Aviation Investigation Final Report

Location:	Jamestown, Tennessee	**Accident Number:**	ATL05FA148
Date & Time:	August 17, 2005, 18:13 Local	**Registration:**	N1824W
Aircraft:	Beech A36	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	2 Fatal
Flight Conducted Under:	Part 91: General aviation		

Analysis

Before takeoff on the accident flight, the pilot obtained a preflight weather briefing that included Convective SIGMET information, and he acknowledged to the briefer that he was aware of thunderstorm activity northeast of GAD. The pilot departed GAD, proceeded northeast toward SME. While in cruise flight north of CSV, the pilot requested to deviate to the left of course for an "immediate buildup," and the controller cleared the pilot to deviate right or left of course as necessary. A study of weather echo data and ATC radar data for the airplane's ground track showed that, about the time that the pilot made the request to deviate, the airplane was likely encountering the southern edge of an intense weather echo. After the pilot acknowledged the clearance, the controller advised the pilot that there appeared to be "weather" off the pilot's left side. The pilot responded that he also showed it in front and that he wanted to keep turning left to avoid it. The controller advised the pilot that he didn't see any weather for which the pilot would want to deviate to the left, and he again cleared the pilot to deviate to the right or the left. About 1 minute later, the controller restricted the pilot's heading and altitude clearances, and the pilot acknowledged. The controller did not provide the pilot any echo intensity, location, or distance information. The pilot did request any further deviations or advise of an emergency. According to the weather echo and ground track study, the airplane encountered intense to extreme thunderstorm activity and turbulence. Examination of the wreckage revealed no evidence of mechanical malfunction.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's decision to continue flight into an area of known thunderstorm activity, which

resulted in loss of aircraft control and collision with trees and the ground during the result uncontrolled descent.

Findings

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

Findings
1. WEATHER CONDITION - THUNDERSTORM
2. (C) FLIGHT INTO KNOWN ADVERSE WEATHER - CONTINUED - PILOT IN COMMAND

Occurrence #2: LOSS OF CONTROL - IN FLIGHT
Phase of Operation: MANEUVERING

Findings
3. AIRCRAFT CONTROL - NOT POSSIBLE - PILOT IN COMMAND

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

Findings
4. OBJECT - TREE(S)

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

Findings
5. TERRAIN CONDITION - GROUND

Factual Information

HISTORY OF FLIGHT On August 17, 2005, about 1813 central daylight time, a Beech A36, N1824W, registered to and operated by the private pilot, collided into mountainous, wooded terrain in the vicinity of Jamestown, Tennessee. The business flight was operated under the provisions of Title 14 CFR Part 91 with an instrument flight rules (IFR) flight plan filed. Visual meteorological conditions prevailed for the route of flight with an area of marginal visual flight rules (MVFR) conditions present in the immediate vicinity of the accident site. The private pilot and the passenger received fatal injuries, and the airplane was destroyed. The flight departed Northeast Alabama Regional Airport (GAD) in Gadsden, Alabama, about 1710 en route to Somerset - Pulaski County - J. T. Wilson Field (SME) in Somerset, Kentucky. According to the pilot's flight plan, the intended flight was from GAD direct to SME at 7,000 feet mean sea level (msl). According to air traffic control (ATC) records, the flight departed and climbed on course to 7,000 feet. About 1731, while the airplane was in cruise flight at 7,000 feet msl and the pilot was in contact with the Chattanooga, Tennessee, approach controller, the pilot requested deviations of 10 degrees right and left of course for 10 miles to avoid weather. The Chattanooga approach controller approved the pilot's request, and, about 1744, the pilot advised the controller that he had resumed a heading of 024 degrees direct to SME. A review of the ATC communications records showed that the pilot was in communication with Atlanta air route traffic control center (ARTCC) controllers since about 1753, and, about 1810, the pilot requested to deviate to the left of course; Atlanta ARTCC personnel transferred communications to the Indianapolis ARTCC. At 1811:12, the pilot made his initial contact with an Indianapolis ARTCC radar controller and reported the flight's altitude was 7,000 feet. At 1811:20, the pilot stated, "two four whiskey would like to turn ah about ah forty-five degrees left for immediate build up." The radar controller replied, "... two four whiskey deviations right or left of course as necessary for weather are approved direct Somerset when able." The pilot acknowledged, then the controller added, "roger, and I show weather just right off your left side." The pilot replied, "well I show it in front of me too so I'm gonna turn left 'til I get ah far enough to miss it by ah by your help please." At 1811:47, the controller stated, "... I'm not showing any weather ah that that you'd want to deviate to the left for so but deviations right or left of course are approved at your discretion direct Somerset when able." The pilot acknowledged and stated, "okay and it looks like I need a block altitude and ah (unintelligible)." At 1812:07, the controller cleared the pilot to "descend at pilot's discretion maintain five thousand pilot's discretion to fi- four thousand three hundred, forty three hundred feet," and the pilot acknowledged. The controller then contacted another ATC facility that was handling a twin-engine airplane, advised the facility that the pilot of N1824W was deviating, and asked that facility to re-route the twin-engine airplane. At 1812:36, the controller asked the pilot how far to the left he was turning, and the pilot replied that the airplane's heading was about 270 degrees. The controller replied, "okay do not go any further south than a two seventy heading and ah amend altitude maintain seven thousand maintain seven or six thousand or above." At 1812:48, the pilot acknowledged the altitude of 6,000 feet or above. No further radio communications were received from the flight, and radar data for the flight ceased about 1814. After subsequent attempts by ATC personnel to contact the pilot by radio were unsuccessful, a search was initiated. An air search spotter in a helicopter located the downed airplane on August 18, 2005, at the 1,600-foot level of rapidly rising terrain. The accident site was about 48 nautical miles (nm) southwest of SME. PERSONNEL INFORMATION The pilot held a private pilot certificate for airplane single-engine land with an instrument rating. His held a third-class FAA airman medical

certificate issued June 29, 2005, with the restrictions "must wear corrective lenses and possess glasses for near and intermediate vision" and " special panel exemption, time-limited for 6 months." The pilot's logbooks were not recovered for examination. A certificated flight instructor provided a record that the pilot completed a flight review and an instrument proficiency check on April 28, 2004, as required by 14 CFR 61.56 and 14 CFR 61.57(d), respectively. On the pilot's most recent application for airman medical certificate, he reported 4,900 total civilian flight hours. AIRCRAFT INFORMATION The airplane was manufactured in 1973 and was originally equipped with a Continental IO-520 series engine. A Teledyne Continental IO-550-B4F engine, manufactured on February 19, 2003, was installed on the airplane on March 21, 2003. It was equipped with a Hartzell PHC-C3YF-IRF three-bladed propeller. The engine and airframe logbooks recorded that an annual inspection was completed April 23, 2005, at a tachometer reading of 1512.2 hours, an airframe total time of 3519.69 hours, and an engine total time of 309.4 hours. A log entry recorded that the most recent altimeter, encoder, and static system tests required by 14 CFR 91.411 and the transponder test required by 14 CFR 91.413 were completed April 21, 2005. The most recent logbook entry was dated August 6, 2005, and recorded a tachometer reading of 1583.8 and an engine total time of 380.5 hours. Damage precluded determination of the tachometer reading at the accident site. According to the airplane's maintenance logs, the airplane was equipped with a WX-10A Stormscope. Damage precluded identification of the instrument at the accident site. METEOROLGICAL INFORMATION According to ATC communications records, before the pilot departed from GAD, he telephoned the Anniston, Alabama, automated flight service station (AFSS) at 1658 to file an IFR flight plan for the planned 1-hour-50-minute flight from GAD direct to SME with a planned departure time of 1710 and a planned altitude of 7,000 feet. The pilot told the AFSS briefer that he was aware of scattered Level 3 to 5 thunderstorms to the northeast of GAD over northern Alabama and Tennessee and that he had seen them on his computer screen. The AFSS briefer described the current weather conditions and indicated that a Convective SIGMET was in effect for the area of northern Alabama and Tennessee. The Memphis Center Weather Advisory 501 was issued at 1559 and was valid until 1800. The advisory area extended from a point 60 miles northeast of Dyersburg, Tennessee, to 40 miles northeast of Nashville, Tennessee, to 55 miles east-northeast of Memphis, Tennessee, to the point 60 miles northeast of Dyersburg. The advisory warned of an area of scattered to numerous Level 4 to 6 thunderstorms moving from 280 degrees at 10 knots, with thunderstorm tops at or above 50,000 feet msl. The National Weather Service (NWS) Surface Analysis Chart for 1900 depicted the primary synoptic conditions at the surface immediately after the accident as a low pressure system with a stationary front extending west-northwest of the low; the low and frontal systems extended over the route of flight and were located south of the accident location. The NWS Weather Depiction Chart for 1700 depicted an area of MVFR conditions in the immediate vicinity of the accident site. The station models in the area of MVFR conditions indicated visibility 4 miles in thunderstorms with overcast sky conditions at 5,000 feet. Otherwise VFR conditions prevailed over the route of flight. No large areas of IFR conditions were depicted over the region. The NWS Radar Summary Chart for 1820 depicted a large area of echoes associated with thunderstorms and rain showers extending southern Kentucky, Tennessee, western North Carolina, South Carolina, Georgia, Alabama, Mississippi, Louisiana, and Arkansas. Several areas of intense echoes identified over Tennessee had echo tops from 53,000 to 55,000 feet. The closest weather reporting facility to the accident site was at Crossville Memorial Airport - Whitson Field (CSV) in Crossville, Tennessee, about 22 nm south of the accident site at an elevation of 1,881 feet msl. The airport was equipped with an Automated Surface Observation System (ASOS) and reported the following weather conditions about the time of the accident: at 1753, wind calm, visibility unrestricted at 10 miles, sky conditions clear below 25,000 feet, temperature 29 degrees Celsius (C), dew point 19 degrees C, altimeter setting 30.00 inches of Mercury (Hg); at 1853, wind

calm, visibility unrestricted at 10 miles, ceiling broken at 10,000 feet, temperature 27 degrees C, dew point 22 degrees C, altimeter setting 30.02 inches of Hg. WRECKAGE AND IMPACT INFORMATION Examination of the accident site revealed broken trees and wreckage debris were scattered approximately 240 feet along an approximate 330-degree magnetic heading. A tree approximately 18 inches in diameter was found broken at the southeast end of the debris path, and crushed and separated sections of the right wing were on the ground near the broken tree. The propeller hub and blades were separated and on the ground near the broken tree. The fuselage, left wing, and sections of the empennage were approximately 200 feet northwest of the broken tree, and the engine was separated and approximately 40 feet northwest of the fuselage. The wreckage debris, which was scattered from the initial broken tree at the southeast end of the debris path to the engine located at the northwest end of the debris path, included fragmented pieces the of following: internal engine components, engine accessories, nose landing gear, cockpit flight controls, and cockpit instruments. Examination of the engine revealed impact damage with crankcase fractures at the accessory housing and nose section. The Nos. 3 and 5 cylinder heads, No. 3 piston head, oil sump, and accessories were not attached, and the crankshaft was separated at the propeller flange area. The No. 3 piston head was found on the ground near the engine. The ignition harness was damaged. Examination of the Nos. 1, 2, 4, and 6 upper spark plugs revealed color and wear consistent with the "normal" condition on the Champion AV-27 comparison chart. The fuel pump was found separated and turned freely. One separated magneto was located and showed impact damage. A vacuum pump housing was found separated; the vanes and rotor were not present. The propeller governor housing was found separated. The oil filter was found separated. Examination of the separated propeller hub revealed two blades were present with the hub. One blade was bent aft and showed leading edge gouges and chordwise score marks, and the other blade showed leading edge gouges and a curled tip. The third propeller blade, which was found separated and on the ground near the hub, showed s-bends and leading edge gouges. A tree limb about 4 inches in diameter was found severed in a diagonal, linear pattern, and a tree trunk showed a linear gouge. The right wingtip was separated and found crushed around a tree at the southeast end of the wreckage debris path. The right main landing gear strut an outboard section of the right aileron were found separated nearby. The inboard section of the right aileron was found separated nearby with one push-pull rod attached and bent. An approximate 2-foot section of the inboard right flap was separated. The right flap actuator was damaged. An approximate 6-foot section of the center of the right wing from the main wheelwell to the tiedown hook was separated. The right aileron balance cable was attached to the bellcrank, and the control cable was separated. The right aileron push-pull rod was separated, and its forward attachment was bent. Examination of the fuselage revealed the cabin, cabin roof, and cabin floor were crushed and breached. The nosewheel was separated. The rudder pedals were separated, and a separate section of the bar assembly was found near the fuselage. The control yoke assembly was separated with pieces found within the debris path. The left wing was attached to the fuselage and crushed from the leading edge aft about mid-span; the wing was present from root to tip. The left main landing gear was present. The left aileron was attached, the balance cable was attached to the bellcrank, and the control cable was attached to a separated bellcrank arm. The left flap was not attached and was found separated within the debris path. The left flap actuator was not located. About 1.5 feet of the lower vertical stabilizer and the left horizontal stabilizer were attached to the aft fuselage, and the left elevator was attached. The elevator cables were attached to the aft bellcrank. The rudder cables were attached to the bellcrank; cable continuity was confirmed to the aft cabin. The left elevator trim actuator was at the limit of nose-down travel, and its trim cable showed evidence of impact-related disturbance. The right horizontal stabilizer, right elevator, and the rudder were found crushed and separated within the debris path. The trim tab for the right elevator was attached. The upper section of the vertical

stabilizer was found crushed and separated. MEDICAL AND PATHOLOGICAL INFORMATION An autopsy was performed on the pilot on August 22, 2005, by Dynacare Tennessee, University Pathologists, P.C., Knoxville, Tennessee. The cause of death for the pilot was listed as "multiple blunt force injuries." The FAA Forensic Toxicology Research Team, Oklahoma City, Oklahoma, received tissue specimens of the pilot for toxicological analysis. The report stated that tests for carbon monoxide, cyanide, volatiles, and drugs were not performed and noted that the specimens were unsuitable for analysis. TESTS AND RESEARCH A National Transportation Safety Board senior meteorologist used the available weather data products and the flight's ATC radar data information to prepare a study to determine the airplane's proximity to adverse weather during the final minutes of the flight. According to the study findings, a plot of the airplane's radar data on a WSR-88D base reflectivity image scan completed at 1806:48 showed that, about that time, the airplane was about 9 nm north of CSV headed on a northwest ground track toward one echo that was about 15 nm north of the airplane's position. About that time, the echo had a maximum reflectivity of 50 dBZ or VIP Level 5. A plot of the airplane's radar data on a WSR-88D base reflectivity image scan for 1812:35 showed that, by that time, the airplane had reached the southern edge of the echo, made a course reversal, and its ground track was headed southwest along the southern edge of the echo. About that time, the echo had a maximum reflectivity of about 50 dBZ, and the airplane's ground track encountered echoes of about 45 dBZ. A plot of the airplane's radar data on a WSR-88D base reflectivity image for 1818:24 showed that, by that time, the airplane's ground track had headed west and had terminated in the vicinity of maximum echoes that ranged from 50 to 55 dBZ, or VIP Level 5 to 6. The study also included a review of lightning strike data to determine lightning activity in the vicinity of the accident site. The study used a site-specific lightning strike map developed from data from the National Lightning Detection Network (NLDN). The strike map, which was centered on a 15-mile radius from the accident site, indicated that no cloud-to-ground lightning strikes occurred between 1800 and 1815 within 15 miles of the accident site. The study noted that the NLDN product has an estimated accuracy of 99 percent detection of cloud-to-ground lightning strikes, which are common during the mature stage of a thunderstorm. The system cannot detect intra-cloud or cloud-to-cloud lightning. ADDITIONAL INFORMATION The FAA Aeronautical Information Manual (AIM) Pilot/Controller Glossary, "Radar Weather Echo Intensity Levels," states, "The following list gives the 'VIP levels' in relation to the precipitation intensity within a thunderstorm:" " Level 1. Weak," "Level 2. Moderate," "Level 3. Strong," "Level 4. Very Strong," "Level 5. Intense," and "Level 6. Extreme." According to FAA advisory circular AC-00-24b, "Thunderstorms," VIP Level 5 is 'intense' with severe turbulence, lightning, hail likely, and organized surface wind gusts. ... Hazardous turbulence may extend as much as 20 miles from the echo edge. [Pilots should] avoid intense or extreme level echoes by at least 20 miles." The FAA AIM, chapter 7-1-15, "ATC Inflight Weather Avoidance Assistance," states that, "For obvious reasons of safety, an IFR pilot must not deviate from the course or altitude or flight level without a proper ATC clearance. When weather conditions encountered are so severe that an immediate deviation is determined to be necessary and time will not permit approval by ATC, the pilot's emergency authority may be exercised. ... It should be remembered that the controller's primary function is to provide safe separation between aircraft. ... It is very important, therefore, that the request for deviation or radar vector be forwarded to ATC as far in advance as possible. Delay in submitting it may delay or even preclude ATC approval or require that additional restrictions be placed on the clearance." FAA order 7110.65, "Air Traffic Control," chapter 2-1-1, "ATC Service," states, "The primary purpose of the ATC system is to prevent a collision between aircraft operating in the system and to organize and expedite the flow of traffic. In addition to its primary function, the ATC system has the capability to provide (with certain limitations) additional services." Chapter 2-1-1, "Duty Priority," states that a controller should, "a. Give first priority to separating aircraft and issuing safety alerts as

required in this order." Chapter 2-1-6 states that a controller should issue a safety alert if an aircraft is unsafe proximity to "terrain, obstructions, or other aircraft." FAA Order 7110.65, chapter 2-6-4, "Weather and Chaff Services," states that a controller should: "A. Issue pertinent information on observed/reported weather or chaff areas. Provide radar navigational guidance and/or approve deviations around weather or chaff areas when requested by the pilot. ... 1. Issue weather and chaff information by defining the area of coverage in terms of azimuth (by referring to the 12-hour clock) and distance from the aircraft or by indicating the general width of the area and the area of coverage in terms of fixes or distance and direction from fixes. 2. Issue the level of echo intensity when that information is available ... ." During 2005 and 2006, the Safety Board noted at least four other fatal accidents that involved airplanes that encountered severe weather while operated by pilots who were in contact with ATC and on active IFR flight plans. As a result, in October 2006, the Board issued Safety Alert SA-11 to advise pilots to actively maintain awareness of severe weather along their route of flight and to provide information to pilots about ATC procedures, limitations, and weather radar assistance. Safety Alert SA-11 may be accessed at the Safety Board's Web site at .

Pilot Information

Certificate:	Private	**Age:**	72,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	None	**Second Pilot Present:**	No
Instructor Rating(s):	Airplane single-engine	**Toxicology Performed:**	Yes
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	June 1, 2005
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	April 1, 2004
Flight Time:	4900 hours (Total, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Beech	**Registration:**	N1824W
Model/Series:	A36	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Utility	**Serial Number:**	E-386
Landing Gear Type:	Retractable - Tricycle	**Seats:**	6
Date/Type of Last Inspection:	April 1, 2005 Annual	**Certified Max Gross Wt.:**	3600 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	3519.69 Hrs as of last inspection	**Engine Manufacturer:**	Teledyne Continental
ELT:	Installed, not activated	**Engine Model/Series:**	IO-550-B4F
Registered Owner:	Charles Henry Christian	**Rated Power:**	300 Horsepower
Operator:		**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	
Observation Facility, Elevation:	KCSV,1881 ft msl	**Distance from Accident Site:**	23 Nautical Miles
Observation Time:	17:53 Local	**Direction from Accident Site:**	188°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	/	**Turbulence Type Forecast/Actual:**	/
Wind Direction:		**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30 inches Hg	**Temperature/Dew Point:**	29°C / 19°C
Precipitation and Obscuration:	N/A - None - Mist		
Departure Point:	Gadsden, AK (KGAD)	**Type of Flight Plan Filed:**	IFR
Destination:	Somerset, KY (KSME)	**Type of Clearance:**	IFR
Departure Time:		**Type of Airspace:**	

Airport Information

Airport:	Somerset - Pulaski County SME	**Runway Surface Type:**	
Airport Elevation:	927 ft msl	**Runway Surface Condition:**	
Runway Used:		**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:	1 Fatal	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 Fatal	**Latitude, Longitude:**	36.336666,-85.049446

Administrative Information

Investigator In Charge (IIC):	Gagne, Catherine
Additional Participating Persons:	Jack Ray; FAA Nashville FSDO - 03; Nashville, TN Eric Thomas; Teledyne Continental Motors; Mobile, AL Robert Ramey; Raytheon Aircraft; Wichita, KS
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Last Revision Date:	
Investigation Class:	Class
Note:	
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