National Transportation Safety Board
Aviation Accident Final Report

Location:	Butte, MT	**Accident Number:**	SEA06FA068
Date & Time:	03/18/2006, 1455 MST	**Registration:**	N54RP
Aircraft:	Beech C99	**Aircraft Damage:**	Substantial
Defining Event:		**Injuries:**	2 Fatal
Flight Conducted Under:	Part 135: Air Taxi & Commuter - Non-scheduled		

Analysis

The cargo flight collided with mountainous terrain in controlled flight while executing an instrument approach procedure. Two pilots were aboard; the company's training and check captain/pilot-in-command in the right seat, and a newly hired commercial pilot in left seat, who was in training for captain The flight had been cleared for the VOR or GPS-B approach via the 7 DME arc. According to the approach plate, the transition to the approach is via a DME arc at 9,000 feet with no procedure turn. The flight is to track inbound on the 127 degree radial, descending down to, but no lower than, 7,700 feet to the initial approach fix (IAF). After crossing the IAF, the flight is to turn to 097 degrees for 10 nautical miles and descend to 6,900 feet. The remainder of the 1.5 nautical miles to the runway is to be flown under visual conditions. Documentation of the accident site indicated that the aircraft collided with trees and subsequently the mountainous terrain on a heading of approximately 127 degrees and about 6,900 feet mean sea level. The initial impact point was located approximately nine nautical miles on a magnetic bearing of 130 degrees from the IAF. Documentation of the horizontal situation indicator (HSI) on the left side instrument panel indicated that the course arrow was positioned to approximately 127 degrees, the inbound heading to the IAF. The co-pilot (right side) course arrow was positioned to 115 degrees. The location of the wreckage and the 127 degree heading on the HSI indicate that the pilots failed to follow the approach procedure and turn to a heading of 097 degrees after crossing the IAF. Instrument meteorological conditions were reported in the area consisting of icing conditions, heavy snow fall, with poor visibility and mountain obscuration. No pre-impact mechanical malfunctions or failures were identified.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The second pilot's failure to follow the published instrument approach procedure and the captain/PIC's inadequate supervision. Snow and mountain obscuration were factors.

Findings

Occurrence #1: IN FLIGHT ENCOUNTER WITH WEATHER
Phase of Operation: APPROACH - IAF TO FAF/OUTER MARKER (IFR)

Findings
1. (F) WEATHER CONDITION - OBSCURATION
2. (F) WEATHER CONDITION - SNOW

Occurrence #2: IN FLIGHT COLLISION WITH OBJECT
Phase of Operation: APPROACH - FAF/OUTER MARKER TO THRESHOLD (IFR)

Findings
3. OBJECT - TREE(S)
4. (F) TERRAIN CONDITION - MOUNTAINOUS/HILLY
5. (C) IFR PROCEDURE - NOT FOLLOWED - COPILOT/SECOND PILOT
6. (C) SUPERVISION - INADEQUATE - PILOT IN COMMAND

Factual Information

HISTORY OF FLIGHT

On March 18, 2006, approximately 1455 mountain standard time, a Beech C99, N54RP, registered to and operated by Ameriflight Inc., as a 14 CFR Part 135 cargo flight, collided with trees and subsequently the terrain located approximately seven nautical miles southwest of the Bert Mooney Airport (BTM), Butte, Montana. Visual meteorological conditions prevailed at the airport, however instrument meteorological conditions were reported in the area of the accident site. An instrument flight rules flight plan was filed. The aircraft was substantially damaged by impact damage and a post-crash fire. The airline transport pilot-in-command and a newly hired commercial pilot were fatally injured. The flight departed from Helena, Montana, approximately 20 minutes prior to the accident.

The aircraft was cleared for the VOR B approach to Butte at 1448. When the flight did not arrive at the airport a search was initiated. The wreckage was located in mountainous terrain by search and rescue personnel on March 20, about 0800, after a weak emergency locator transmitter signal was heard by other aircraft.

At the time of the accident, a National Weather Service (NWS) volunteer weather spotter located about one and-a-half miles southeast from the accident site reported that a weather front had been approaching the area from the south to the north/northeast. At the time of the accident, and at their residence, the conditions included icing conditions followed by heavy snow fall with poor visibility and variable winds in the mountains surrounding the accident site.

PERSONNEL INFORMATION

The pilot sitting in the right seat was acting as pilot-in-command (PIC)/captain. At the time of the accident, the captain held commercial, airline transport pilot, certificated flight instructor in airplane single and multi-engine land aircraft, certificated instrument flight instructor and instrument and advanced ground instructor certificates. The captain held a second class medical certificate dated January 16, 2006, with a limitation that he must wear corrective lenses.

Ameriflight company records indicated that the captain was hired by Ameriflight in January 2001. The most recent 14 CFR Part 135 PIC Check flight in the Beech 99 (BE-99) was on April 24, 2005. The captain was also one of the company's training and check captains in the BE-99.

At the time of the accident the captain had accumulated a total flight time of 5,219 hours in all aircraft, with 5,109 hours as PIC. Approximately 2,616 hours had been accumulated in the BE-99, with 2,506 hours as PIC. Approximately 250 hours had been logged as giving flight instruction in the BE-99. Approximately 163 hours had been accumulated in the preceding 90 days in the BE-99. The captain's home base was located in Helena, Montana.

The second pilot seated in the left seat had been hired by Ameriflight in February 2006. At the time of the accident, this pilot held commercial and flight instructor certificates and was rated for instrument flight and flight in airplane single engine land and multi-engine land aircraft. Under the flight instructor certificate, he was rated to give instruction in single-engine land aircraft and for instrument flight. The pilot held a first class medical certificate dated

February 16, 2006, with a limitation that corrective lenses must be worn.

At the time of the accident the second pilot had accumulated a total flight time in all aircraft of 2,023 hours, with 1,130 hours as PIC. A total flight time of 17 hours had been accumulated in the BE-99, with no time listed as PIC. Approximately 45 hours had been accumulated in all types of aircraft in the preceding 90 days with 17 hours in the BE-99.

Company personnel records indicated that the second pilot had completed training for employment as Captain in the BE-99, and was scheduled to take his check ride the day following the accident. The pilot was hired in February 2006, and classroom training began in March 2006, in Burbank, California. The Line Training Qualification Check was accomplished on March 4, 2006. Company training lesson plans consisted of ground school classroom time, simulator time and flight time in the aircraft. Flight training and observation flights of the routing in Montana began on March 14, 2006. Flight scheduling records indicated that the pilot had been on board aircraft flying from his main base of operations in Helena, Montana, to Billings, Montana, and Great Falls, Montana. The last flight before the accident was on March 16, 2006. Each of the training and observation flights were with an instructor on-board who was acting as the Captain/PIC. This was the pilot's first flight with the company into the Bert Mooney Airport, Butte, Montana.

AIRCRAFT INFORMATION

At the time of the accident, the aircraft, a Beech C99, had accumulated a total airframe time (TAT) of approximately 22,169.5 hours and 35,539 cycles. Ameriflight maintenance personnel maintained the aircraft under an Approved Aircraft Inspection Program (AAIP). Ameriflight's computer generated aircraft maintenance status report dated March 16, 2006, indicated that an AAIP #3 Event was accomplished on December 6, 2005 at 22,065 hours TAT, and an AAIP routine inspection was accomplished on February 15, 2006, at 22,134 hours TAT. An avionics check A was accomplished on January 19, 2006.

The aircraft was equipped with two Pratt & Whitney PT6A-36 engines. Maintenance records indicated that the left engine gas generator had accumulated a total time since overhaul (TSO) of 11,864 hours and 16,660 cycles since overhaul (CSO). The power section had accumulated 7,235 hours TSO and 9,866 CSO.

The right engine gas generator had accumulated 5,042 hours TSO and 6,877 CSO. The power section had accumulated 5,042 hours TSO and 6,877 hours CSO.

Review of maintenance records indicated that there were no open pilot squawks on the aircraft during the 5 days prior to the accident. One maintenance write-up (apparently during an inspection) reported that the right ice light was inoperative and it was replaced. No maintenance items were deferred on the minimum equipment list (MEL) or Continued Items program.

METEOROLOGICAL INFORMATION

At 1400, the weather reporting facility for BTM was reporting winds from 360 degrees at 6 knots, Visibility was 3 statute miles with light snow and mist. Few clouds were reported at 1,300 feet, broken clouds at 1,800 feet and overcast at 2,800 feet. The temperature and dew point were 01 degrees C. The altimeter was 29.73" Hg.

At 1427, the wind was from 100 degrees at 5 knots. Visibility was 10 statute miles. Broken clouds were reported at 3,000 feet and 4,300 feet, with overcast at 5,000 feet. The

temperature and dew point were 02 degrees C. The altimeter setting was 29.72" Hg.

At 1453, the wind was from 360 degrees at 8 knots. Visibility was 10 statute miles. The clouds were broken at 6,000 feet. Temperature and dew point were 02 degrees C. The altimeter setting was 29.72" Hg.

AIRMETs were in effect for Montana reporting instrument flight rule conditions; turbulence; icing, and mountain obscuration.

Two National Weather Service weather spotters located about 1.5 miles southeast of the accident site and about 500 feet lower in elevation reported that on the day of the accident, the morning was clear. Clouds came in about noon and the temperature was about 35 degrees F. The afternoon storm moved into the area from the southwest to west and was moving in a northward to northeast direction. The wind was not over 20 miles per hour. The precipitation started at 1400 as light rain followed by snow. About 1630, wet snow had begun to accumulate. The spotters reported that the storm was typical for the time of year, and they felt there was no need to call the weather service.

AIDS TO NAVIGATION

The flight was cleared for the VOR or GPS-B approach via the 7 DME (Distance Measuring Equipment) arc. The transition to the approach is via a DME arc at 9,000 feet with no procedure turn. The flight is to track inbound on the 127 degree radial, descending down to, but no lower than 7,700 feet to Coppertown VOR (CPN), the Initial Approach Fix (IAF). After crossing CPN, the flight is to turn to 097 degrees for 10 nautical miles and descend to 6,900 feet. The remainder of the 1.5 nautical miles to the runway is to be flown under visual conditions.

At the time of the accident, Federal Aviation Administration (FAA) personnel reported that all navigation aids for the Bert Mooney Field were operational.

On March 23, 2006, a special after accident flight inspection was conducted by FAA personnel to test the VOR or GPS-B approach. The test was flown at 1000 MST. The wind was calm, the visibility was 10 statute miles. The sky was clear and the altimeter was 30.02" Hg. The flight test evaluated the procedure turn radial from 10 nautical miles to the facility and the final approach radial from the facility to the missed approach point. The facility operation was satisfactory.

COMMUNICATIONS

At 1422, Ameriflight (AMF) 2591 contacted Helena ground control to report that they were ready to taxi for the Instrument Flight Rules (IFR) flight to Butte. The flight was cleared to taxi to runway 27 for the Helena 2 Departure. The controller cleared AMF 2591 to Butte via the Helena 2 departure for victor 113 at 14,000 feet. Departure frequency was reported as 119.5 and the transponder code squawk was 4315. The pilot correctly read the clearance back and at 1433, the flight was cleared for takeoff.

At 1435, AMF 2591 contacted departure control to report that they were at 5,000 feet and climbing to 14,000 feet. At 1440, AMF 2591 was instructed to contact Salt Lake City Center. AMF 2591 contacted Salt Lake Center to report that they were over the Helena VOR at 12,600 feet, climbing to 14,000. The controller acknowledged AMF 2591 and reported that they were in radar contact.

At 1442, AMF 2591 informed Salt Lake Center that they were at 14,000 feet and that they had the "one minute weather at Butte," indicating that "at Butte looks like things are improved but we'll go ahead and start with the VOR bravo approach today via the seven DME (distance measuring equipment) arc." The controller cleared AMF 2591 for the VOR B approach at 1447. At 1449, the controller informed AMF 2591 that radar contact was lost and for the flight to change to advisory frequency was approved. The controller instructed AMF 2591 to report cancellation or arrival time on the current frequency. AMF 2591 responded that they would cancel on the ground.

At 1505, the Salt Lake Center controller attempted to contact AMF 2591. There was no response from the flight.

WRECKAGE AND IMPACT INFORMATION

On March 23, 2006, investigators from the National Transportation Safety Board, Federal Aviation Administration, Raytheon Aircraft Company, Pratt & Whitney and Ameriflight conducted an on-site documentation of the wreckage.

The mountainous terrain was covered with snow to a depth of about four feet. The area was covered with dense deciduous trees with areas of clearings.

The approximate initial impact was determined to be a grouping of trees with the tops broken off. The trees were about 100 feet in height with the top branches having a diameter of about 6 inches. Utilizing a hand held global positioning system (GPS) unit, the area was about N 45 degrees 54.081 minutes latitude, W 112 degrees 37.094 minutes longitude at a terrain elevation of 6,880 feet. This location is approximately 9 nautical miles on a magnetic heading of approximately 130 degrees from the CPN VOR.

The left wing tip was found uphill (approximate 25 degree terrain angle) on a 125 - 130 degree heading from the initial impact trees. The left wing tip section measured 6 feet in length and displayed a circular indentation along the leading edge. The location was N 45 degrees 54.06 minutes latitude, W 112 degrees 37.078 minutes longitude. The terrain elevation was 6,920 feet with 100 foot trees in the immediate area.

The right wing tip was found along the 125 -130 degree heading. The terrain angle leveled off in the immediate area. The section of right wing tip measured 7 feet. Two circular indentations were noted along the leading edge. One indentation measured 6 inches across, the other measured 15 inches across. Wood fragments were noted within the metal folds. About one foot of aileron section was still attached at the outboard hinge. The location was N45 degrees 54.038 minutes latitude, W 112 degrees 37.034 minutes longitude. The terrain elevation was 6,968 feet.

The main wreckage was located in a heavily wooded area at the edge of a clearing. Trees varied in height to about 100 feet with varying diameters to the tree trunks. The trees at the edge of the clearing were identified as the initial ground impact. At the base of the initial grouping of trees, the right wing section from the wing root to the engine nacelle was wrapped around the trunk of one tree. Impact damage was noted to the tree trunk and to a tree located 15 feet to the left. The empennage section and a section of the left side aft fuselage with the airstair door attached at the lower aft hinge were found. Control cables attached at the aft end of the empennage were noted. The cable length measured 26 feet. A magnetic heading from this point along the wreckage distribution path to the furthest item was 125 degrees. The empennage section had the vertical stabilizer attached with the rudder separated at the hinges

but still in place lying on the ground with the control cables attached. The left side horizontal stabilizer spar was bent aft. The outer skin was torn away with a circular indentation noted near the root area. Three sections of the stabilizer were found within the local area. These sections displayed circular indentations along the leading edge. The right side stabilizer remained intact and attached to the aft fuselage. A 30-inch in length circular indentation was noted at the root area. The elevator remained attached. The left side aileron control cables from the bellcrank to the nacelle remained attached. The rudder trim was in the neutral position.

Approximately 52 feet into the wreckage path, the nose gear assembly was found followed by the center fuselage area and cockpit at 55 feet. The main part of the fuselage was at N 45 degrees 53.980 minutes latitude, W 122 degrees 36.964 minutes longitude. The terrain elevation was 6,956 feet. This section of fuselage was destroyed by heat distress and reduced to ash and melted metal. To the right of the main wreckage, 21 feet away was the right engine with the propeller assembly detached. The propeller assembly for this engine was found within 15 feet of the engine. All three propeller blades remained in the hub. All three propeller blades displayed "S" bending deformation and impact gouges to the blade edges.

Miscellaneous pieces of debris were found leading up to the left engine, which was 123 feet from the initial ground impact point. The propeller assembly remained attached.

Documentation of the cabin area found that the flap actuators were destroyed. The flap control in the cockpit was found at the flaps 30% approach position. The landing gear lever was found in the extended position.

ELT Artex model 00-10-009 Rev C. S/N: A22480 was found by search and rescue personnel in the aft fuselage. The unit was armed and had been emitting a week signal. The antenna cable was pulled out. On Sunday March 19, 2006, a commercial airliner and a general aviation aircraft heard a signal. On March 20, 2006, about 0800 a search helicopter located the wreckage. Adverse weather hampered air searches.

MEDICAL AND PATHOLOGICAL INFORMATION

The State Medical Examiners Forensic Science Division, State of Montana, performed post-mortem examinations on the PIC and the second pilot. The Medical examiner reported that the cause of death to the PIC was due to blunt force injuries. The cause of death to the second pilot was due to thermal injuries.

Toxicological samples from both occupants were sent to the Federal Aviation Administration Civil Aeromedical Institute for analysis. The results of the analysis are identified in the attached Toxicology reports.

TESTS AND RESEARCH

The wreckage was recovered from the accident site on March 23, 2006, by personnel from Arlin's Aircraft Service, Belgrade, Montana, and transported to a hangar on the Bozeman/Belgrade Airport.

On March 24, 2006, the investigative team met to examine both engines and the remains of the cockpit instrument panel.

During the examination/teardown of the left side engine S/N: 38147, and right side engine S/N: 56740, both engines displayed similar rotational signatures in that the compressor

section blade airfoils were intact. The blade tips and shroud displayed circumferential rubbing. The downstream side of the disc outer rim and blade platforms displayed heavy circumferential rubbing and machining, with frictional heat discoloration from axial contact with the power turbine guide vane ring and interstage baffle. The disc hub displayed heavy circumferential machining from axial contact with the power turbine, through the interstage baffle. The compressor turbine could be rotated by hand and was continuous with the compressor rotor to the left engine. The power turbine shroud displayed heavy circumferential scoring from contact with the power turbine blade tips.

The left side propeller assembly remained attached to the engine and was later removed. During the inspection of the assembly, it was noted that propeller blade designated as "LA" displayed an approximate 45 degree aft bending. The tip of the blade was torn off and was curled aft. Minor leading and trailing edge nicks were noted along the blade edge. Chordwise striations were noted near the blade tip with some polishing, and gouging signatures about blade mid-span. Blade "LB" was bent forward about 90 degrees. The blade tip was curled aft. No leading or trailing edge nicks were noted. Blade "LC" displayed an approximate 40 degree aft bending with slight "S" bending deformation. The blade tip was curled forward with tearing of the material noted. Leading edge nicks were noted to the blade edge with chordwise striations near the tip area. The spinner was partially torn off on one side.

The right side propeller assembly separated from the engine during the impact sequence. Propeller blade "RA" was bent aft about 90 degrees, with the blade curling forward near the tip. Trailing edge nicks were noted along the blade edge as well as gouges in the material near the tip area. Longitudinal scratches were noted on the blade back where the blade was bent. Blade "RB" was bent aft about 40 degrees with slight "S" bending. The tip area was deformed. No scratches or nicks were noted along the blade edge. Blade "RC" was bent aft about 45 degrees. Minor trailing edge nicks were noted along the blade edge. The spinner remained attached and was flattened on the sides.

Inspection of the pilot (left-side panel) Horizontal Situation Indicator (HSI) noted that the unit face displayed heat distress, but the unit face and pointers were intact. It was noted that the course arrow was positioned to approximately 127 degrees which is the inbound heading to CPN VOR. The co-pilot side (right side) course arrow was positioned to 115 degrees.

ADDITIONAL DATA/INFORMATION

The wreckage was released to the owner's representative on May 17, 2006.

Pilot Information

Certificate:	Airline Transport; Flight Instructor; Commercial	**Age:**	37, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	**Seat Occupied:**	Right
Other Aircraft Rating(s):		**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	Airplane Multi-engine; Airplane Single-engine; Instrument Airplane	**Toxicology Performed:**	Yes
Medical Certification:	Class 2	**Last Medical Exam:**	01/01/2006
Occupational Pilot:		**Last Flight Review or Equivalent:**	10/01/2005
Flight Time:	5219 hours (Total, all aircraft), 2616 hours (Total, this make and model), 5109 hours (Pilot In Command, all aircraft), 237 hours (Last 90 days, all aircraft), 88 hours (Last 30 days, all aircraft), 4 hours (Last 24 hours, all aircraft)		

Other Flight Crew Information

Certificate:		**Age:**	
Airplane Rating(s):		**Seat Occupied:**	
Other Aircraft Rating(s):		**Restraint Used:**	
Instrument Rating(s):		**Second Pilot Present:**	Yes
Instructor Rating(s):		**Toxicology Performed:**	
Medical Certification:		**Last Medical Exam:**	
Occupational Pilot:		**Last Flight Review or Equivalent:**	
Flight Time:			

Aircraft and Owner/Operator Information

Aircraft Manufacturer:	Beech	**Registration:**	N54RP
Model/Series:	C99	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	No
Airworthiness Certificate:	Normal	**Serial Number:**	U-218
Landing Gear Type:	Retractable - Tricycle	**Seats:**	2
Date/Type of Last Inspection:	02/01/2006, AAIP	**Certified Max Gross Wt.:**	11300 lbs
Time Since Last Inspection:	35 Hours	**Engines:**	2 Turbo Prop
Airframe Total Time:	22169 Hours	**Engine Manufacturer:**	Pratt & Whitney
ELT:	Installed, not activated	**Engine Model/Series:**	PT6A-36
Registered Owner:	Ameriflight Inc.	**Rated Power:**	715 hp
Operator:	Ameriflight Inc.	**Air Carrier Operating Certificate:**	On-demand Air Taxi (135)

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument Conditions	**Condition of Light:**	Day
Observation Facility, Elevation:	BTM, 5550 ft msl	**Observation Time:**	1453 MST
Distance from Accident Site:	6 Nautical Miles	**Direction from Accident Site:**	235°
Lowest Cloud Condition:		**Temperature/Dew Point:**	2°C / -1°C
Lowest Ceiling:	Broken / 6000 ft agl	**Visibility**	10 Miles
Wind Speed/Gusts, Direction:	8 knots, 360°	**Visibility (RVR):**	
Altimeter Setting:	29.72 inches Hg	**Visibility (RVV):**	
Precipitation and Obscuration:	Moderate - Blowing - Snow		
Departure Point:	Helena, MT (HLN)	**Type of Flight Plan Filed:**	IFR
Destination:	Butte, MT (BTM)	**Type of Clearance:**	IFR
Departure Time:	1435 MST	**Type of Airspace:**	

Airport Information

Airport:	Bert Mooney (BTM)	**Runway Surface Type:**	
Airport Elevation:	5550 ft	**Runway Surface Condition:**	
Runway Used:	NA	**IFR Approach:**	Global Positioning System; VOR/DME
Runway Length/Width:		**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	2 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:	N/A	**Aircraft Fire:**	On-Ground
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 Fatal	**Latitude, Longitude:**	45.883333, -122.600000

Administrative Information

Investigator In Charge (IIC):	Debra J Eckrote	**Adopted Date:**	04/25/2007
Additional Participating Persons:	Timothy Markle; FAA/FSDO; Helena, MT John Hazlet; Ameriflight; Burbank, CA Thomas Berthe; Pratt & Whitney; South Burlington, VT Russell Schrock; Raytheon Aircraft Company; Wichita, KS		
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.ntsb.gov/pubdms/.		

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