



National Transportation Safety Board Aviation Accident Final Report

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| Location: | Vestavia Hills, AL | Accident Number: | ATL04FA049 |
| Date & Time: | 12/10/2003, 1420 CST | Registration: | N441W |
| Aircraft: | Cessna 441 | Aircraft Damage: | Destroyed |
| Defining Event: | | Injuries: | 2 Fatal |

Flight Conducted Under: Part 91: General Aviation - Executive/Corporate

Analysis

The flight was climbing from 5,000 to 10,000 feet and the pilot obtained a maximum altitude of 6,300 feet. The airplane then began to lose altitude and deviate off course. The pilot declared a mayday and reported the airplane was in a spin. Several witnesses near the accident site reported hearing airplane engine noises and seeing the airplane descend from the clouds in a nose-down spiral to the ground. Two AIRMETs were valid at the time of the accident and included the accident location: "AIRMET TANGO update 3 for turbulence Occasional moderate turbulence below a flight level of 18,000 feet due to wind shear" "AIRMET ZULU update 2 for ice and freezing level Occasional moderate rime and/or mixed icing in clouds and precipitation below 8,000 feet." Two pilots who departed in separate Beech 200 airplanes about the time of the accident airplane stated they encountered "moderate rime" icing between 5,000 and 6,000 feet, and one pilot reported instrument metrological conditions and light turbulence between 1,800 to 6,000 feet. Examination of the airplane revealed no evidence of airframe or engine malfunction. The de-ice ejector flow control valves for the left wing, right wing, and empennage pneumatic boots were removed for examination, and all valves functioned when power was supplied.

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 adequate airspeed during climb in icing conditions, which resulted in an inadvertent stall / spin of the airplane and subsequent uncontrolled descent and collision with terrain. A factor was the accumulation of airframe ice.

Findings

Occurrence #1: IN FLIGHT ENCOUNTER WITH WEATHER
Phase of Operation: CLIMB - TO CRUISE

Findings

1. PREFLIGHT PLANNING/PREPARATION - INADEQUATE - PILOT IN COMMAND
2. WEATHER CONDITION - ICING CONDITIONS

Occurrence #2: LOSS OF CONTROL - IN FLIGHT
Phase of Operation: CLIMB - TO CRUISE

Findings

3. (C) AIRSPEED - NOT MAINTAINED - PILOT IN COMMAND
4. STALL/SPIN - INADVERTENT - PILOT IN COMMAND

Occurrence #3: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: DESCENT - UNCONTROLLED

Findings

5. TERRAIN CONDITION - RAVINE

Factual Information

HISTORY OF FLIGHT

On December 10, 2003, at 1420 central standard time, a Cessna 441, N441W, registered to and operated by Warrington Development Corp., descended in a spin and collided into a creek ravine in a residential area in Vestavia Hills, Alabama. The flight was operated under the provisions of Title 14 CFR Part 91 with an instrument flight rules (IFR) plan filed. Instrument meteorological conditions prevailed at flight altitude. The airline transport pilot and the passenger received fatal injuries, and the airplane was destroyed. The flight departed Birmingham, Alabama, at 1412 on December 10, 2003.

According to a witness, the pilot arrived at the airport around 0900 and "stayed on the computers all morning" checking the weather. The witness stated the pilot also spoke with arriving pilots about the weather they encountered on approach to the airport. According to records from the Anniston Automated Flight Service Station (AFSS), the pilot telephoned at 1142 and obtained a weather briefing for a flight from Birmingham, Alabama, to Venice, Florida, and telephoned again minutes later to file an IFR plan for the flight.

According to air traffic control records, the flight was cleared for takeoff from runway 24 at 1412 and was cleared to climb on runway heading to an altitude of 5,000 feet. The flight departed, and the pilot contacted the departure controller at 1416 and reported the flight was level at 5,000 feet. The controller cleared the flight to climb to 10,000 feet and turn to proceed on course. A review of radar data revealed the flight initiated a climbing left turn, then continued to climb on course. The radar data revealed the flight obtained a maximum altitude of 6,300 feet at 1418:13, then began to lose altitude and deviate off course toward the left. At 1418:50, the pilot stated to the controller, "mayday mayday mayday four one whiskey I'm coming out of the sky." At 2018:57, the pilot stated, "(unintelligible) severe buf (unintelligible)," and at 1419:10, "we're in a spin." No further radio contact was received from the flight.

Several witnesses near the accident site reported hearing airplane engine noises and seeing the airplane descend from the clouds in a nose-down spiral. An off-duty police officer near the accident site stated the airplane's descent angle was "straight down ... it wasn't gaining any distance." The officer stated the airplane hit trees and he lost sight of it, then he saw a fireball and black smoke. He drove toward the smoke and saw the airplane nose-down in a creek with "intense" ground fires burning near the front of the airplane.

PERSONNEL INFORMATION

The pilot held an airline transport pilot certificate for airplane multi-engine land and commercial pilot privileges for airplane single-engine land, rotorcraft-helicopter, and instrument helicopter. The pilot held a first class medical certificate issued August 2003 with no waivers or limitations. The pilot's log book was not recovered for examination. An insurance application signed by the pilot dated October 3, 2003, was found at the accident site. On the application, the pilot reported 4350 civilian flight hours, which included 3900 hours in multi-engine fixed-wing aircraft and 1485 hours in multi-engine turbo-prop aircraft; the pilot also reported 424 total hours in the Cessna 441, with 0 hours pilot-in-command time in any aircraft within the preceding 12 months. A FlightSafety International Professional Pilot Proficiency Card for the pilot was signed by an examiner dated November 5, 2003; the card stated the pilot

"has demonstrated competence to serve as pilot in command of CE-441."

AIRCRAFT INFORMATION

The Cessna 441, serial number 441-0181, was manufactured in 1980 and was equipped in January 1998 with two AlliedSignal (Honeywell) TPE331-10N-512S turboprop engines (serial numbers P-77109C and P-77107C) and two four-bladed McCauley propellers. The engines and propellers were installed in accordance with Supplemental Type Certificate SA5682NM. According to records provided by a maintenance facility, a Phase 2 inspection was completed September 30, 2003; the Phase 2 inspection included a 100-hour inspection of both engines. An entry dated September 14, 2003, in a trip log for the airplane recorded 5906.3 hours airframe total time, 1615.4 hours left engine total time, and 1625.8 hours right engine total time. A trip log entry dated December 10, 2003, recorded 5933.0 hours airframe total time, 1643.1 hours left engine total time, and 1653.5 hours right engine total time.

According to records provided by a fueling facility, the airplane's main fuel tanks were topped off with 289.2 gallons of fuel prior to departure.

A review of the Cessna Aircraft Company Information Manual for the Model 441 revealed in Section 2, Limitations, Ice Protection Equipment (Flight in Icing Conditions): "This airplane is approved for flight into icing conditions, as defined by the FAA, if the following equipment is installed and operational. 1 Heated stall warning vane or optional angle-of-attack lift sensor vane. 2. Heated pitot/static sources (2). 3. Wing and empennage deice boot system. 4. Windshield anti-ice system. 5. Propeller deice system (2). 6. Engine inlet anti-ice system (2). 7. Left wing deice light. 8. Outside air temperature indicator."

METEOROLOGICAL INFORMATION

The surface weather observing station at Birmingham International Airport reported at 1353 winds were from 270 degrees at 13 knots, visibility 10 statute miles with light rain, sky condition overcast at 2,200 feet above ground level, temperature 3 degrees centigrade, dew point 1 degree centigrade, altimeter setting 29.77 inches. The report contained the following remarks: rain began 33 minutes after the hour, ice pellets began 38 minutes after the hour and ended 53 minutes after the hour.

A review of Flight Service Station data revealed two AIRMETs were valid at the time of the accident and included the accident location: "AIRMET TANGO update 3 for turbulence Occasional moderate turbulence below a flight level of 18,000 feet due to wind shear associated with a strong surface low-pressure system and middle- to upper-level low." "AIRMET ZULU update 2 for ice and freezing level Occasional moderate rime and/or mixed icing in clouds and precipitation below 8,000 feet."

A review of PIREPs revealed at 1357, a "CRJ" crew reported light to moderate rime icing during climb between 3,000 and 6,000 feet, and, at 1509, a "B737" crew reported light to moderate rime icing during descent between 6,000 and 2,700 feet.

Two pilots who departed in separate Beech 200 airplanes about the time of the accident airplane stated they encountered "moderate rime" icing between 5,000 and 6,000 feet. One of the pilots estimated his airplane accumulated approximately 1/4 inch of rime ice in 45 seconds as the airplane climbed between 5,000 and 6,000 feet. The pilot stated he cycled the airplane's de-ice boots, which successfully cleared the ice accumulation. The pilot also reported "solid IMC" and light turbulence in the cloud layer between 1,800 to 6,000 feet.

WRECKAGE AND IMPACT INFORMATION

Examination of the accident site revealed the airplane came to rest upright in a creek at the bottom of a wooded ravine in a residential and commercial area 9.2 nautical miles southwest of the Birmingham International Airport. Trees within 20 feet of the wreckage displayed fresh breaks and scrapes. Wreckage debris was found primarily in immediate proximity to the fuselage. A strong odor of fuel was present, and fuel was recovered from the creek and soil by hazmat personnel.

The nose and cockpit areas were crushed aft to the forward cabin and were found under and against a concrete area of the creek embankment. The fuselage and cabin floor were buckled, the forward pressure bulkhead was crushed aft into the cockpit, and the cockpit floor was crushed against the bottom of the instrument panel. The instrument panel, side consoles, and side panel were crushed; the anti-ice and de-ice system switches were damaged and loose in the console. The control quadrant was crushed; the right and left fuel condition levers were full forward, the right power lever was full forward and bent, the left power lever was aft at flight idle and bent, and the friction locks were forward.

The empennage was separated and was found on top of the fuselage. The vertical stabilizer was attached, and the rudder was attached to the vertical stabilizer at the upper hinges with the rudder trim tab and actuator attached. The rudder control cables were attached to the rudder bell crank, and cable continuity was established from the bell crank to the cockpit center pedestal. The left horizontal stabilizer was attached, the left elevator outboard of the trim tab was separated, the inboard portion of the left elevator was attached at the inboard hinge, and the trim tab was attached. The left elevator trim actuators were attached, and trim control cable continuity was established from the actuator chain to the cockpit center pedestal. The right horizontal stabilizer, the right elevator, the right side of the torque tube, and the right elevator trim tab were separated and found adjacent to the fuselage. The right elevator was separated inboard of the trim tab, and the trim tab was crushed. The right elevator trim actuators were crushed and the push-pull rods were separated; trim control cable continuity was established from the actuator chain to the cockpit center pedestal. The elevator control cables were attached to the bell crank, and control cable continuity was established from the bell crank to cockpit center pedestal.

The left wing was attached to the fuselage, and the left engine was attached. The underside and leading edge of the wing were crushed, and the fuel tanks were breached. The forward side of the engine cowl and portions of the wing were coated with soot and were resting on charred ground. The aft side of the engine cowl displayed no evidence of soot. The left main landing gear was in the stowed position. The left inboard and outboard flaps were separated and found adjacent to the wing. The left aileron was crushed and separated and attached to a separated portion of wing spar. The aileron displayed no evidence of soot, and the aileron control cables were separated outboard of the wing root. The aileron trim tab was crushed and separated, and the aileron trim control cable was separated outboard of the wing root.

The inboard portion of the right wing was attached to the fuselage, and the right engine was separated from its mounts and resting on the ground at the right engine nacelle. The right wing outboard of the engine nacelle was crushed and separated. The underside and leading edge of the wing were crushed, and the fuel tanks were breached. The right main landing gear was in the stowed position. The right inboard and outboard flaps were separated and found adjacent to the wing. The hydraulic flap actuator was damaged. The right aileron was crushed and

attached to a separated portion of wing spar, and the control cables were separated outboard of the wing root.

The de-ice ejector flow control valves for the left wing, right wing, and empennage pneumatic boots were removed for examination. All valves functioned when power was supplied.

The four propeller blades for the left engine were separated from the hub, the hub was fractured, and the blades were found in close proximity to the engine. The tips of two of the blades were separated, and the blades displayed chordwise gouging and twist deformation. The left engine was removed from the airframe for examination. Disassembly revealed rotational scoring on the propeller shaft immediately aft of the propeller shaft nut, on the aft taper of the propeller shaft, and on the aft face of the propeller shaft lock nut. The four planet gear assembly mounting dowels were bent clockwise in the diaphragm housing, and the corresponding mounting holes were elongated. Rotational scoring between the static and rotating components was observed in the compressor section, combustor section, and turbine section of the engine. Foreign object ingestion damage was observed on the leading edge of nearly all the vanes of the first-stage compressor diffuser assembly. All first-stage compressor impeller blades were bent opposite the direction of rotation. The second-stage compressor impeller aft curvic coupling teeth were heavily damaged. Metal spray deposits were observed on the suction side of the first-, second-, and third-stage turbine stator vanes, and on the suction side of the first-, second-, and third-stage turbine rotor blades.

The four propeller blades for the right engine were separated from the hub, the hub was fractured, and the blades were found in close proximity to the engine. The tip of one blade was separated, another blade was bent and separated approximately 12 inches from the base end, and the blades displayed chordwise gouging and twist deformation. The right engine was removed from the airframe for examination. Disassembly revealed rotational scoring on the propeller shaft immediately aft of the propeller shaft nut, on the aft taper of the propeller shaft, and on the aft face of the propeller shaft lock nut. The four planet gear assembly mounting dowels were bent clockwise in the diaphragm housing. Rotational scoring between the static and rotating components was observed in the compressor section and turbine section of the engine. Foreign object ingestion damage was observed on the leading edge of nearly all the vanes of the first-stage compressor diffuser assembly, and on the leading edge of seven vanes of the second-stage compressor diffuser assembly. Dirt residue was observed throughout the combustor and turbine areas of the engine. The first-stage compressor impeller aft curvic coupling teeth and the second-stage compressor impeller forward curvic coupling teeth were heavily damaged. Metal spray deposits were observed on the suction side of the first-, second-, and third-stage turbine stator vanes, and on the suction side of the first-, second-, and third-stage turbine rotor blades.

MEDICAL AND PATHOLOGICAL INFORMATION

An autopsy was performed on the pilot on December 11, 2003, by the Jefferson County Coroner, Medical Examiner Office, Birmingham, Alabama. The report stated the cause of death was "multiple blunt trauma." Forensic toxicology was performed on specimens from the pilot by the Federal Aviation Administration, Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma. The report stated no ethanol was detected in the brain or muscle, diphenhydramine was detected in the kidney and liver, and pseudoephedrine was detected in the kidney and liver.

ADDITIONAL INFORMATION

A review of the Federal Aviation Administration (FAA) Advisory Circular (AC) 91-74, "Pilot Guide: Flight in Icing Conditions," revealed on page 6 "moderate icing" is defined as: "The rate of accumulation is such that even short encounters become potentially hazardous and use of deicing/anti-icing equipment or flight diversion is necessary;" "rime ice" is defined as, "A rough, milky, opaque ice formed by the instantaneous freezing of small, supercooled water droplets."

A review of the Cessna Aircraft Company Information Manual for the Model 441 revealed in Section 7, Airplane & Systems Descriptions, Ice Protection Equipment (Flight in Icing Conditions), Deice Boot System, "The system should be cycled when ice accumulates to between 1/4 and 1/2 inch. The deice boots are inflated each time that the deice boot switch is activated."

The wreckage was released to a representative of X L Specialty Insurance Company on November 15, 2004.

Pilot Information

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|----------------------------------|---|--|----------------------------|
| Certificate: | Airline Transport; Flight Instructor; Commercial | Age: | 57, Male |
| Airplane Rating(s): | Multi-engine Land; Single-engine Land | Seat Occupied: | Left |
| Other Aircraft Rating(s): | Helicopter | Restraint Used: | Seatbelt, Shoulder harness |
| Instrument Rating(s): | Airplane; Helicopter | Second Pilot Present: | No |
| Instructor Rating(s): | Airplane Multi-engine | Toxicology Performed: | Yes |
| Medical Certification: | Class 1 Without Waivers/Limitations | Last FAA Medical Exam: | 02/01/2004 |
| Occupational Pilot: | | Last Flight Review or Equivalent: | 07/05/2004 |
| Flight Time: | 8378 hours (Total, all aircraft), 424 hours (Total, this make and model), 4582 hours (Pilot In Command, all aircraft) | | |

Aircraft and Owner/Operator Information

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|--------------------------------------|--------------------------------|---------------------------------------|--------------|
| Aircraft Make: | Cessna | Registration: | N441W |
| Model/Series: | 441 | Aircraft Category: | Airplane |
| Year of Manufacture: | | Amateur Built: | No |
| Airworthiness Certificate: | Normal | Serial Number: | 441-0181 |
| Landing Gear Type: | Retractable - Tricycle | Seats: | 6 |
| Date/Type of Last Inspection: | 09/30/2003, 100 Hour | Certified Max Gross Wt.: | 9925 lbs |
| Time Since Last Inspection: | 26.7 Hours | Engines: | 2 Turbo Prop |
| Airframe Total Time: | 5933 Hours at time of accident | Engine Manufacturer: | AlliedSignal |
| ELT: | Installed | Engine Model/Series: | TPE331-10N |
| Registered Owner: | Warrington Development Corp. | Rated Power: | 715 hp |
| Operator: | Warrington Development Corp. | Operating Certificate(s) Held: | None |

Meteorological Information and Flight Plan

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|---|------------------------|---|------------------|
| Conditions at Accident Site: | Visual Conditions | Condition of Light: | Day |
| Observation Facility, Elevation: | KBHM, 644 ft msl | Distance from Accident Site: | 9 Nautical Miles |
| Observation Time: | 1353 CST | Direction from Accident Site: | 19° |
| Lowest Cloud Condition: | | Visibility | 10 Miles |
| Lowest Ceiling: | Overcast / 2200 ft agl | Visibility (RVR): | |
| Wind Speed/Gusts: | 13 knots / | Turbulence Type Forecast/Actual: | / |
| Wind Direction: | 270° | Turbulence Severity Forecast/Actual: | / |
| Altimeter Setting: | 29.77 inches Hg | Temperature/Dew Point: | 3°C / 1°C |
| Precipitation and Obscuration: | | | |
| Departure Point: | Birmingham, AL (KBHM) | Type of Flight Plan Filed: | IFR |
| Destination: | Venice, FL (KVNC) | Type of Clearance: | IFR |
| Departure Time: | 1412 CST | Type of Airspace: | Class C |

Airport Information

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|-----------------------------|---------------------------------|----------------------------------|---------|
| Airport: | Birmingham International (KBHM) | Runway Surface Type: | Asphalt |
| Airport Elevation: | 644 ft | Runway Surface Condition: | Wet |
| Runway Used: | 24 | IFR Approach: | None |
| Runway Length/Width: | 10000 ft / 150 ft | VFR Approach/Landing: | None |

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: | None |
| Total Injuries: | 2 Fatal | Latitude, Longitude: | 33.416389, -86.806944 |

Administrative Information

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| Investigator In Charge (IIC): | Catherine E Gagne | Report Date: | 04/28/2005 |
| Additional Participating Persons: | Michael G Mitchell; FAA - Birmingham FSDO - 09; Vestavia Hills, AL Henry J Soderlund; Cessna Aircraft Company; Wichita, KS David H Shonka; Cessna Aircraft Company; Wichita, KS Marlin J Kruse; Honeywell Engines, Systems & Services; Phoenix, AZ | | |
| 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](#).