



National Transportation Safety Board Aviation Accident Final Report

Location:	Wheeling, IL	Accident Number:	CHI06FA076
Date & Time:	01/30/2006, 1829 CST	Registration:	N920MC
Aircraft:	Cessna 421B	Aircraft Damage:	Destroyed
Defining Event:		Injuries:	4 Fatal
Flight Conducted Under:	Part 91: General Aviation -		

Analysis

The airplane was destroyed and the occupants fatally injured when it impacted the ground during approach to landing. Examination of the airplane, its engines and propellers, revealed no anomalies that were determined to have existed prior to impact. The propellers were found to have been in their normal operating range and neither propeller was in a feathered position. The quill shafts of both engines showed evidence of damage due to the production of torque. A sound spectrum examination of audio transmissions showed signatures that both engines were operating during the last two radio transmissions from the airplane. Based on radar data, communications and meteorological information obtained during the investigation, the airplane was operating in visual meteorological conditions below an overcast layer of clouds. The radar data showed the airplane as it approached the airport and as it entered a left hand traffic pattern for runway 34. Radio communications confirmed that the airplane had been cleared for a left hand traffic pattern to runway 34. The radar data showed the airplane as it made a turn to the left while its speed decreased to about 82 knots calibrated airspeed as of the last received radar return. This radar return was about 0.1 nautical miles from the accident site and 0.8 nautical miles and 216 degrees from the approach end of runway 34. The airplane owner's manual listed stall speeds ranging from 81 to 94 knots calibrated airspeed for airplane configurations including gear and flaps up to gear down and flaps 15 degrees, and bank angles from 0 to 40 degrees. Flap position could not be determined because the flap chain had separated from the flap drive motor. The owner's manual also listed an approach speed of 103 knots.

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 airspeed during the landing approach which led to an inadvertent stall and subsequent uncontrolled descent and impact with the ground.

Findings

Occurrence #1: LOSS OF CONTROL - IN FLIGHT
Phase of Operation: APPROACH - VFR PATTERN - DOWNWIND

Findings

1. (C) AIRSPEED - NOT MAINTAINED - UNKNOWN
2. (C) STALL - INADVERTENT - UNKNOWN

Occurrence #2: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: DESCENT - UNCONTROLLED

Findings

3. TERRAIN CONDITION - GROUND

Factual Information

This narrative was modified on July 17, 2007.

HISTORY OF FLIGHT

On January 30, 2006, at 1829 central standard time (CST), a Cessna model 421B, N920MC, piloted by a private pilot, was destroyed when it impacted the ground in Wheeling, Illinois. The airplane was in the landing traffic pattern for runway 34 at the Palwaukee Municipal Airport (PWK) when the accident occurred. The 14 CFR Part 91 business flight was operating in visual meteorological conditions and was on an instrument flight rules (IFR) flight plan. All four occupants were fatally injured. The airplane had departed from the Johnson County Executive Airport (OJC), Olathe, Kansas, about 1710.

According to communication records, the airplane received an IFR clearance and departed OJC at 1710. The airplane continued its flight to the Chicago area where an ILS runway 16 approach to PWK was executed. The IFR flight plan was cancelled and the airplane was cleared to land on runway 34 at PWK. The airplane subsequently impacted the ground approximately 0.9 miles and 210 degrees from the approach end of runway 34 at PWK.

PERSONNEL INFORMATION

The individual listed as the pilot in command (PIC) on the aircraft flight plan held a private pilot certificate with single engine land, multiengine land, and instrument airplane ratings. He also held a second class medical certificate that was issued on January 24, 2005. The medical certificate included a restriction that the pilot wear corrective lenses.

A review of the PIC's flight logbooks was conducted. Due to several mathematical errors that were discovered, re-totalling of the individual logbook entries was conducted. These totals revealed that the pilot had accumulated a total of 1,284.05 hours total flight experience including; 161.2 hours in single-engine airplanes, 1,052.65 hours in multiengine airplanes, and 70.2 hours in flight simulator devices. The records showed that 32.75 hours were logged in Cessna 421 airplanes. Of those 32.75 hours, 18.2 hours were obtained prior to the pilot having received the instruction required by 14 CFR 61.31 (g) to act as pilot in command of a pressurized airplane. In addition, of the 32.75 hours logged in Cessna 421 airplanes, 27.5 hours were obtained prior to the pilot having received dual instruction in a Cessna 421 airplane. A total of 5.25 hours of logged dual instruction in Cessna 421 airplanes was recorded in the pilot's logbook.

Another occupant held a commercial pilot certificate with single engine land, multiengine land, and instrument airplane ratings. The single engine rating was limited to private pilot privileges. This pilot also held a third class medical certificate issued on November 10, 2005. The medical certificate included a restriction that the pilot wear corrective lenses for near vision. On his most recent application for his airman medical certificate, he reported having in excess of 2,000 hours of flight experience including 40 hours in the preceding 6 months. The pilot's flight logbooks were not reviewed.

No determination could be made as to which front seat occupant was manipulating the controls prior to or at the time of the accident.

AIRCRAFT INFORMATION

The airplane was a Cessna model 421B, serial number 421B0884. It was a twin-engine, low-wing, retractable gear airplane. The airplane was equipped with wing and tail de-icing boots and propeller anti-ice and was approved for flight into known icing conditions. A review of the airframe logbooks revealed that the airplane had accumulated 5,436.8 hours total time in service as of the most recent annual inspection dated December 28, 2005.

The airplane was powered by 2 Teledyne Continental Motors model GTSIO-520-H engines. Each geared engine was rated to produce 375 horsepower at 2,275 propeller rpm. Each engine maintenance logbook was reviewed. During the review, a mathematical error relating to the accumulated time on the left engine was found. After taking this mathematical error into account it was found that the left engine, serial number 267029-R, had accumulated 1,782.8 hours total time and 455.5 hours since overhaul as of the December 28, 2005, annual inspection. The right engine, serial number 267035-R, had also accumulated 1,782.8 hours total time and 455.5 hours since overhaul as of the December 28, 2005, annual inspection.

According to Cessna Aircraft company records, the airplane was originally purchased from Cessna on March 21, 1975. Federal Aviation Administration (FAA) registration records showed that the airplane was purchased on August 27, 2004, by the hotel company owned by the pilot rated passenger. On May 12, 2005, the airplane registration was transferred to HK Golden Eagle, Inc. The pilot rated passenger was listed on the FAA registration documents as the president/secretary of HK Golden Eagle, Inc.

METEOROLOGICAL INFORMATION

The National Weather Service (NWS) Weather Depiction Chart for 1900 CST January 30, 2006, depicted a region of IFR conditions over northern Indiana and southwestern Michigan. Surrounding this area was an area of marginal visual flight rules (MVFR) conditions that covered portions of Wisconsin, Illinois, Indiana, and Michigan that included the accident site.

The NWS Current Icing Potential for 1800 CST depicted a probability of icing conditions over the Chicago area which ranged from about 10 percent at 3,000 feet, to about 70 percent at 5,000 feet. Several pilot reports of icing were recorded in the hours surrounding the accident time. One aircraft reported moderate rime icing between 2,500 and 7,000 feet about 15 minutes prior to the accident time.

PWK is equipped with an Automated Surface Observation System (ASOS) and is augmented by NWS certified weather observers. The surface observations at PWK reported a mixture of freezing precipitation and snow that started at 0649 CST and turned to light snow and mist which continued on and off through 1648 CST. No major accumulation of ice or snow was reported during the period. The observations surrounding the accident time were as follows:

At 1753 CST, wind from 310 degrees at 13 knots, visibility unrestricted at 10 statute miles, ceiling broken at 2,000 feet above ground level (AGL), overcast at 2,800 feet AGL, temperature -1 degrees Celsius (C), dew point temperature -4 degrees C, altimeter setting 29.81 inches of Mercury (Hg). Remarks: automated observation system, sea level pressure 1010.0 hectopascals (hPa), 6-hour precipitation less than 0.01 inches, temperature -0.6 degrees C, dew point -3.9 degrees C, 12-hour maximum temperature 2.8 degrees C, 12-hour minimum temperature -0.6 degrees C, 3-hour pressure tendency risen 1.9-hPa.

At 1836 CST, wind from 310 degrees at 9 knots, visibility unrestricted at 10 statute miles, ceiling overcast at 2,100 feet AGL, temperature -1 degrees C, dew point temperature -4 degrees C, altimeter setting 29.83 inches of Hg. Remarks: automated observation system, aircraft

mishap.

COMMUNICATIONS

Records indicate that an individual called the Columbia Automated Flight Service Station (AFSS) at 1543, filed an IFR flight plan, and obtained weather information for a flight from OJC to PWK. The caller identified N920MC as the registration number of the airplane when filing the flight plan. The caller also indicated that he was the pilot in command and provided his name and telephone number to the AFSS briefer when he filed the flight plan. The complete transcript of this communication is included in the docket material associated with this report.

At 1710, the accident airplane departed OJC and radio contact with air traffic control was established. Between 1710 and 1826, the airplane continued its flight to PWK while maintaining communications with the appropriate ATC facilities. At 1826, communication between the aircraft and the PWK air traffic control tower (ATCT) was established. The following is a transcript of radio communications between N920MC and the PWK ATCT local control (LC) position:

1826:10 N920MC palwaukee tower this is um zero mike charlie over cutey ah inbound for landing

1826:19 PWK-LC golden eagle nine two zero mike charlie report canceling left traffic for three four

1826:23 N920MC left traffic for three four nine two zero mike charlie

1828:11 PWK-LC zero mike charlie you canceling

1828:13 N920MC i'm canceling i f r zero mike charlie

1828:17 PWK-LC zero mike charlie three four clear to land

1828:19 N920MC clear to land nine two zero mike charlie

1828:57 unknown ah

1829:00 unknown (unintelligible)

No further transmissions were received from the accident airplane.

The transcripts and summaries of transmissions between the various ATC facilities and the accident airplane are included in the docket material associated with this report.

AIRPORT INFORMATION

PWK is a tower controlled airport and has three intersecting paved runways. Runway 16/34 was the longest of the airport's runways at 5,000 feet long by 150 feet wide. Runway 34 was the runway in use at the time of the accident. Runways 6/24 and 12/30 were 3,660 feet by 50 feet, and 4,386 feet by 75 feet, respectively.

WRECKAGE AND IMPACT INFORMATION

The airplane impacted into an industrial storage yard for a local construction company. The coordinates of the accident site were 42 degrees, 5.960 minutes north latitude, 87 degrees, 54.558 minutes west longitude. The storage yard was paved with concrete and was used to house various construction items including trucks, trailers, and concrete forms.

The aircraft was fragmented and burned during the impact, post-impact explosion and fire. Portions of both wings, the fuselage, and the tail surfaces were found at the accident site. The majority of the fuselage was consumed by the post-impact fire and explosion. The outboard half of the right wing had separated from the airplane. The empennage consisted of burned portions of the horizontal stabilizer, vertical stabilizer, elevator and rudder. The rudder remained attached to the vertical stabilizer, and the melted and burned portions of the elevator remained attached to the horizontal stabilizer.

Examination of the control system confirmed flight control cable continuity from the instrument panel to the tail surfaces. The aileron control cables were traced from the instrument panel to the aileron sector. The four left and right aileron wing cables were traced from the aileron sector to the ailerons. All cable breaks exhibited signatures consistent with tensile overload. Flap position could not be determined because the flap chain had separated from the flap drive motor.

Both engines and propellers were examined at the manufacturer's facilities after removal from the accident scene.

MEDICAL AND PATHOLOGICAL INFORMATION

Autopsies were performed on both pilots by the Cook County Medical Examiner's Office.

A Forensic Toxicology Fatal Accident Report listed negative results for all tests performed with regard to the pilot in command.

TESTS AND RESEARCH

Both engines were examined at the Teledyne Continental Motors facility under the direct supervision of the NTSB investigator in charge.

Examination of the left engine revealed no internal failures that could be determined to have existed prior to the impact. Examination of the quill shaft that connects the engine crankshaft to the gear reduction section of the engine revealed spiral cracking of the case hardened layer of the shaft. The hardness of the shaft was tested and was found to be within the manufacturer's specifications. The spiral cracks were consistent with the application of an excessive torsion load to the shaft.

Examination of the right engine revealed no internal failures that could be determined to have existed prior to the impact. Examination of the quill shaft that connects the engine crankshaft to the gear reduction section of the engine revealed cracking of the case hardened layer of the shaft at the radius adjacent to one of the splined ends. The hardness of the shaft was tested and was found to be within the manufacturer's specifications.

Examination of the propellers was conducted at the manufacturer's facility under the direct supervision of the NTSB investigator in charge. Both propellers exhibited damage consistent with impact and no indications of a pre-impact failure were found. The left propeller hub was fractured and the propeller blades had separated. The right propeller blades remained attached to the hub. Impact signature marks found on the hub sockets and blade butts indicated that the propeller blades were at pitch angles within the normal operating range of the propeller at the time of the impact. Neither propeller was in a feathered position. The right propeller blades had chordwise scratching consistent with propeller rotation at the time of impact. One of the blades from the left propeller had its outer tip separated and another blade exhibited gouges on its leading edge.

A certified cassette re-recording of communications between the airplane and the PWK ATCT LC position was sent to the National Transportation Safety Board audio laboratory for examination. Six transmissions were examined using an audio spectrum analyzer to identify any background sound signatures that could be associated with either of the airplane's engines or propellers. Several of the transmissions contained background sounds that were identified as having come from the engines/propellers. The first transmission contained a sound signature that equated to a rotational speed of about 2,610 rpm. Only one sound signature was identifiable during this transmission. The last two radio transmissions from the accident airplane also contained identifiable sound signatures which equated to propeller speeds of 2,247/2,296 rpm and 2,082/2,170 rpm respectively. No conclusion could be made as to which engine produced which sound signature.

The Cessna 421 Owner's Manual lists a maximum engine operating speed of 2,275 propeller rpm.

Radar data was obtained from the FAA's Chicago O'Hare Terminal Radar Approach Control facility. The airplane's flight track was plotted on a portion of a Chicago VFR Terminal Area Chart and on a satellite image of the area surrounding the accident site. Both plots are included in the docket material associated with this accident report.

A review of the radar data was conducted. At 1820, the airplane was at a pressure altitude of 3,900 feet (about 3,800 feet msl), and about 165 knots calibrated airspeed. The airplane was heading in an east-northeast direction as it approached the Northbrook VHF omnidirectional range (VOR) station located 343 degrees and 6.8 nautical miles from PWK. The data showed that the airplane descended as it approached the VOR and leveled its descent at 2,500 feet pressure altitude. During this period of time the calibrated airspeed remained between 150 and 170 knots. The track plot showed that about 1825:30 the airplane made a right turn to a south-southeast heading toward PWK. At 1826:17, the data showed that the airplane's ground track was 175 degrees at a calibrated airspeed of 165 knots and a pressure altitude of 2,000 feet. Over the next 115 seconds, the airplane remained on a southerly heading and the airspeed decreased to 110 knots. At 1828:22, the airplane was about 0.79 nautical miles and 250 degrees from the north end of runway 34 at PWK. At this time the airplane was heading 170 degrees at 110 knots calibrated airspeed at a pressure altitude of 1,400 feet. Between 1828:33 and 1829:03.85, the airplane's heading went from 165 degrees to 124 degrees and during the same interval the calibrated airspeed decreased from 110 knots to 82 knots and the pressure altitude went from 1,400 feet to 1,200 feet. The last radar return was recorded at 1829:03.85. The accident site was located 0.1 nautical miles and 124 degrees from the last recorded radar position. The last recorded radar position was 0.8 nautical miles and 216 degrees from the approach end of runway 34 at PWK.

The business located where the airplane impacted the ground had external security video cameras located at various locations on the property. One of the security cameras captured the accident airplane while in flight and also three frames of video immediately prior to the explosion on impact. Based on the location of the security camera, several frames of the security video show an aircraft with its landing lights on approaching from the north of the camera location on a southerly heading. The aircraft then travels out of the frame of the video. Approximately 15 seconds later, the airplane re-enters the security video frame and three frames of video were captured prior to the explosion. These three frames of the video show the airplane in a left wing low, near vertical descent. The entire underside of the airplane is visible

including the fuselage, wings, horizontal tail, and extended landing gear. Due to the low resolution of the video images, no determination could be made as to flap position. Still images of the three frames prior to the explosion and the first frame showing the explosion are included in the docket material associated with this accident.

The Cessna model 421 Owner's Manual lists the following stall speeds and aircraft configurations for an airplane loaded to 7,450 pound gross weight:

Stall speed 83 knots calibrated airspeed with landing gear and flaps up and 0 degree bank angle.

Stall speed 85 knots calibrated airspeed with landing gear and flaps up and 20 degree bank angle.

Stall speed 94 knots calibrated airspeed with landing gear and flaps up and 40 degree bank angle.

Stall speed 81 knots calibrated airspeed with landing gear down, flaps 15 degrees down, and 0 degree bank angle.

Stall speed 83 knots calibrated airspeed with landing gear down, flaps 15 degrees down, and 20 degree bank angle.

Stall speed 94 knots calibrated airspeed with landing gear down, flaps 15 degrees down, and 40 degree bank angle.

The Cessna Owner's Manual lists an approach speed of 103 knots indicated airspeed and a minimum single engine control speed of 87 knots indicated airspeed. A review of the airspeed correction table shows a maximum of 2 knots differential between calibrated airspeed and indicated airspeed for speeds between 70 and 110 knots for all flap settings.

ADDITIONAL INFORMATION

The FAA, Cessna Aircraft Company, and Teledyne Continental Motors were parties to the investigation.

Pilot Information

Certificate:	Private	Age:	59, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	Seat Occupied:	Left
Other Aircraft Rating(s):	None	Restraint Used:	Seatbelt
Instrument Rating(s):	Airplane	Second Pilot Present:	Yes
Instructor Rating(s):	None	Toxicology Performed:	Yes
Medical Certification:	Class 2 With Waivers/Limitations	Last FAA Medical Exam:	01/01/2005
Occupational Pilot:		Last Flight Review or Equivalent:	10/01/2004
Flight Time:	1284 hours (Total, all aircraft), 33 hours (Total, this make and model)		

Other Flight Crew Information

Certificate:	Commercial; Private	Age:	61, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	Seat Occupied:	Right
Other Aircraft Rating(s):	None	Restraint Used:	Seatbelt
Instrument Rating(s):	Airplane	Second Pilot Present:	Yes
Instructor Rating(s):	None	Toxicology Performed:	Yes
Medical Certification:	Class 3 With Waivers/Limitations	Last FAA Medical Exam:	11/01/2005
Occupational Pilot:		Last Flight Review or Equivalent:	
Flight Time:	2000 hours (Total, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	Registration:	N920MC
Model/Series:	421B	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	No
Airworthiness Certificate:	Normal	Serial Number:	421B0884
Landing Gear Type:	Retractable - Tricycle	Seats:	6
Date/Type of Last Inspection:	12/01/2005, Annual	Certified Max Gross Wt.:	7450 lbs
Time Since Last Inspection:		Engines:	2 Reciprocating
Airframe Total Time:	5437 Hours as of last inspection	Engine Manufacturer:	Continental
ELT:	Installed, not activated	Engine Model/Series:	GTSIO-520-H
Registered Owner:	H K Golden Eagle, Inc.	Rated Power:	375 hp
Operator:	On file	Operating Certificate(s) Held:	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	Night
Observation Facility, Elevation:	PWK, 647 ft msl	Distance from Accident Site:	1 Nautical Miles
Observation Time:	1836	Direction from Accident Site:	36°
Lowest Cloud Condition:	Clear	Visibility	10 Miles
Lowest Ceiling:	Overcast / 2100 ft agl	Visibility (RVR):	
Wind Speed/Gusts:	9 knots /	Turbulence Type Forecast/Actual:	/
Wind Direction:	310°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	29.82 inches Hg	Temperature/Dew Point:	-1°C / -4°C
Precipitation and Obscuration:	Light - Snow; Mist		
Departure Point:	OLATHE, KS (OJC)	Type of Flight Plan Filed:	IFR
Destination:	Wheeling, IL (PWK)	Type of Clearance:	IFR
Departure Time:	1710 CST	Type of Airspace:	

Airport Information

Airport:	PALWAUKEE MUNI (PWK)	Runway Surface Type:	Asphalt
Airport Elevation:	647 ft	Runway Surface Condition:	
Runway Used:	34	IFR Approach:	Circling; ILS
Runway Length/Width:	5000 ft / 150 ft	VFR Approach/Landing:	Traffic Pattern

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:	42.123611, -87.902222

Administrative Information

Investigator In Charge (IIC):	John M Brannen	Report Date:	07/25/2007
Additional Participating Persons:	Robert Donahue; FAA, Dupage FSDO; West Chicago, IL Henry Soderlund; Cessna Aircraft Company; Wichita, KS Josh Cawthra; Teledyne Continental Motors; Mobile, AL		
Publish Date:			
Investigation Docket:	NTSB accident and incident dockets serve as permanent archival information for the NTSB's investigations. Dockets released prior to June 1, 2009 are publicly available from the NTSB's Record Management Division at pubinq@ntsb.gov , or at 800-877-6799. Dockets released after this date are available at http://dms.nts.gov/pubdms/ .		

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The Independent Safety Board Act, as codified at 49 U.S.C. Section 1154(b), precludes the admission into evidence or use of any part of an NTSB report related to an incident or accident in a civil action for damages resulting from a matter mentioned in the report. A factual report that may be admissible under 49 U.S.C. § 1154(b) is available [here](#).