45-degree angle, and exhibited black paint transfer. The debris path extended on an approximate 280-degree magnetic heading to the front of the residence. The airplane came to rest inverted on a heading about 060 degrees magnetic. The right engine and portions of the right wing were located at the rear of the residence. The left engine, portions of the left wing, the empennage, and the cockpit area were located at the front of the residence.

The majority of wreckage had been consumed by a postcrash fire.

Rudder control continuity was confirmed from the rudder pedals to the rudder, with cable cuts performed by emergency medical services (EMS) noted. Rudder trim continuity was confirmed from the trim wheel to the rudder tab, and measurement of the rudder trim actuator revealed an approximate 2-degree tab left (rudder right) position. Elevator control continuity was confirmed from the cockpit area to the elevator horn, with some turnbuckle melting and EMS cable cuts noted. Elevator trim continuity was confirmed and measurement of the elevator trim actuator revealed an approximate neutral setting. Left aileron control cable continuity and trim was confirmed from the control yoke to the left aileron bellcrank, with melting of several aluminum components noted. Measurement of the aileron trim actuator revealed an approximate 15-degree left aileron tab down (aileron up) position. Right aileron control continuity was confirmed from the control yoke to the right wing root, where the cable had separated consistent with overstress, and continued on to the right aileron bellcrank.

The airplane's landing gear was observed in the retracted position and the position of the flaps could not be determined. The right fuel selector was positioned to the right main fuel tank and the left fuel selector was not located. Several flight instruments were recovered from the cockpit and although they sustained fire damage, some were readable. Both attitude indicators were tumbled left wing low. An airspeed indicator displayed approximately 110 knots. A turn and bank indicator's needle was near the centered position and the ball was destroyed.

Both propellers had separated from their respective engines. The engines, turbochargers, and propellers were retained for further examination.

MEDICAL AND PATHOLOGICAL INFORMATION

An autopsy was performed on the pilot by the State of Florida District Seventeen Medical Examiner’s Office, Fort Lauderdale, Florida, on April 18, 2009. The autopsy report noted the cause of death as "multiple blunt trauma."

Toxicological testing was performed on the pilot by the FAA Bioaeronautical Science Research Laboratory, Oklahoma City, Oklahoma. Review of the toxicology report revealed:

"24 (%) CARBON MONOXIDE detected in Blood
2.08 (ug/ml) CYANIDE detected in Blood"

TESTS AND RESEARCH

Engine Examinations

Both engines underwent a teardown examination at the manufacturer's facility, under the supervision of an FAA inspector, on June 23 and 24, 2009. Examination of the left engine did not reveal any abnormalities that would have prevented normal operation prior to impact.

Examination of the right engine did not reveal any evidence of catastrophic failure. The oil cap was noted as detached from the oil filler tube; however, on-scene photographs confirmed that

the oil cap was secure on the oil filler tube prior to recovery of the engine from the rear of the residence. Impact and extensive thermal damage was noted at the No. 4 and No. 6 cylinders. Further examination of the No. 4 cylinder exhaust riser flange revealed a color distortion consistent with an exhaust leak and one of the flange boltholes was elongated. The fuel nozzle and B-nut were secure in the No. 4 cylinder, but its respective fuel line was separated about 8 inches from the nozzle; however, the fuel line had sustained impact and fire damage. Due to the severity of postcrash fire, the fire source could not be positively determined. The turbocharger exhibited impact and thermal damage, and the turbocharger compressor wheel contained metallic deposits.

Turbocharger Examinations

Both turbochargers underwent a teardown examination at the engine manufacturer's facility, under the supervision of an FAA inspector, on June 24, 2009. Examination of the turbochargers revealed that both had sustained fire and impact damage, and neither was able to rotate in their respective assembled state. The right engine turbine wheel rotated freely once the compressor housing was lifted from the center housing. The left turbocharger compressor wheel was covered with a molten metallic material, consistent with the postcrash fire. The right turbocharger compressor wheel exhibited uniform deposits of a metallic material, primarily on the concave side of the blades, consistent with ingestion during operation. It was also noted the right engine aluminum fresh air duct had been consumed by fire, and was a possible source for the metallic material found on the concave side of each impeller blade. The right turbocharger compressor wheel was forwarded to the NTSB Materials Laboratory, Washington, DC, for further examination.

Propeller Examinations

Both propellers underwent a teardown examination at the manufacturer's facility, under the supervision of an FAA inspector, on August 18, 2009. The examinations revealed that both propellers exhibited impact damage, and neither exhibited any evidence of preimpact mechanical malfunction. Both propellers exhibited signatures consistent with "low power" rotation at impact. Neither propeller was at or near the feather position at impact. Blades from both propellers exhibited signatures consistent with operation at or near the low pitch position at impact.

Metallurgical Examination

A sample of metallic deposits, collected from the surface of the right engine turbocharger compressor wheel blades, was sent to an independent laboratory for composition identification. The independent laboratory results were then reviewed by an NTSB chemist. The metallic deposit contained the following elements in percentages of 0.01 weight % or higher: aluminum (Al), boron (B), calcium (Ca), cadmium (Cd), chromium (Cr), copper (Cu), iron (Fe), gallium (Ga), magnesium (Mg), manganese (Mn), sodium (Na), nickel (Ni), phosphorus (P), lead (Pb), silicon (Si), titanium (Ti), vanadium (V) and zinc (Zn). The results were indicative of a mixture of aluminum alloys as well as the presences of other ferrous constituents. The percentage of the elements in the sample did not match a particular, standard aluminum alloy.

Emergency Procedure

Review of an owner's manual for the make and model airplane revealed in part:

"IN FLIGHT WING OR ENGINE FIRE

(1) Both Auxiliary Fuel Pumps – OFF.
(2) Appropriate Engine – SECURE.
    (a) Mixture – IDLE CUT-OFF.
    (b) Propeller – FEATHER.
    (c) Fuel Selector – OFF.
    (d) Alternator – OFF.
    (e) Magnetos – OFF.
(3) Cabin Heater – OFF.
(4) Land and evacuate aircraft as soon as practical."

History of Flight

Takeoff	Powerplant sys/comp malf/fail (Defining event)
Takeoff	Fire/smoke (non-impact)
Emergency descent	Loss of control in flight
Uncontrolled descent	Collision with terr/obj (non-CFIT)

Pilot Information

Certificate:	Commercial; Private	**Age:**	80,Male
Airplane Rating(s):	Single-engine land; Single-engine sea; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	Glider	**Restraint Used:**	
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:**	December 18, 2007
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	23000 hours (Total, all aircraft), 5000 hours (Total, this make and model), 25 hours (Last 90 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	**Registration:**	N1935G
Model/Series:	421B	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	No
Airworthiness Certificate:	Normal	**Serial Number:**	421B0836
Landing Gear Type:	Retractable - Tricycle	**Seats:**	6
Date/Type of Last Inspection:	May 22, 2008 Annual	**Certified Max Gross Wt.:**	7450 lbs
Time Since Last Inspection:		**Engines:**	2 Reciprocating
Airframe Total Time:	as of last inspection	**Engine Manufacturer:**	Continental Motors
ELT:	Installed, not activated	**Engine Model/Series:**	GTSIO-520-H
Registered Owner:		**Rated Power:**	375 Horsepower
Operator:		**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	FXE,13 ft msl	**Distance from Accident Site:**	1 Nautical Miles
Observation Time:	10:53 Local	**Direction from Accident Site:**	280°
Lowest Cloud Condition:	Scattered / 3300 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	15 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	60°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30 inches Hg	**Temperature/Dew Point:**	24°C / 16°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Fort Lauderdale, FL (FXE)	**Type of Flight Plan Filed:**	IFR
Destination:	Fernandina, FL (55J)	**Type of Clearance:**	None
Departure Time:	11:13 Local	**Type of Airspace:**	

Airport Information

Airport:	Fort Lauderdale Executive FXE	**Runway Surface Type:**	Asphalt
Airport Elevation:	13 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	08	**IFR Approach:**	None
Runway Length/Width:	6001 ft / 100 ft	**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	In-flight
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Fatal	**Latitude, Longitude:**	26.19111,-80.147781

Administrative Information

Investigator In Charge (IIC):	Gretz, Robert
Additional Participating Persons:	Donald Schoonover; FAA/FSDO; Miami, FL Mike Koonce; Cessna Aircraft Company; Wichita, KS Chris Lang; Teledyne Continental Motors; Mobile, AL Randy Knutesen; Kelly Aerospace; Montgomery, AL Tom Knopp; McCauley Propeller; Wichita, KS
Original Publish Date:	May 6, 2010
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=73675

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