Aviation Investigation Final Report

Location:	BELLE PLAINE, Minnesota	**Accident Number:**	CHI95FA121
Date & Time:	April 12, 1995, 09:58 Local	**Registration:**	N4738A
Aircraft:	CESSNA P-210N	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	3 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

THE INSTRUMENT RATED PRIVATE PILOT DECLARED AN EMERGENCY DURING INITIAL CLIMBOUT IN ICING CONDITIONS. NO OTHER TRANSMISSIONS WERE RECEIVED AND THE AIRPLANE WAS LOST FROM ARTCC RADAR AT 7300 FEET MSL. THE LEFT WING AND BOTH HORIZONTAL STABILIZERS SEPARATED IN FLIGHT, EXHIBITING PERMANENT DEFORMATION SUPPORTING POSITIVE OVERLOAD (STABILIZERS DEFLECTED DOWN, MAIN WINGS DEFLECTED UP). ALL THREE EMPENNAGE DEICE BOOTS WERE FOUND TO HAVE NUMEROUS PATCHES, WHICH WOULD NOT HOLD NORMAL SYSTEM PRESSURE. THE SYSTEM REQUIRED THE EMPENNAGE TO HOLD PRESSURE BEFORE IT WOULD CYCLE TO THE MAIN WINGS. REPLACEMENT OF THE BOOTS HAD BEEN RECOMMENDED TO THE OWNERS 3 MONTHS PRIOR. WITNESSES WHO ARRIVED ON SCENE IMMEDIATELY AFTER THE ACCIDENT DESCRIBED ICE ON THE WINGS AND BOOTS.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: the failure to replace the deteriorated deicing boots, and the failure of the boots to operate when the airplane encountered icing condition. An additional causes were the pilot's failure to maintain adequate airspeed and the excessive pullup performed by the pilot during the uncontrolled descent.

Findings

Occurrence #1: LOSS OF CONTROL - IN FLIGHT
Phase of Operation: CLIMB - TO CRUISE

Findings
1. (F) WEATHER CONDITION - ICING CONDITIONS
2. (C) ANTI-ICE/DEICE SYSTEM,EMPENNAGE - INOPERATIVE
3. (C) ANTI-ICE/DEICE SYSTEM,EMPENNAGE - DETERIORATED
4. (C) MAINTENANCE,REPLACEMENT - NOT PERFORMED - COMPANY/OPERATOR MANAGEMENT
5. (C) AIRSPEED - INADEQUATE - PILOT IN COMMAND

Occurrence #2: ABRUPT MANEUVER
Phase of Operation: DESCENT - UNCONTROLLED

Findings
6. (C) PULL-UP - EXCESSIVE - PILOT IN COMMAND

Occurrence #3: AIRFRAME/COMPONENT/SYSTEM FAILURE/MALFUNCTION
Phase of Operation: DESCENT - UNCONTROLLED

Findings
7. WING,SPAR - OVERLOAD
8. HORIZONTAL STABILIZER ATTACHMENT - OVERLOAD

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

Factual Information

HISTORY OF FLIGHT

On April 12, 1995, a Cessna P-210N, N4738A, operated by the P210 Corporation of Minneapolis, Minnesota, experienced an in-flight breakup during initial climb to cruise. The instrument rated private pilot and two passengers sustained fatal injuries. No fire occurred. Instrument meteorological conditions existed at the time of the accident, and an instrument flight plan was filed.

The flight was conducted under 14 CFR Part 91 as a personal flight, originated from Flying Cloud Airport (FCM), Edens Prairie, Minnesota at 0944:30 central daylight time and was destined for Jefferson County Airport (BJC), Broomington, Colorado. Radar contact with Minneapolis Air Route Traffic Control Center was lost at 0958:17. The wreckage came to rest along a 3/4 mile path in the town of Belle Plaine, Minnesota, 19 miles on a bearing of 220 degrees from the Flying Cloud Airport.

PERSONNEL INFORMATION

The 51 year old pilot held a private pilot certificate with an instrument rating and privileges for airplane single engine land.

He had accumulated a total of 438 hours of flight time, of which 70 were in the make and model airplane. He had a total of 11 actual instrument, and 57 simulated instrument hours. In the past 90 days he had flown 29 hours, none in the previous 30 days.

The pilot had recently begun a course of instruction for his commercial pilot certificate.

AIRCRAFT INFORMATION

The airplane, N4738A, was a pressurized 1983 Cessna P-210N, serial number P21000820. The airplane was equipped with a Teledyne Continental Motors (TCM) TSIO-520-AF engine, serial number 525074, turbocharged and rated at 310 horsepower. The airplane was certified for flight into known icing, and equipped with propeller, windshield, wing, and empennage deice systems.

The airplane was certificated in the normal category, and was maintained under an annual inspection program. The last inspection was an annual conducted on March 1, 1995 at 1,953 hours total tachometer and airframe time, 32 hours prior to the accident.

Several witnesses reported hearing a "loud bang," the sound of "an engine revving up, then

stopping abruptly," followed by the airplane descending in a spiral out of the 800 foot overcast. The left wing was observed descending separately from the fuselage, "like a falling leaf."

METEOROLOGICAL

Weather throughout the area at the time of the accident was 700 to 800 foot overcast, with tops at 10,000 to 12,000 feet. Drizzle, sleet, and freezing rain were reported by surrounding stations. Numerous pilot reports of moderate clear and rime icing existed.

One witness who was a student pilot, stated he arrived at the wreckage immediately after it impacted and "observed 1/8 inch of clear ice on the wings, covering the boots and streaked back slightly."

COMMUNICATIONS

The pilot had established communications with Minneapolis Air Route Traffic Control Center (ARTCC), south departure radar, sector M98. During climbout, the pilot stated he had an emergency, and no other transmissions were received. Minneapolis ARTCC reported a large deviation in the airplanes altitude at the same time as the transmission, and then the radar target went into "coast mode," indicating a rapid altitude loss. Radar contact was lost at 7,300 feet above mean sea level (MSL).

WRECKAGE AND IMPACT INFORMATION

The fuselage came to rest 200 yards north of the Belle Plaine Farm Cooperative, located at 804 East Main Street, Belle Plaine, Minnesota. The wreckage path extended from southeast to northwest, and was approximately 3/4 mile long.

The left wing, and both horizontal stabilizers separated from the airframe prior to ground impact. Inspection of the attaching structure showed permanent downward deformation in both horizontal stabilizers, and permanent upward deformation in the spar roots of both main wing spars.

The left main spar upper cap exhibited compressionbuckling and was moved inward relative to the attachment fitting. The lower cap moved outward relative to the attachment fitting. Examination by Safety Board metallurgists confirmed that the failure of the left wing support structure was consistent with positive overstress (wing tip moving up). No evidence of pre-existing cracking was found.

An inspection of the elevator static stops revealed no evidence of pounding or flutter. All control cables were intact, or showed evidence of overload type failures.

The fuel tanks in both wings were ruptured, and no evidence of fuel was present in the right tank. A slight amount of fuel was present in the left wing and centerline header tank. The fuel

valve manifold was selected to the right tank, and was wet with fuel.

The engine came to rest approximately 200 yards northwest of the main wreckage, inverted and imbedded in the soft, muddy soil. There were no surrounding ground scars to indicate the engine had skidded to its final resting place, and no ground scars between the location of the main wreckage and the engine. The oil pan was crushed, and impact damage was evident on the upper surface. The engine cowling remained attached to the fuselage and firewall, and was torn open in the direction of the engine's final resting place.

Inspection of the turbocharger turbine revealed dry, baked mud inside. Fixed impact marks were found on the inside of the turbocharger housing, adjacent to the compressor and turbine blades, with no indication of rotational scoring.

The propeller remained attached to its output flange. No indications of rotation, chordwise scratching, bending or twisting was evident on the propeller.

No pre-impact discrepancies were found with the pitot-static system, flight instruments, or navigation instruments.

MEDICAL/PATHOLOGICAL

An autopsy was performed on the all three occupants at Regina Medical Center on May 13, 1995. No pre-existing disease was noted. No toxicological substances were found.

TESTS AND RESEARCH

The wing and empennage deice boots were tested with pressurized air for inflation capability. The wing boots were visually intact, exhibited a small number of patches, and both inflated and held pressure when 20 psi air was applied.

The horizontal stabilizer boots did not fully inflate nor hold pressure when 20 psi air pressure was applied. When pressure was first applied to the boots, water was ejected from numerous pin holes followed continuously by air. The holes appeared to have been patched with a black, rubberized substance.

The sequence of boot inflation is from the tail boots to the inboard boots, and finally the outboard boots. Each section is inflated for approximately six seconds, for a total cycle time of eigtheen seconds. The inflation cycle is controlled by a timer. Pressure sensors require the system to hold 14.3 to 18.0 psi in order to receive the green de-ice light in the cockpit. The de-ice light and system timer work independent of each other.

The electro-magnetic pneumatic system cycle valves were tested and operated when 18 volt DC power was applied. The vacuum manifold connecting left and right vacuum pumps operated normally. All pneumatic lines were clear and intact.

The repair facility in Minneapolis which inspected the deice boots in January 1995, reported that they advised the owners to replace the boots due to numerous (approximately 30) leaks. The inspector stated that the main wing boots inflated, but that the horizontal and vertical stabilizer boots inflated approximately 25% of normal and did not hold pressure. The boot system cycled during testing. The facility reported they were not requested to replace the boots, and they believed the owners intended to wait until autumn of 1995 to replace the boots.

One of the other two co-owners stated that he had flown the airplane back from Florida one week prior to the accident, and had encountered light icing conditions during his approach to Minneapolis. He stated that the deicing system operated, and he was able to visually observe ice shed from the left horizontal stabilizer.

The engine was removed and disassembled at the Teledyne Continental Motors facility in Mobile, Alabama, with no pre-existing discrepancies noted.

ADDITIONAL INFORMATION

The wreckage was returned to Loss Management Incorporated of St. Peters, Missouri, on April 15, 1995. The remaining retained components were returned on May 8, 1995, and July 7, 1995.

Pilot Information

Certificate:	Private	**Age:**	51,Male
Airplane Rating(s):	Single-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 3 Valid Medical--w/ waivers/lim	**Last FAA Medical Exam:**	May 12, 1993
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	438 hours (Total, all aircraft), 70 hours (Total, this make and model), 29 hours (Last 90 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	CESSNA	**Registration:**	N4738A
Model/Series:	P-210N P-210N	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	P2100820
Landing Gear Type:	Retractable - Tricycle	**Seats:**	6
Date/Type of Last Inspection:	March 1, 1995 Annual	**Certified Max Gross Wt.:**	3400 lbs
Time Since Last Inspection:	32 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	1985 Hrs	**Engine Manufacturer:**	CONTINENTAL
ELT:	Installed, activated, did not aid in locating accident	**Engine Model/Series:**	TSIO-520
Registered Owner:	P-210 CORPORATION	**Rated Power:**	300 Horsepower
Operator:		**Operating Certificate(s) Held:**	None
Operator Does Business As:		**Operator Designator Code:**	

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument (IMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	MSP ,841 ft msl	**Distance from Accident Site:**	29 Nautical Miles
Observation Time:	14:51 Local	**Direction from Accident Site:**	30°
Lowest Cloud Condition:	Unknown	**Visibility**	4 miles
Lowest Ceiling:	Overcast / 700 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	8 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	200°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29 inches Hg	**Temperature/Dew Point:**	3°C / 1°C
Precipitation and Obscuration:	N/A - None - Fog		
Departure Point:	EDEN PRAIRIE , MN (FCM)	**Type of Flight Plan Filed:**	IFR
Destination:	JEFFERSON CNTY , CO (BJC)	**Type of Clearance:**	IFR
Departure Time:	09:44 Local	**Type of Airspace:**	Class E

Airport Information

Airport:		**Runway Surface Type:**	
Airport Elevation:		**Runway Surface Condition:**	
Runway Used:	0	**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:	2 Fatal	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	3 Fatal	**Latitude, Longitude:**	44.619731,-93.759742(est)

Administrative Information

Investigator In Charge (IIC):	Thomas, Matthew
Additional Participating Persons:	EMILE LOHMAN; WICHITA , KS R. S BOYLE; MOBILE , AL JOHN C VERGANZ; MINNEAPLOIS , MN JAMES R WALLINGFORD; MINNEAPOLIS , MN
Original Publish Date:	September 24, 1995
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=9726