



National Transportation Safety Board Aviation Accident Final Report

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|--------------------------------|--------------------------------------|-------------------------|------------|
| Location: | West Gardiner, ME | Accident Number: | MIA08MA051 |
| Date & Time: | 02/01/2008, 1748 EST | Registration: | N102PT |
| Aircraft: | CESSNA 525 | Aircraft Damage: | Destroyed |
| Defining Event: | Loss of control in flight | Injuries: | 2 Fatal |
| Flight Conducted Under: | Part 91: General Aviation - Personal | | |

Analysis

The instrument-rated private pilot departed on an instrument flight rules (IFR) cross-country flight plan in near-zero visibility with mist, light freezing rain, and moderate mixed and clear icing. After departure, and as the airplane entered a climbing right turn to a track of about 260 degrees, the pilot reported to air traffic control that she was at 1,000 feet, climbing to 10,000 feet. The flight remained on a track of about 260 degrees and continued to accelerate and climb for 38 seconds. The pilot then declared an emergency, stating that she had an attitude indicator failure. At that moment, radar data depicted the airplane at 3,500 feet and 267 knots. Thirteen seconds later, the pilot radioed she wasn't sure which way she was turning. The transmission ended abruptly. Radar data indicated that at the time the transmission ended the airplane was in a steep, rapidly descending left turn. The fragmented airplane wreckage, due to impact and subsequent explosive forces, was located in a wooded area about 6 miles south-southwest of the departure airport. Examination of the accident site revealed a near vertical high-speed impact consistent with an in-flight loss of control. The on-site examination of the airframe remnants did not show evidence of preimpact malfunction. Examination of recovered engine remnants revealed evidence that both engines were producing power at the time of impact and no preimpact malfunctions with the engines were noted.

The failure, single or dual, of the attitude indicator is listed as an abnormal event in the manufacturer's Pilot's Abbreviated Emergency/Abnormal Procedures. The airplane was equipped with three different sources of attitude information: one incorporated in the primary flight display unit on the pilot's side, another single instrument on the copilot's side, and the standby attitude indicator. In the event of a dual failure, on both the pilot and copilot sides, aircraft control could be maintained by referencing to the standby attitude indicator, which is in plain view of the pilot. The indicators are powered by separate sources and, during the course of the investigation, no evidence was identified that indicated any systems, including those needed to maintain aircraft control, failed.

The pilot called for a weather briefing while en route to the airport 30 minutes prior to departure and acknowledged the deteriorating weather during the briefing. Additionally, the pilot was eager to depart, as indicated by comments that she made before her departure that

she was glad to be leaving and that she had to go. Witnesses indicated that as she was departing the airport she failed to activate taxi and runway lights, taxied on grass areas off taxiways, and announced incorrect taxi instructions and runways. Additionally, no Federal Aviation Administration authorization for the pilot to operate an aircraft between 29,000 feet and 41,000 feet could be found; the IFR flight plan was filed with an en route altitude of 38,000 feet.

The fact that the airplane was operating at night in instrument meteorological conditions and the departure was an accelerating climbing turn, along with the pilot's demonstrated complacency, created an environment conducive to spatial disorientation. Given the altitude and speed of the airplane, the pilot would have only had seconds to identify, overcome, and respond to the effects of spatial disorientation.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's spatial disorientation and subsequent failure to maintain airplane control.

Findings

| Personnel issues | |
|------------------|--|
| | Spatial disorientation - Pilot (Cause) |
| | Incorrect action performance - Pilot (Cause) |

Factual Information

HISTORY OF FLIGHT

On February 01, 2008, about 1747 eastern standard time, a Cessna 525, N102PT, crashed in a wooded area in West Gardiner, Maine. The certificated private pilot, who was the owner of the airplane, and one passenger were killed; the airplane was destroyed. The flight was operated by a private individual under the provisions of 14 Code of Federal Regulations (CFR) Part 91 as a personal flight. Instrument meteorological conditions prevailed and an instrument flight rules (IFR) flight plan was filed for a flight from the Augusta State Airport (AUG), Augusta, Maine to Lincoln Airport (LNK), Lincoln, Nebraska. The flight had originated from AUG about 1745.

Employees of the fixed base operator (FBO) at AUG stated that at the pilot's request the airplane was fueled and moved from the ramp into the FBO's hangar earlier that morning. The hangar was utilized by an air carrier operator that was based at the airport. When the air carrier's 1630 flight was canceled due to weather conditions, the Cessna was taken out of the hangar about 1600 and moved back to the ramp area to allow for the air carrier's airplane to be put back into the hangar.

A person identifying herself as the pilot of N102PT called the Lockheed Martin, Kankakee, Illinois, Automated Flight Service Station (AFSS) about 1701, to file an IFR flight plan from AUG to LNK. The pilot received a standard weather briefing for the flight at that time. The standard weather briefing advised of the icing, fog, mist, precipitation, and turbulence from departure climb to the flight altitude level requested of 38,000 feet and throughout the filed flight plan. The pilot commented that the weather was "just cruddy".

The attending FBO representative stated that the pilot arrived at the airport at about 1715, at which time she and the passenger loaded their personal effects into the airplane, returned a rental car, and paid for the fuel; this was done in a hurry. She made the comment to the passenger to hurry that they have to go as he was going to use the restroom. The pilot declined to have the airplane de-iced when asked by the FBO representative. She and the passenger then boarded the airplane. Shortly after, about 1730, the airplane's engines were heard starting and soon afterward the airplane was observed taxiing.

The FBO representative heard the pilot's radio transmissions over the radio in the FBO. He also noticed the airplane was not on the taxiway as it taxied, but rather on the grass area on the south side of the asphalt taxiway. At that time the ground was covered with snow and ice. He stated that for the past hour and half the weather conditions had turned from light snow to freezing rain, and ice was observed covering the cars in the parking lot. The ice was estimated about 1/4 inch thick. The employee noted the pilot did not turn on the airport taxi and runway lights, which would have been accomplished via the common air traffic radio frequency for the airport. He also observed that the airplane traveled through a ditch, which was covered with ice and snow, and at about that time, the airplane's engines were heard to accelerate to a high power setting. It was later discovered that the airplane's left main tire broke through the ice and became trapped in the ditch requiring the additional engine power to be released. The airplane continued on the grass area after the high engine power setting was heard.

The FBO representative heard the pilot announce that she was taxiing to runway 3; however, the airplane was taxiing towards runway 26 on the snow covered grass area. The FBO representative turned on the runway and taxi lights after hearing the incorrect runway

announcement. The pilot shortly announced taxiing to runway 35, while back taxiing on runway 26, after the lights were illuminated. She later announced she was taxiing to runway 17 via taxiway Charlie. About 1745 the announcement for departure from runway 17 was heard; the FBO representative observed the departure at that time.

At 1731, the pilot of N102PT contacted the Portland International Jetport (PWM), Portland, Maine, Air Traffic Controller Tower (ATCT) for the IFR clearance from AUG to LNK. At 1732, the controller provided a full route clearance and the pilot read it back correctly. The pilot advised that they would be departing from runway 17 in about 5 minutes. At 1736, the pilot utilized the clearance frequency advising of the engines start and that they were taxiing out runway 17, and then stated, correction, taxiing for runway 35. At 1741, the pilot advised the controller that they were ready for departure at AUG. The controller instructed the pilot to climb to ten thousand feet and issued the departure release. The pilot read back the instructions.

At 1744, the pilot radioed departure control, and reported climbing out of one thousand for ten thousand. At 1745, the controller instructed the pilot to ident, the pilot complied, and the controller established radar contact when the airplane was 2 miles southwest of AUG. The controller then instructed the pilot to proceed direct to Syracuse when able, which the pilot acknowledged. At 1746, the pilot declared an emergency, reporting "We've got an attitude indicator failure." The controller requested the pilot's intentions. At 1747, the pilot stated she wasn't sure which way she was turning. The transmission abruptly cut off at mid-transmission, and about the same time, radar contact was lost. An emergency locator transmitter (ELT) was then received on 121.5 MHz.

Radar data recorded by the Federal Aviation Administration (FAA) Boston Center depicted the airplane departing runway 17 at AUG and entering a climbing right turn to a track of about 260 degrees. It maintained that track, while accelerating as it climbed for 38 seconds, before the pilot declared an emergency and indicated an attitude indicator failure. At that moment, the radar depicted the airplane at 3,500 feet, and 267 knots. Thirteen seconds later, the pilot radioed that she did not know which way they were turning. At the time of this transmission, radar data depicted the airplane in a tight left rapidly descending turn, which continued until radar contact was lost.

About 1749, local authorities received several 911 calls from residents reporting a possible airplane crash. A short time later, the airplane wreckage was located about 6 miles south-southwest of AUG. One witness stated to local law enforcement authorities that he saw an airplane fly overhead at a low altitude, and moments later, observed a large explosion off in the distance.

PERSONNEL INFORMATION

The pilot, age 45, held a private pilot certificate, with airplane single engine land, multiengine land, and instrument rating; with type ratings for Cessna 525S and Cessna 500. She was issued a FAA second-class medical certificate on December 6, 2004, with no limitations. At that time, the private pilot reported a total flight experience of 2,800 hours. The pilot's flight logbook was not recovered and presumed onboard the airplane at the time of the accident.

On the airplane's insurance application, dated December 12, 2007, the pilot reported the last medical certificate was a third-class issued in November 2007, with a total flight experience of 3,522 hours. Between the FAA medical certificate issued on December 6, 2004, and the date of

the accident, no other medical certificates were identified in the pilot's FAA records.

The pilot last received recurrent training as required by FAR Part 61.56 for the Cessna 525 from Flight Safety International, San Antonio, Texas, on December 13, 2005. A total of 11 hours of ground school and 6 hours of simulator training were documented. According to information provided by family members and annotated in the airplane insurance policy application, the pilot was scheduled to return to Flight Safety International in March 2008.

The pilot's FAA authorization to operate an aircraft in compliance with FAA part 91.180, Operation Within Airspace (Flight Level [FL] 29,000 to FL 41,000) Designated as Reduced Vertical Separation Minimum Airspace (RVSM), could not be found. The flight plan was filed with an en route altitude of FL 38,000 feet.

AIRCRAFT INFORMATION

The accident airplane, a Cessna model 525, serial number 525-0433, was manufactured in 2001, and issued a standard airworthiness certificate, in the normal category on May 2, 2001. The airplane was certified in accordance with 14 CFR Part 23, and could be operated by either a single or two pilots. A type rating issue by the FAA is required to operate the airplane as pilot-in-command. The airplane was delivered new with a Rockwell Collins Pro Line 21 Integrated Avionics System which includes flight director guidance, autopilot, yaw damper and pitch functions. The integrated avionic system is designed and intended for single pilot operations. The system includes, in part, the primary flight display (PFD), multifunction display (MFD), and weather radar. The right seat instrument panel had an electrical powered attitude indicator and direction gyro. The airplane was equipped with a standby attitude indicator, airspeed indicator, altimeter, and compass. The primary flight controls were mechanically operated by cables and had corresponding manual trim controls. The airplane was powered by two Williams International FJ-44-1A medium bypass turbofan engines, rated at 1900 pounds static thrust. The airplane was certificated in accordance with 14 CFR Part 23.1416 and Part 23.1419; operating in icing condition. The airplane was equipped with anti-ice and deice systems. The airplane's fuel capacity was of 477 gallons.

A review of the airplane's maintenance records contained in the Cessna Aircraft Company maintenance tracking system (CESCOM) indicated that as of January 8, 2008, the airframe total time was approximately 1,649 hours with approximately 1,696 cycles. The engines' total times were 1,649 hours and with approximately 1,707 cycles. A review by the FAA of the service orders, dating up to November 14, 2007, from the Citation Service Center, which maintained the airplane, found the airplane was current with regards to airworthiness for part 91 and (IFR) operations. The airplane's original maintenance records were not located and presumed onboard the airplane at the time of the accident.

A review of the airplane's CESCOM records revealed that the airplane was in airworthiness compliance for part 91 operations. The altimeter/static system certification to RVSM standards was current. The airplane was equipped from the factory for RVSM operations.

METEOROLOGICAL INFORMATION

The closest official weather observation was AUG, located 6 miles northeast of the accident site. The 1753 surface observation was: winds from 020 degrees at 3 knots; visibility 3 statute miles; freezing rain; haze; overcast clouds at 1,800 feet; temperature minus 6 degrees Celsius

(C); dew point temperature minus 6 degrees C; altimeter 30.32 inches of mercury.

A weather study was conducted by the National Transportation Safety Board, Operational Factors Division. At the time of the accident the meteorological conditions were cloud bases 2,100 feet with cloud tops 10,000 feet; flight visibility 0 miles in the clouds and 6 miles below the lowest cloud base in mist; light freezing rain, mixed / clear icing moderate intensity below 5,000; light to moderate turbulence below 10,000 feet. A significant meteorological information (SIGMET) for occasional severe mixed / clear icing in clouds and precipitation was in effect for the accident area.

COMMUNICATION

There were no known problems with communications between the pilot and air traffic controllers.

WRECKAGE AND IMPACT INFORMATION

The accident site was in a wooded area. There was a heavy snowfall immediately after the accident, which covered the majority of the accident site making component identification and recovery difficult. The airplane wreckage was highly fragmented, consistent with an explosion and only a section of the empennage and portions of both aft wings were recognizable. An 8-foot deep crater defined the airplane's initial impact. The debris fanned out toward the northeast from the impact crater for approximately 350 feet. The damage to the surrounding trees near the crater indicated that the airplane was approximately 80 degrees nose down at impact. In addition, a postcrash fire consumed a large portion of the wreckage making inventory of the airplane and its systems not possible. The on-site examination of the airframe remnants did not show evidence of preimpact malfunction. The recovered remnants of the engines were examined at Williams International, Walled Lakes, Michigan. The examination revealed evidence that both engines were producing power at the time of impact and no preimpact malfunctions with the engines were noted.

FLIGHT RECORDER

The airplane was not equipped with a flight data recorder (FDR) or a cockpit voice recorder (CVR). Neither of these devices was required per current regulations.

MEDICAL AND PATHOLOGICAL INFORMATION

The DNA identification of the pilot and passenger was conducted by the Maine State Police Crime Laboratory, Augusta, Maine. The postmortem examinations of the pilot and passenger were conducted by the Maine State Medical Examiner, Augusta, Maine. The listed cause of death for the pilot and passenger was multiple blunt force trauma.

The FAA Civil Aeromedical Institute (CAMI) conducted toxicological testing on specimens from the pilot. The tests were negative for alcohol and drugs.

ADDITIONAL INFORMATION

A family member stated that the pilot would communicate with her several times a day during her stay in the Kingfield, Maine, area. The pilot's time mostly consisted of reading and watching her son at a skiing academy. The family member did not recall any mention from the pilot with respect to being upset or concerned with time restraints; however, the pilot did

mention to her that the place (area) was boring on several occasions. During the drive to AUG from the Kingfield area, the pilot stated that they would be spending the night in Nebraska before going home and again mentioned that she was glad they were leaving.

The Cessna, FAA approved, Pilot's Abbreviated Emergency/Abnormal Procedures Checklist for the Citation 525, Flight Guidance section covers procedures for an "Attitude," dual and single failure, which is listed as an abnormal event. Item Q3 (dual failure) states for the airplane's attitude control to make reference to the standby attitude gyro, for airplane heading to make references to the magnetic compass, and land as soon as practical.

FAA advisory circular (AC) 60-4A, "Pilot's Spatial Disorientation", and FAA Publication AM-400-03/01, "Spatial Disorientation", make reference to an effective perception, integration and interpretation of visual, vestibular, and proprioceptive sensory information must be maintained to control the aircraft. Any discrepancies between the person's sensory inputs will result in a sensory mismatch that can produce illusions and lead to the pilot's spatial disorientation. It may take as much as 35 seconds to establish full control after loss of visual and/or vestibular reference by qualified pilots. The spatial disoriented pilot may place the aircraft in a dangerous attitude during this time, which can lead to a rapid, uncontrollable, near-vertical, descent.

History of Flight

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| Enroute-climb to cruise | Loss of control in flight (Defining event) |
| Uncontrolled descent | Collision with terr/obj (non-CFIT) |

Pilot Information

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|---------------------------|--|-----------------------------------|------------|
| Certificate: | Private | Age: | 45, Female |
| Airplane Rating(s): | 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 Without Waivers/Limitations | Last FAA Medical Exam: | 12/06/2004 |
| Occupational Pilot: | No | Last Flight Review or Equivalent: | 12/13/2005 |
| Flight Time: | (Estimated) 3522 hours (Total, all aircraft) | | |

Aircraft and Owner/Operator Information

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|-------------------------------|--|--------------------------------|--------------|
| Aircraft Make: | CESSNA | Registration: | N102PT |
| Model/Series: | 525 | Aircraft Category: | Airplane |
| Year of Manufacture: | | Amateur Built: | No |
| Airworthiness Certificate: | Normal | Serial Number: | 525-0433 |
| Landing Gear Type: | Tricycle | Seats: | 8 |
| Date/Type of Last Inspection: | 11/14/2007, AAIP | Certified Max Gross Wt.: | 10700 lbs |
| Time Since Last Inspection: | 1649 Hours | Engines: | 2 Turbo Fan |
| Airframe Total Time: | 1649 Hours as of last inspection | Engine Manufacturer: | WILLIAMS |
| ELT: | Installed, activated, aided in locating accident | Engine Model/Series: | FJ 44 SERIES |
| Registered Owner: | SYMONS JEANETTE TRUSTEE | Rated Power: | 1900 lbs |
| Operator: | Jeanette A. Symons | Operating Certificate(s) Held: | None |

Meteorological Information and Flight Plan

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|----------------------------------|-------------------------|--------------------------------------|------------------|
| Conditions at Accident Site: | Instrument Conditions | Condition of Light: | Night/Dark |
| Observation Facility, Elevation: | AUG, 352 ft msl | Distance from Accident Site: | 6 Nautical Miles |
| Observation Time: | 1753 EST | Direction from Accident Site: | 207° |
| Lowest Cloud Condition: | Unknown | Visibility | 3 Miles |
| Lowest Ceiling: | Overcast / 1800 ft agl | Visibility (RVR): | |
| Wind Speed/Gusts: | 3 knots / | Turbulence Type Forecast/Actual: | / |
| Wind Direction: | 20° | Turbulence Severity Forecast/Actual: | / |
| Altimeter Setting: | 30.32 inches Hg | Temperature/Dew Point: | -6° C / -6° C |
| Precipitation and Obscuration: | Light - Freezing - Haze | | |
| Departure Point: | West Gardiner, ME (AUG) | Type of Flight Plan Filed: | IFR |
| Destination: | Lincoln, NE (LNK) | Type of Clearance: | IFR |
| Departure Time: | 1745 EST | Type of Airspace: | |

Wreckage and Impact Information

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| Crew Injuries: | 1 Fatal | Aircraft Damage: | Destroyed |
| Passenger Injuries: | 1 Fatal | Aircraft Fire: | On-Ground |
| Ground Injuries: | N/A | Aircraft Explosion: | On-Ground |
| Total Injuries: | 2 Fatal | Latitude, Longitude: | 44.237500, -69.851667 |

Administrative Information

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| Investigator In Charge (IIC): | Jose Obregon | Report Date: | 06/27/2011 |
| Additional Participating Persons: | Douglas H Bordeaux; FAA / FSDO; Portland, ME Mark A Auclair; FAA / FSDO; Portland, ME Emile J Lohman; Cessna Aircraft Company; Wichita, KS Jan R Smith; Cessna Aircraft Company; Wichita, KS Chris Greene; Williams International; Walled Lake, MI | | |
| Publish Date: | 06/27/2011 | | |
| 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/ . | | |

The National Transportation Safety Board (NTSB), established in 1967, is an independent federal agency mandated by Congress through the Independent Safety Board Act of 1974 to investigate transportation accidents, determine the probable causes of the accidents, issue safety recommendations, study transportation safety issues, and evaluate the safety effectiveness of government agencies involved in transportation. The NTSB makes public its actions and decisions through accident reports, safety studies, special investigation reports, safety recommendations, and statistical reviews.

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](#).