Aviation Investigation Final Report

Location:	Norris, South Dakota	**Accident Number:**	CHI01FA113
Date & Time:	February 19, 2001, 10:00 Local	**Registration:**	N9927S
Aircraft:	Beech 95-B55	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	3 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The airplane was destroyed when it impacted rolling terrain. All of the airplane's occupants were fatally injured. The pilot was not instrument rated. Radar data for the last few minutes of the flight shows the airplane descending from a pressure altitude of 7,900 feet to 7,500 feet. The last radar return shows the airplane 289 degrees true and 2.27 nautical from the accident site at an altitude of 7,700 feet. Weather data obtained for the accident time indicates that the possibility of isolated instrument meteorological conditions existed along the airplane's route of flight. The airplane's route of flight coincided with an intensifying cold front in the area of the accident. The examination of the airplane, engines and related systems did not reveal any anomalies that could be associated with a pre-impact condition.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot encountering instrument meteorological conditions and his subsequent loss of control of the airplane.

Findings

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

Findings
1. (C) VFR FLIGHT INTO IMC - ENCOUNTERED - PILOT IN COMMAND

2. (C) AIRCRAFT CONTROL - NOT MAINTAINED - PILOT IN COMMAND

Occurrence #2: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: DESCENT - UNCONTROLLED

Factual Information

HISTORY OF FLIGHT

On February 19, 2001, about 1000 mountain standard time, a Beech 95-B55, N9927S, piloted by a commercial pilot, was destroyed when it impacted rolling terrain about 5 miles south-southeast of Norris, South Dakota. The pilot and the two passengers were fatally injured. The personal flight was conducted under the provisions of 14 CFR Part 91 and was not on a flight plan. The aircraft departed the Rapid City Regional Airport (RAP), Rapid City, South Dakota, at 0929 and was en route to the Karl Stefan Memorial Airport, Norfolk, Nebraska. Surface weather reporting stations, along a direct route of flight between the departure and destination airports, recorded visual meteorological conditions.

The aircraft failed to reach its final destination and was reported missing on February 23, 2001. The Air Force Rescue Coordination Center initiated a search and rescue mission. The South Dakota Air National Guard, South Dakota Civil Air Patrol, and the Nebraska Civil Air Patrol participated in the resulting search and rescue mission. The search was suspended on March 16, 2001. A rancher found the aircraft on March 29, 2001.

Radar data was obtained for the approximate time of the accident. From the obtained data, 18 radar position targets were identified that correlate with the departure time and accident location. The last radar position identified was 289 degrees true and 2.27 nm from the accident site. The last recorded radar return listed a pressure altitude of 7,500 feet. According to United States Geological Survey maps, the accident site elevation is approximately 2,660 feet msl.

PERSONNEL INFORMATION

The pilot held a commercial pilot certificate with ratings for single and multiengine land airplanes. The pilot was not instrument rated. According to the pilot logbook, the pilot had accumulated a total of 1,381.8 hours of flight time as of the last entry dated December 22, 2000. Logbook records show that the pilot accumulated 113.8 hours of flight time in last year preceding the accident, 12.9 hours in the last 90 days, and 6.0 hours in the last 60 days. All of the flight times in the last year were in multiengine airplanes, and all but 6.0 hours were in the accident airplane.

According to Federal Aviation Administration (FAA) records, the pilot was issued a second-class medical certificate on February 22,1999.

AIRCRAFT INFORMATION

The airplane was a Beech model 95-B55. The airplane was a fixed wing, 6-seat, twin-engine, low-wing airplane of metal construction with retractable landing gear. Two 260 horsepower Continental IO-470-L engines powered the airplane.

The airplane maintenance records were found at the accident site. It is not known if the maintenance records are complete. Many of the entries in the logbooks were made by adhering self-adhesive labels to the pages of the logbook. Some of the labels were loose and no longer adhered to the logbook pages.

The most recent entry found in the right engine logbook was dated January 15, 2001, and listed 2532.2 hours total airframe time, 3,622.9 total engine hours, 918.2 hours since the last engine overhaul, with a recording hour-meter reading of 1858.2. The logbook states that the right engine was overhauled on March 11, 1987, and was installed on the airframe on April 7, 1987.

The most recent entry found in the left engine logbook was dated October 18, 2000, and listed 2506.3 hours total airframe time, with a recording hour-meter reading of 1832.3. The engine hours were not included in the October 18, 2000 entry. The logbook states that the left engine was overhauled on March 13, 1987, and was installed on the airframe on April 7, 1987 at a recording hour-meter reading of 939.8 hours. Based on the recording hour-meter reading found in the January 15, 2001 entry in the right engine logbook, and the hour-meter reading at the time of the left engine installation, the time since the overhaul of the left engine was calculated to be 918.3 hours as of January 15, 2001.

According to the information contained in the airframe logbook, the airplane had accumulated 2519.6 hours total time in service as of the last entry dated November 10, 2000, with an hour-meter reading of 1845.6. The most recent entry for an annual inspection was dated June 16, 2000, and the airplane had accumulated 2465.0 hours total time in service as of that date.

FAA records indicate that the airplane was registered to a corporation whose address was the same as that of the pilot. The registration date shown on FAA records is March 27, 2000.

METEOROLOGICAL INFORMATION

The National Transportation Safety Board meteorology group chairman prepared a report of the weather conditions along the route of flight and in the vicinity of the accident site. According to the report, a surface analysis chart showed a cold front extending from northwestern Montana southeastward through northeast Wyoming to the vicinity of RAP. The front continued southeastward to near Ainsworth and Lincoln Nebraska, before curving to the northeast through the Great Lakes region. The chart also showed a ridge of high pressure extending from western Canada southeastward through the upper high plains into eastern South Dakota.

The aviation area forecast (FA) issued by the Aviation Weather Center (AWC) at Kansas City, Missouri, listed, in part, the following:

> North Central Area
> Issued: February 19, 0345
> Synopsis and VFR Clouds/Weather
> Synopsis valid until February 19, 2200
> Clouds/Weather valid until February 19, 1600...Outlook valid February 19, 0600-2200
> ND SD NE KS MN IA MO WI LM LS MI LH IL IN KY
> .
> See AIRMET SIERRA for IFR conditions and mountain obscuration.
> Thunderstorms imply severe or greater turbulence severe ice low level wind shear and IFR conditions.
> .
> Synopsis... at 0400 low pressure northeastern Minnesota with cold front DLH-ABR-MLS line and warm front DLH-BAE line. Trough MSP-FOD-TXO line. By 2200 cold front DXO-STL-ICT-GLD line. Trough AKO-CDS-MAF line.
> .
> .
> South Dakota
> Above ground level scattered 4,000 feet broken 10,000 feet top 16,000 feet. Occasional ceiling broken 4,000 feet light snow. Outlook...visual flight rules.
> .
> Nebraska
> Panhandle...above ground level scattered 4,000 feet broken 12,000 feet top 16,000 feet. By 1200-1400 occasional ceiling broken 2,000 feet visibility 3-5 miles light snow. Outlook...marginal visual flight rules ceiling snow.
> Central and eastern Nebraska...sky clear. Occasional scattered 10,000 feet. Until 0700-0900 visibility 3-5 miles mist. By 1300-1500 above ground level scattered 4,000 feet broken 10,000 feet top 16,000 feet. Outlook...visual flight rules.

The Area Forecast Discussion (AFD) issued by the RAP Weather Service Office (WSO) at 1030 stated, "...A few weak returns showing up on the KUDX 88D [Rapid City Weather Surveillance Radar-1988 Doppler radar] this morning. A look out the window indicates mostly virga but models indicate strengthening frontogenisis across the central and southern portions of the CWA this afternoon so will leave a mention of a few flurries or sprinkles across the area this afternoon."

The AFD issued by the RAP WSO at 1515 stated, "...Area of snow flurries seen on the KUDX 88D from the Black Hills to south of Pierre lines up well with the 850-700 millibar layer frontogenesis maximum. The best frontogenetical forcing continues to slide southward

tonight."

The AFD issued by the North Platte WSO at 0357 stated, "... Models are in pretty good agreement with the timing of the cold front moving through the Central Plains today and tonight. Satellite imagery shows the front over northern South Dakota and low cloud development behind the front....Upper jet moves across the Central Plains today keeping plenty of high clouds over the forecast area. The cold front moves into southern South Dakota fairly early today but then hangs up and waits for cold air to push it into northern Nebraska in the late afternoon."

The AFD issued by the North Platte WSO at 1451 stated, "...1100 surface analysis had arctic boundary extending from south of O'Neill then northwest to east of Valentine."

Weather radar data from the KUDX 88D and the KLNX 88D (North Platte, Nebraska Weather Surveillance Radar-1988 Doppler radar) was reviewed. Plots of the reflectivities along with aircraft radar position data are appended to the Meteorological Factual Report.

Additional weather information is contained in the Meteorological Factual Report appended to this report.

WRECKAGE AND IMPACT INFORMATION

An on scene examination of the aircraft wreckage was started on March 30, 2001. A hand held Global Positioning System (GPS) receiver was used to determine the latitude and longitude of the initial impact point. The initial impact point was located at 43-degrees 24.047-minutes north latitude and 101-degrees 10.541-minutes west longitude. The wreckage was distributed in a fan shaped pattern from about 080-130 degrees magnetic from the initial impact point. The furthest piece of wreckage was located about 540 feet and 115 degrees magnetic from the initial impact point. The engines and propellers were found adjacent to the initial impact point. The propeller hubs were about 1 1/2-2 feet below ground level. The empennage was found about 280 feet and 115 degrees magnetic from the initial impact point. The horizontal and vertical stabilizers remained attached to the aft fuselage section. The rudder was found separated from the vertical stabilizer and was located about 50 feet from the other empennage pieces. The right elevator remained attached to the horizontal stabilizer. The left elevator was separated from the horizontal stabilizer and was broken at about mid-span. Both wing tips along with numerous pieces of wing skin and spar material were found at the accident site. Pieces of all of the wing control surfaces were found at the accident site. The landing gear was determined to be in the down position. The wing flaps were determined to be in the up position.

The aircraft was subsequently moved to an airport hangar where a partial reconstruction was performed. The reconstruction confirmed that all of the aircraft control and flying surfaces were present at the accident site. An inspection of the control system components was performed. Due to the extent of damage to the aircraft, the pre-impact continuity of the control

system could not be determined. All identified control system breaks exhibited signatures consistent with overload failure.

The right engine was examined. The right crankshaft was broken at the forward crankshaft throw and at crankshaft cheek number 8. The forward portion of the crankshaft remained attached to the propeller hub. The accessory case section of the engine was broken open and the accessory drive gears were broken out. The top of the crankcase was broken and fragmented and the crankshaft was exposed. The number 6 cylinder was damaged and part of the cylinder head was imbedded into the number 4 cylinder. The number 6 connecting rod was separated from its rod cap. The connecting rod cap was found on the number 6 connecting rod journal. The piston pin was still in-place in the connecting rod. The connecting rod pin was broken loose from the piston. The piston was still in the cylinder. The ignition and fuel injection systems were broken loose from the engine. The magnetos were fragmented. The top portions of all of the cylinders had varying degrees of damage. The number 5 cylinder was pushed rearward into the number 3 cylinder.

The left engine crankshaft was broken just aft of the propeller mounting flange. The break exhibited signatures consistent with torsional overload. The crankshaft was broken across crankshaft cheek number 9. The accessory case section of the engine was broken open and the accessory drive gears were broken out. The crankcase was broken and was beginning to separate in the area near the number 2 and 3 main bearing journals. The front of the engine crankcase was broken off. The crankshaft was exposed. All of the cylinders had damage. The number 6 cylinder was pushed back into the number 4 cylinder. The top of the number 5 cylinder was broken off. The number 6 connecting rod was twisted. The ignition and fuel systems were separated from the engine.

Both propellers were found within the impact craters at the accident site. The right propeller had one blade still attached. The other propeller blade had separated at the blade root and was also located within the impact crater. The left propeller was found with both blades still attached. All four of the propeller blades exhibited varying degrees of S-bending.

The airplane's combustion heater was found crushed and was sent to the NTSB Materials Laboratory for further examination.

MEDICAL AND PATHOLOGICAL INFORMATION

Autopsies were performed on all of the occupants of the airplane. The Clinical Laboratory of the Black Hills, in Rapid City, South Dakota, performed the autopsies on March 30, 2001.

Toxicology samples were examined by the FAA Toxicology and Accident Research Laboratory in Oklahoma City, Oklahoma. The results of the examination of samples taken from the pilot listed the following:

108 (mg/dL, mg/hg) ETHANOL detected in Muscle

7 (mg/dL, mg/hg) ACETALDEHYDE detected in Muscle
125 (mg/dL, mg/hg) METHANOL detected in Muscle
68 (mg/dL, mg/hg) N-PROPANOL detected in Muscle
5 (mg/dL, mg/hg) 2-BUTANOL detected in Muscle

NO DRUGS DETECTED in Muscle

Muscle specimens were the only specimens received by the FAA Toxicology and Accident Research Laboratory.

The accident occurred on February 19, 2001, and the bodies were not recovered until March 29, 2001.

TESTS AND RESEARCH

The airplane cabin heater was a Janitrol model D83A28, serial number 4731243. The airplane maintenance records revealed that the aircraft combustion heater was overhauled and reinstalled in the airplane on April 29, 1998. According to work order documents obtained from the authorized repair station that performed the overhaul, the heater assembly was overhauled in accordance with Janitrol maintenance instruction manual 30C57, 9/66. The work order states that the ignition unit was inspected and tested in accordance with Janitrol maintenance instruction manual 24C54, Revision 4/69, and that Janitrol service bulletin 71 revision B, 11/90 was complied with. The work order states that the ignition lead assembly was overhauled in accordance with Janitrol instruction manual 46C00, 2/57. The work order also states that the Heater assembly, ignition unit, and the ignition lead assembly were functionally tested and that the tests were "OK". The documents also state that the combustion tube assembly, spark plug, fuel nozzle, 3 gaskets, 2 sleeves, 2 connectors and the ignition cable were replaced.

A fixed base operator (FBO) at the Rapid City Regional Airport, Rapid City, South Dakota was contacted concerning maintenance of the airplane's combustion heater. It was found that the FBO had performed maintenance on the combustion heater on January 30, 2001. A copy of the work order was obtained. The work order for the maintenance performed stated, "Problem: Heater Inoperative." The work order further stated, "Action Taken: Cleaned and inspected all fuel and electrical connections on heater. Performed operational check of heater. No defects noted."

The postaccident examination of the combustion heater by the NTSB Materials Laboratory revealed the following. The heater was found to have several fractures. Fractures were found at the base of the exhaust tube, air inlet tube, and head-end fuel drain plug. Fractures were also found in the combustion chamber walls at the tail end. All of the observed fractures were in areas that had significant deformation of the surrounding metal. The fracture surfaces were examined and all of the fracture surfaces identified exhibited signatures consistent with

overstress fracture. The complete report of the examination of the heater is appended to this report.

ADDITIONAL INFORMATION

The FAA, Raytheon Aircraft Company, and Teledyne Continental Motors were parties to the investigation.

The wreckage was released to a representative of the insurance company.

Pilot Information

Certificate:	Commercial	**Age:**	50,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	None	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 2 Valid Medical--w/ waivers/lim	**Last FAA Medical Exam:**	February 22, 1999
Occupational Pilot:	UNK	**Last Flight Review or Equivalent:**	March 12, 1999
Flight Time:	1382 hours (Total, all aircraft), 13 hours (Last 90 days, all aircraft), 6 hours (Last 30 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Beech	**Registration:**	N9927S
Model/Series:	95-B55	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	TC-1589
Landing Gear Type:	Retractable - Tricycle	**Seats:**	6
Date/Type of Last Inspection:	June 16, 2000 Annual	**Certified Max Gross Wt.:**	5100 lbs
Time Since Last Inspection:		**Engines:**	2 Reciprocating
Airframe Total Time:		**Engine Manufacturer:**	Continental
ELT:	Installed, not activated	**Engine Model/Series:**	IO-470-L
Registered Owner:	Chace Auctioneers, Inc.	**Rated Power:**	260 Horsepower
Operator:		**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	
Observation Facility, Elevation:	PHP,2207 ft msl	**Distance from Accident Site:**	43 Nautical Miles
Observation Time:	09:55 Local	**Direction from Accident Site:**	334°
Lowest Cloud Condition:	Scattered / 10000 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	4 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	50°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.97 inches Hg	**Temperature/Dew Point:**	-2°C / -4°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Rapid City, SD (RAP)	**Type of Flight Plan Filed:**	None
Destination:	Norfolk, NE (OFK)	**Type of Clearance:**	None
Departure Time:	09:29 Local	**Type of Airspace:**	Class G

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:	2 Fatal	**Aircraft Fire:**	
Ground Injuries:	N/A	**Aircraft Explosion:**	
Total Injuries:	3 Fatal	**Latitude, Longitude:**	43.400833,-101.175834

Administrative Information

Investigator In Charge (IIC):	Brannen, John
Additional Participating Persons:	Scott Boyle; Teledyne Continental Motors; Arvada, CO Robert Ramey; Raytheon Aircraft Company; Wichita, KS Dan McKinney; FAA-Rapid City, SD - FSDO; Rapid City, SD
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