National Transportation Safety Board
Aviation Accident Final Report

Location:	MCCOOK, NE	**Accident Number:**	CHI94MA072
Date & Time:	01/26/1994, 1515 CST	**Registration:**	N5468G
Aircraft:	CESSNA 421C	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	2 Fatal, 3 Serious, 2 Minor
Flight Conducted Under:	Part 135: Air Taxi & Commuter - Non-scheduled		

Analysis

THE PART 135 ON-DEMAND AIR TAXI FLIGHT DEPARTED DENVER, COLORADO, WITH A DESTINATION OF COLUMBUS, NEBRASKA. WEATHER FORECASTS WERE FOR ICING CONDITIONS ALONG THE ENTIRE ROUTE OF FLIGHT. WHILE EN ROUTE, ATC ADVISED THE PILOT OF REPORTED ICING AHEAD. THE PILOT WAS CLEARED TO CLIMB TO 19,000 FEET TO GET ON TOP OF THE CLOUDS. THE PILOT REPORTED 'SOME ALTERNATOR PROBLEMS,' AND REQUESTED TO DIVERT TO NORTH PLATTE, NEBRASKA. HE THEN ELECTED TO DIVERT TO MCCOOK, NEBRASKA, DUE TO THE WEATHER AT NORTH PLATTE. ATC LOST COMMUNICATION WITH THE PILOT DURING THE DIVERSION. WITNESSES REPORTED THE AIRPLANE CIRCLED THE MCCOOK AIRPORT TWICE. ACCORDING TO THEM, THE AIRPLANE ENTERED A BANK OF ABOUT 45 DEG, THEN STALLED. SUBSEQUENTLY, IT TRAVELED ABOUT 190 FEET THROUGH A STAND OF TREES BEFORE COMING TO REST. WITNESSES REPORTED THE AIRPLANE WAS COVERED WITH ICE. ONE-HALF INCH OF MIXED ICE WAS FOUND ON A PIECE OF WINDSHIELD. BOTH ALTERNATORS HAD ONE PHASE IN THE STATOR WINDING SHORTED.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: IMPROPER IN-FLIGHT PLANNING/DECISION BY THE PILOT, AND THE ACCUMULATION OF AIRFRAME ICE, WHICH RESULTED IN AN INADVERTENT STALL. FACTORS ASSOCIATED WITH THE ACCIDENT WERE: PARTIAL FAILURE OF BOTH ALTERNATORS, WHICH RESULTED IN A SUBSEQUENT ELECTRICAL SYSTEM FAILURE AND AN INOPERATIVE ANTI-ICE/DE-ICE SYSTEM, ADVERSE WEATHER (ICING) CONDITIONS, AND AIRFRAME (WING) ICE.

Findings

Occurrence #1: AIRFRAME/COMPONENT/SYSTEM FAILURE/MALFUNCTION
Phase of Operation: CRUISE

Findings
1. (F) ELECTRICAL SYSTEM,ALTERNATOR - FAILURE,PARTIAL
2. (F) ELECTRICAL SYSTEM - FAILURE,TOTAL
3. (F) ANTI-ICE/DEICE SYSTEM - INOPERATIVE

Occurrence #2: LOSS OF CONTROL - IN FLIGHT
Phase of Operation: CIRCLING (IFR)

Findings
4. (C) IN-FLIGHT PLANNING/DECISION - IMPROPER - PILOT IN COMMAND
5. (F) WEATHER CONDITION - ICING CONDITIONS
6. (F) WING - ICE
7. ICE/FROST REMOVAL FROM AIRCRAFT - NOT POSSIBLE
8. (C) STALL - INADVERTENT - PILOT IN COMMAND

Occurrence #3: IN FLIGHT COLLISION WITH OBJECT
Phase of Operation: DESCENT - UNCONTROLLED

Findings
9. OBJECT - TREE(S)

Occurrence #4: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: DESCENT - UNCONTROLLED

Factual Information

HISTORY OF THE FLIGHT

On January 26, 1994, at 1515 central standard time (CST), a Cessna 421C, N5468G, operated by Sky Harbor Air Service, Inc., Omaha, Nebraska, crashed while making a visual approach to the McCook Airport, McCook, Nebraska. The airplane was destroyed. The commercial pilot and one passenger sustained fatal injuries, three passengers received serious injuries, and two passengers received minor injuries. The On-Demand Charter flight, operating under 14 CFR Part 135, originated at the Stapleton International Airport, Denver, Colorado, with an intended destination of Columbus, Nebraska. An IFR flight plan was filed, and instrument meteorological conditions prevailed at the time.

This flight was the return leg of a corporate/executive charter flight which had originated on January 24, 1994. On that day the pilot had flown the six executives from Columbus, Nebraska, to Denver. The airplane was kept in a hangar while it was in Denver. The pilot and airplane remained in Denver to transport the executives to Denver when their business was completed. The departure from Denver was planned for 1400 CST.

The pilot called the Denver Automated Flight Service Station (AFSS) at 0918 CST and received a weather briefing. The briefing included IFR conditions along the entire route, moderate turbulence, moderate rime and mixed icing to 16,000 feet, with pilot reports (PIREPS)of severe rime and mixed icing in freezing precipitation.

At 0954 and 1158 CST the pilot called Denver AFSS and received updates on the weather briefing he had received earlier. At 1258 CST he called Denver AFSS and filed two flight plans. The first was from Denver to Columbus, Nebraska, and the second was from Columbus to Omaha, Nebraska. He also received a weather update when he filed the flight plans. He was advised that an airmet was still in effect for IFR conditions along the entire route of flight with moderate rime and mixed icing from the surface to 18,000 feet. There were also pilot reports of icing along the route of flight.

The flight departed Denver Stapleton International Airport at 1344 CST. The air traffic control of the flight was transferred from Denver Departure Control to the Denver Air Route Traffic Control Center (Denver Center) at 1359 CST. The initial cruising altitude assigned was 10,000 feet. This was increased to 17,000 feet before the airplane reached 10,000 feet. The pilot reported reaching 17,000 feet at 1415 CST. During the climb, Denver Center reported receiving intermittent altitude information from the airplane's transponder.

At 1434 CST, Denver Center advised the pilot he was about to enter an area of reported icing from 14,000 to 19,000 feet. The pilot responded that the flight was in the tops of the clouds at 17,000 feet and not picking up any ice, and requested to climb to 19,000 feet. The pilot reported reaching 19,000 feet at 1438 CST.

From 1451 to 1454 CST there were several unintelligible radio communication attempts between Denver Center and the pilot. Communication was reestablished at 1454:49 CST which Denver Center reported as "real weak and broken." At 1454:58 CST, the pilot communicated, "...it looks like we're having some alternator problems, we're going to deviate, and the destination's going to be North Platte (Nebraska)." Denver Center cleared the pilot for the deviation direct to the North Platte Airport at 1455:04 CST. At 1456:12 CST, Denver Center cleared the pilot to descend to 7,000 feet at his discretion.

Denver Center gave the pilot the current North Platte weather at 1457:06 CST. The special observation was: indefinite ceiling five hundred, sky obscured; visibility one-quarter mile with heavy snow and fog. Denver Center offered to find a location that might have better weather. At 1457:29 CST the pilot replied, "...I'd appreciate that, we're on our way down to seven thousand." At 1457:33 CST, Denver Center gave the pilot the McCook, Nebraska, weather. The pilot replied, "Okay, let's go to McCook...." Denver Center issued a vector for McCook to the pilot.

At 1459:52 CST, the pilot reported to Denver Center, "...we just lost our McCook navaid." This was the last radio transmission received from the pilot. Denver Center reported losing the airplane's transponder at 1501:20 CST.

Denver Center contacted the Columbus (Nebraska) Automated Flight Service Station (AFSS), at 1502:25 CST, to inform them of the situation. At 1506:41 CST, Columbus AFSS contacted Red Willow Aviation, the fixed base operator (FBO), at the McCook Airport. While talking to Columbus AFSS on the telephone, the FBO reported the airplane flew over the airport at 1512:33 CST. The FBO reported the airplane circled the airport twice with the landing gear up. At 1514:39 CST, the FBO told Columbus AFSS: "He just went down west of the airport in a residential area."

The FBO reported the airplane was circling the airport at approximately 400 feet agl. He stated he could see that the windshield and right hand windows were iced over. When the airplane was between runway 12 and 03, the FBO said: "...he gave it a hard left turn about 40 degrees [angle of bank] and the aircraft pitched nose down from about 200 feet in the air and hit the ground."

Four of the five surviving passengers were interviewed. All four related that the pilot had told them he was having radio problems and wanted to divert to North Platte but the weather was too bad and they were going to McCook. Three of the men recalled being in a left turn circling the airport. They reported feeling the airplane shake after the pilot steepened the turn.

One of the survivors was a former U.S. Navy flight simulator instructor. He was seated in the forward facing seat on the right side of the airplane, and could see part of the instrument panel. He reported both windshields iced over completely during the descent. He could see the vertical speed indicator (VSI), and recalls the descent was at 1,000 feet per minute. He said he looked at the altimeter when the airplane broke out of the clouds and it was indicating 4,000 feet. He reported the pilot asked everyone to help look for the airport. He said they saw the airport through a left side window and circled. He could tell all of the runways were snow covered. He stated the pilot increased bank to 45 degrees, then he felt a buffet and the nose went down, the airplane hit some trees, he felt a tumbling sensation, felt a hard impact then it was silent.

PERSONNEL INFORMATION

The pilot held a Commercial Pilot Certificate with airplane single and multiengine land, and instrument ratings. He held a Class 1 Medical Certificate with no limitations. The company flight records indicate the pilot had accumulated 2550 hours total flight time, with 66 hours in this make and model airplane.

The records show he had flown 84 hours in the last 90 days, 48 hours in this make and model airplane. The pilot had received a satisfactory FAR Part 135 flight check administered by an FAA Inspector, on January 21, 1994.

AIRCRAFT INFORMATION

The airplane was a Cessna 421C, serial number 421C-0215, and was manufactured in 1977. Total accumulated airframe time at the time of the accident was 5837 hours. The last inspection was a 100 hour inspection completed on November 29, 1993. The airplane had flown 48 hours since the last inspection.

Examination of the operator's maintenance records did not reveal any outstanding or deferred maintenance items. It was noted that five alternators and one voltage regulator had been replaced during the 18 month period prior to the accident.

The airplane was equipped with a factory installed equipment package which allowed flight in icing conditions as defined by the FAA. The package consisted of wing, empennage, and propeller deice boots; electric windshield for the pilot; heated stall warning vane; heated wing locker tank vents; heated pitot tube and 100-ampere alternators.

The operator was authorized to use this airplane to conduct IFR/VFR, and Day/Night operations under the provisions of FAR Part 135.

METEOROLOGICAL INFORMATION

The McCook record observation taken at 1452 CST was: estimated ceiling 1000 overcast, visibility 2 miles with light snow and fog, temperature 23, dew point 22, wind 030 at 12 knots, altimeter 29.74.

Area weather forecasts and observations are included with this report.

COMMUNICATIONS

The pilot was in communication with Denver Center. The last radio transmission received from the pilot was at 1459:52 CST. A transcript of all radio communications pertaining to this flight is included with this report.

WRECKAGE

The on-site investigation began at 0800 on January 28, 1994. The airplane crashed in a wooded ravine approximately one-quarter mile southwest of the McCook Municipal Airport. Wreckage and debris was scattered along a path heading 165 degrees magnetic. The length of the debris trail from the first tree impact to the airplane was 340 feet.

The airplane travelled 190 feet through a stand of trees to the first ground impact mark. Scattered around the first ground impact mark were several cleanly cut pieces of tree trunk about 8 inches in diameter. The left wing tip section, about 4 feet long was found near the area of first tree impact. There was clear ice approximately one-eighth inch thick on the booted section of the leading edge.

The airplane came to rest against the slope of the ravine 150 feet from the initial ground impact point. There was no evidence of ground contact by the airplane from the point of initial ground impact to its final resting place.

All of the propeller blades from both engines separated from their respective hubs. All of the propeller blades had multiple bends and nicks. Both engines separated from their mounts and were laying together about 25 feet south of the airplane.

The fuselage of the airplane was laying on its left side with the left wing folded under it. The

right wing was separated from the fuselage at the wing root and was next to the airplane. There was fire damage to the right wing. The nose and cockpit area of the airplane were crushed and under the wreckage. The cabin area of the airplane was intact.

The landing gear was in the up position. The flaps were in the up position. The throttles were both mid-range. The propeller controls were both full forward, and the mixtures were both full rich. Control continuity was verified from the cockpit control pedestal to the elevator, rudder, and ailerons. A piece of the cockpit windshield was found. It was covered by approximately one-half inch of mixed rime and clear ice.

The electrical switch panel was bent and damaged by impact. The volt-ammeter selector switch was on the left alternator position. The left alternator switch was in the off position. The right alternator switch was in the on position. The battery switch was on the off position. The avionics circuit breaker panel was crushed and bent. The battery was intact. Battery voltage was read with a multimeter. The battery voltage was 13 volts. All circuit breakers were in the out position or were missing from the panel. Both alternators, the caution annunciator panel, the two voltage regulators, and the electrical switch panel were removed from the airplane for further examination.

MEDICAL AND PATHOLOGICAL INFORMATION

An autopsy and toxicological examination were performed on the pilot. The autopsy was performed on January 28, 1994, at the Adams & Swanson Funeral Home, North Platte, Nebraska, by Dorothy M. Wycoff, M.D. The toxicological examination detected nicotine in the blood, and the blood had an 8.5% carbon monoxide concentration.

FIRE

There was a postcrash fire which was confined to the right wing area. It was extinguished by rescue personnel who arrived immediately after the crash.

TESTS AND RESEARCH

The alternators, voltage regulators, and electrical switch panel were examined at an FAA certificated repair station in Rockford, Illinois. The left overvoltage relay tripped at 31.1 volts. The right overvoltage relay tripped at 31.6 volts. The right alternator field fuse was intact and not blown. The left alternator field fuse was broken in the fuse holder, but the fuse filament was intact. The right ammeter shunt was functional. The left ammeter shunt was functional. The switches for the left alternator, right alternator, and battery were functional.

The right voltage regulator was functional, and regulated test voltage to 27.5 volts. The left voltage regulator was bent, and had some impact damage. The test was terminated at 29 volts when the regulator began to smoke.

Both of the alternators sustained impact damage. The impact damage did not allow either alternator to be functionally tested.

The left alternator was a Prestolite 100 Amp, Model ALV9510, serial number A-81688. The alternator was installed on March 15, 1993. Cessna Multiengine Service Information Letters, ME80-1 and ME82-4, had not been incorporated on this alternator. Service Information Letter ME80-1 addresses repositioning the alternator brush holder to prevent moisture from entering the brush holder. Service Information Letter ME82-4 announces the availability of an alternator water deflector kit to prevent moisture from entering the alternator. The alternator

had been in service 350 hours at the time of the mishap. The alternator was separated from the engine in the crash sequence and had sustained impact damage. One phase of the stator winding was blackened. One phase wire in the negative diode plate was shorted and burned.

The right alternator was a Prestolite 100 Amp, Model ALV9510, serial number A-88175. The alternator was installed on June 17, 1993. Cessna Multiengine Service Information Letters, ME80-1 and ME82-4, had not been incorporated on this alternator. One phase of the stator winding was blackened. There was evidence of arcing between this phase and the alternator case.

The caution annunciator panel was examined at the National Transportation Safety Board's Materials Laboratory, Washington, D.C. The "DOOR WARN", "R TRANS", and "SPARE" indicators were missing. The "LOW VOLT" indicator lamp was intact and stretched. The filaments in all remaining lamps were either totally intact or broken. There was no evidence of stretching on any of the remaining filaments.

ADDITIONAL DATA

The wreckage was released to Mr. Shields Bud Craft, Associated Aviation Underwriters, Dallas, Texas. The components removed for further examination were returned to Air Salvage of Dallas at the request of Mr. Craft.

Pilot Information

Certificate:	Flight Instructor; Commercial	**Age:**	34, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	Seatbelt, Shoulder harness
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	Airplane Single-engine; Instrument Airplane	**Toxicology Performed:**	Yes
Medical Certification:	Class 1 Valid Medical--no waivers/lim.	**Last FAA Medical Exam:**	06/25/1993
Occupational Pilot:		**Last Flight Review or Equivalent:**	
Flight Time:	2550 hours (Total, all aircraft), 66 hours (Total, this make and model), 2532 hours (Pilot In Command, all aircraft), 84 hours (Last 90 days, all aircraft), 28 hours (Last 30 days, all aircraft), 1 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	CESSNA	**Registration:**	N5468G
Model/Series:	421C 421C	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	No
Airworthiness Certificate:	Normal	**Serial Number:**	421C-0215
Landing Gear Type:	Retractable - Tricycle	**Seats:**	8
Date/Type of Last Inspection:	11/29/1993, 100 Hour	**Certified Max Gross Wt.:**	7450 lbs
Time Since Last Inspection:	48 Hours	**Engines:**	2 Reciprocating
Airframe Total Time:	5837 Hours	**Engine Manufacturer:**	CONTINENTAL
ELT:	Installed, activated, did not aid in locating accident	**Engine Model/Series:**	GTSIO-520-L
Registered Owner:	SKY HARBOR AIR SERVICE	**Rated Power:**	375 hp
Operator:	SKY HARBOR AIR SERVICE	**Operating Certificate(s) Held:**	On-demand Air Taxi (135)
Operator Does Business As:		**Operator Designator Code:**	ATZA

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument Conditions	**Condition of Light:**	Day
Observation Facility, Elevation:	MCK, 2579 ft msl	**Distance from Accident Site:**	0 Nautical Miles
Observation Time:	1520 CST	**Direction from Accident Site:**	0°
Lowest Cloud Condition:	Unknown / 1000 ft agl	**Visibility**	1.5 Miles
Lowest Ceiling:	Overcast / 1000 ft agl	**Visibility (RVR):**	0 ft
Wind Speed/Gusts:	10 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	30°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29 inches Hg	**Temperature/Dew Point:**	-5°C / -6°C
Precipitation and Obscuration:			
Departure Point:	DENVER, CO (DEN)	**Type of Flight Plan Filed:**	IFR
Destination:	COLUMBUS, NE (OLU)	**Type of Clearance:**	IFR
Departure Time:	1244 MST	**Type of Airspace:**	Class G

Airport Information

Airport:	MCCOOK MUNI (MCK)	**Runway Surface Type:**	
Airport Elevation:	2579 ft	**Runway Surface Condition:**	
Runway Used:	0	**IFR Approach:**	
Runway Length/Width:		**VFR Approach/Landing:**	

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:	1 Fatal, 3 Serious, 2 Minor	**Aircraft Fire:**	On-Ground
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 Fatal, 3 Serious, 2 Minor	**Latitude, Longitude:**	

Administrative Information

Investigator In Charge (IIC):	MARK E DOUB,	**Report Date:**	01/11/1995
Additional Participating Persons:	DANIEL L MCKINNEY; LINCOLN, NE JOSEPH HOLLIER; LINCOLN, NE		
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.ntsb.gov/pubdms/.		