



# National Transportation Safety Board Aviation Accident Final Report

<b>Location:</b>	Billings, MT	<b>Accident Number:</b>	SEA08FA135
<b>Date &amp; Time:</b>	05/23/2008, 0124 MDT	<b>Registration:</b>	N195GA
<b>Aircraft:</b>	BEECH 1900C	<b>Aircraft Damage:</b>	Destroyed
<b>Defining Event:</b>	Loss of control in flight	<b>Injuries:</b>	1 Fatal
<b>Flight Conducted Under:</b>	Part 135: Air Taxi & Commuter - Non-scheduled		

## Analysis

About one minute after takeoff on a night Instrument Flight Rules (IFR) contract cargo flight, the tower controller advised the pilot that he was squawking the wrong transponder code. Although the pilot reset the transponder to the correct code, he was advised that he was still squawking the wrong code. He then realized that he had selected the wrong transponder, and then switched to the correct one. During the time the pilot was dealing with this issue, the airplane drifted about 30 degrees right of the assigned heading, but the pilot returned to the correct heading as he was contacting the departure controller. The departure controller cleared him to continue his climb and instructed him to turn left about 120 degrees, which he did. About 40 seconds after initiating his left turn of about 120 degrees, while climbing straight ahead through an altitude about 4,700 feet above ground level (AGL), the pilot was instructed to turn 20 degrees further left. Almost immediately thereafter, the airplane began turning to the right, and then suddenly entered a rapidly descending right turn. The airplane ultimately impacted the terrain in a nearly wings-level nose-down attitude of greater than 45 degrees. At the moment of impact the airplane was on a heading about 220 degrees to the right of its last stabilized course. The investigation did not find any indication of an airframe, control system, or engine mechanical failure or malfunction that would have precluded normal flight, and no autopsy or toxicological information could be acquired due to the high amount of energy that was released when the airplane impacted the terrain. The determination of the initiating event that led to the uncontrolled descent into the terrain was not able to be determined.

## 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 aircraft control during the initial climb for undetermined reasons.

## Findings

Not determined	Not determined - Unknown/Not determined (Cause)
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## Factual Information

### HISTORY OF FLIGHT

On May 23, 2008, about 0124 mountain daylight time, a Beechcraft 1900C, N195GA, impacted the terrain about three miles northeast of Billings-Logan International Airport, Billings, Montana. The airline transport pilot, who was the sole occupant, was killed, and the airplane, which was owned and operated by Alpine Air Express, was destroyed by the impact and a post-crash fire. The 14 CFR Part 135 contract mail flight departed Billings-Logan Airport about three minutes prior to the impact. The pilot was on an Instrument Flight Rules (IFR) flight plan. There was no report of an Emergency Locator Transmitter (ELT) activation.

At 01:17 on the morning of the accident, the pilot of Alpine Flight 5008 made his initial contact with Billings Ground Control. He advised the controller that he was at the postal ramp requesting taxi for takeoff. He said that he would like to pick up his IFR clearance to Great Falls, and advised the controller that he had Information Sierra (a recording of the surface weather observation transmitted on the Automatic Terminal Information Service). The controller cleared him to taxi to runway 10 Left via taxiway Alpha. The controller then cleared the pilot to Great Falls via the Billings Two Departure and then "as filed." The controller cleared him to climb to and maintain 7,000 feet mean sea level (MSL), and told him to expect 16,000 feet as an initial cruising altitude. The pilot was then advised to squawk transponder code 4361.

The pilot read back the entire clearance, and the controller then explained to the pilot that he could not assign the flight an initial cruising altitude of 18,000 feet MSL (the initially filed altitude) because of a "low altimeter." The pilot responded that he did not have any problem with being assigned the lower altitude.

At 0120:27, the pilot advised the tower that he was ready for departure on runway 10 Left. The controller cleared the pilot for departure, and advised him to turn to a heading of 070 degrees after takeoff. The pilot then initiated the takeoff, and according to recorded radar data, upon reaching a point about one-half way down the runway, he established a ground track of about 070 degrees.

About 0122:14, which was about one minute and thirty-five seconds after the pilot read back his takeoff clearance and pulled onto the runway to initiate the takeoff roll, the tower controller asked him to check his transponder code. The controller also reminded the pilot that his assigned code was 4361. Six seconds later, the pilot responded, "There's 4361. I rotated it one notch too far."

About 20 seconds later, while the aircraft was passing through about 5,500 feet MSL, the controller transmitted, "Alpine five thousand eight, I show you on a VFR (Visual Flight Rules) code. It must be the other transponder you have on" (Note: The aircraft had two transponders, either of which could be selected by a switch located on the center console just to the right of the pilot's right knee.)

Eight seconds later, the pilot responded with, "All right. Stand by." And then about six seconds after that response, the pilot asked, "How's that?" The controller advised the pilot that he was now receiving the correct code, and then directed the pilot to contact Departure Control.

According to the recorded radar data, just after the pilot started dealing with the issue of the

transponder code, the airplane's course started drifting to the right. At 0123:02, when the first full 4361 beacon code data was received, the airplane's course had turned about 30 degrees to the right. Immediately after the first 4361 beacon code data was received, the airplane started to turn back to the left. By about 0123:20 the airplane had returned to its original course.

Upon contacting the departure controller, the pilot advised the controller that he was passing through 6,500 feet for 7,000 feet on a heading of 070. The controller advised the pilot that he had radar contact, directed him to turn left to a heading of 310 degrees, and then cleared him to climb to and maintain 16,000 feet. The pilot responded with, "Three ten. Up to one six thousand. Alpine five thousand eight," and then according to recorded radar data, turned to the assigned heading and continued his climb.

About 40 seconds after the pilot had been told to turn to 310 degrees, the controller instructed him to turn further left to a heading of 290 degrees, to join Victor 187 (a low-altitude airway), and then to resume his own navigation. The pilot responded with, "Two ninety to join. Own nav. Alpine, uh, five thousand."

Then, according to the recorded radar data, instead of the airplane turning further to the left, it started turning right at about the same rate of turn as it had when the pilot first initiated his turn from 070 degrees to 310 degrees. According to the Continuous Data Recording (CDR) Editor Listing Data, the last radar return containing valid mode C altitude data occurred at 0124:10. The CDR data associated with that return indicated a smoothed altitude of 7,832 feet, a magnetic heading of 329 degrees, and an airspeed of 190 knots. The next CDR data information, recorded at 0124:15, contained no reported altitude, but indicated a magnetic heading of 350 degrees, and an airspeed of 180 knots. By the time the next CDR data was recorded at 0724:21, the radar had gone into coast mode (a mode where the radar system makes predictions based upon the previous trend).

Soon thereafter, a parking lot security camera at a business near the crash site recorded a portion of the fireball that accompanied the impact. The time superimposed on the video at the moment of impact indicated 0824:18. (Note: The hour indication on the camera was one hour off due to daylight savings time, and the accuracy of the minutes and seconds indication could not be verified).

## PERSONAL INFORMATION

The 40 year old pilot held an airline transport rating (ATP) for Airplane Multi Engine Land, with commercial privileges for Airplane Single Engine Land. He had been type rated in the Beech 1900, on January 20, 2007. He had accumulated about 4,770 hours of flight time, of which about 362 hours were in the Beech 1900. According to Alpine Air, he logged 162 hours of night time, and 36 hours of actual instrument time in the 90 days prior to the accident.

A review of his flight/duty activity for the three days prior to the accident revealed that on May 19 he reported for duty at 2000, and went off duty at 0430 on the morning of May 20. While on duty he flew 2.6 hours. On the evening of May 20 he reported for duty at 1945, and went off duty on the morning of May 21 at 0300. While on duty he flew 1.2 hours. He reported for duty at 1945 on the evening of May 21, and went off duty the morning of May 22 at 0730. While on duty he flew 3.5 hours. He came on duty at 2200 on the evening of May 22, and the accident occurred about three hours and 20 minutes later, on the morning of May 23.

During the investigation, the Investigator-In-Charge (IIC) talked with a number of friends and associates of the pilot. According to those discussions, the pilot had been acting normally

during the 72 hours leading up to the accident. He was reported as being good-natured, not dealing with any known emotional or psychological issues, and not appearing to be tired or sick. He had participated in some family activities on the evening of May 22, prior to reporting for duty at Alpine Air.

When the pilot arrived at the Alpine Air hangar about 2200, he was advised that the airplane he was assigned for that night's flight to Great Falls (N125GA) was already in position at the ATO (the post office facility on the south side of the airport). He was then asked if he would taxi N195GA over to the ATO ramp. That airplane (N195GA) had just undergone maintenances, and was scheduled to be flown on the Butte/Helena, Montana, run by another pilot. He (the accident pilot) then taxied N195GA to the ATO ramp. Reportedly, after the mail had been loaded into his assigned airplane (N125GA), the pilot started his pre-flight inspection of the airplane around 2400. According to Alpine Air, during that inspection, the pilot discovered a mail cart-induced skin puncture that grounded that airplane (N125GA). Alpine Air then made the decision to have the pilot take N195GA to Great Falls, and to have another airplane, that would become available later, assigned to the Butte/Helena flight. The pilot therefore had the cargo (mail) moved from N125GA to N195GA, and then he performed a preflight inspection on N195GA.

According to one of the other pilots, who briefly interacted with the accident pilot that night, he (the accident pilot) seemed a "little more serious" than usual. It was the opinion of the other pilot that the only reason for the "seriousness" was the fact that the sequence of events associated with the change of airplanes caused the accident pilot to have more activities/responsibilities on his mind during the preparation/pre-departure time.

#### AIRPLANE INFORMATION

The airplane was manufactured in 1986, and as of May 21, 2008, the airframe had accumulated 34,650.8 hours and 48,452 cycles. It was being maintained under Alpine Air's Approved Aircraft Inspection Program (AAIP). The last D2 inspection was performed on January 8, 2008, and the last D3 inspection was performed May 1, 2008. The last C inspection was performed on May 21, 2008.

Both engines underwent hot section inspections on April 14, 2008. The right propeller was last overhauled on March 30, 2004, and the left propeller was last overhauled on September 28, 2006.

A review of the Aircraft Flight and Maintenance Log (AFML) revealed that after the airplane landed on the morning of May 20, 2008, an entry was made indicating that both engines were low on power (torque) at altitude, but that they made acceptable power on the ground for takeoff. According to one of the pilots who had recently flown the airplane, and who had made a write-up entry addressing this anomaly, neither of the airplane's engines developed as much torque at altitude, within ITT (Inter-Turbine Temperature) limits, as the other Beech 1900's in the fleet. He also stated that the left engine had experienced a torque loss of between 300 to 500 pounds when it was climbing through an altitude of between 7,000 to 10,000 feet MSL. It was this pilot's opinion that the torque loss did not affect the airplane's controllability, but that it could possibly be an irritant or distraction to a pilot.

The corrective action listed in the AFML for both engines was, "Calibrated the ITT and torque indication. Performed an engine power check per B1900 Maintenance Manual Chapter 76. Found in an airworthy condition."

The airplane did not fly on May 21, but there were three engine related entries made in the AFML. The first was, "Left ITT gauge unadjustable." The corrective action was, "Removed and replaced left ITT gauge with a serviceable unit. Calibrated ITT gauge. Ops check good."

The second discrepancy entry stated, "Both engines due Torque and ITT need calibration due to not being able to determine that previous calibration was done." The corrective action listed was, "Calibrated both engines Torque and ITT systems. Both systems needed some adjustments, but were in limits when complete."

The third discrepancy stated, "Both engines are low torque after Torque and ITT calibration." The corrective action listed was, "Performed engine ground runs power check per B1900 Maintenance Manual, Chapter 176, after bleed valve maintenance. Found in airworthy condition, reference LP (log page) 73492, Item 6 and 7."

The airplane did not fly on May 22, but an engine bleed valve closing test was performed on both engines in accordance with chapter 73 of the Pratt & Whitney Maintenance Manual. The bleed valve on the right engine checked "Good," but the bleed valve on the left engine did not meet specifications. The left engine bleed valve seat was replaced, and the bleed valve closing check was repeated. The resulting entry on log page 73492, Items 6 and 7 was "Checks Good."

#### AIRPLANE WEIGHT AND BALANCE

During the investigation the IIC reviewed both the United States Postal Service Daily Weight Scanning Report and the Alpine Aviation Beechcraft 1900 Load Manifest for the accident flight. According to the manifest the airplane was loaded with 2,800 pounds of fuel, and a total cargo weight of 3,795 pounds. According to the manifest, the airplane's estimated takeoff weight was 15,606 pounds, which is 994 pounds below its maximum takeoff weight of 16,600 pounds.

The manifest indicated that the nose cargo area was empty; bay one held 108 pounds of cargo; bay two held 854 pounds; bay three remained empty; bay four held 1,128 pounds; bay five held 997 pounds; bay six held 420 pounds; and bay seven held 288 pounds. According to the manifest, the takeoff weight index was  $-0.2$ , and the center of gravity (CG) was determined to be within limits by use of a CG calculator.

#### METEROLOGICAL INFORMATION

The hourly Billings-Logan Airport aviating surface weather observation (METAR) taken at 0053, about 30 minutes prior to the accident, indicated winds from 080 degrees at 18 knots, gusting to 24 knots. The visibility was 10 statute miles, with light rain. There were scattered clouds at 600 feet above ground level (AGL), and overcast clouds at 1,000 feet AGL. The temperature was 08 degrees Celsius, with a dew point of 06 degrees Celsius. The altimeter setting was 29.60 inches of mercury.

The Special METAR taken at the same location at 0142, about 18 minutes after the accident, indicated winds from 080 degrees at 13 knots, a visibility of 10 statute miles, and light rain. There were scattered clouds at 800 feet AGL, and overcast clouds at 1,200 feet AGL. The temperature was 08 degrees Celsius, with a dew point of 07 degrees Celsius. The altimeter setting was 29.60 inches of mercury.

According to the pilot of the Alpine Air flight that departed via the Billings Two Departure about five minutes prior to the accident flight (Alpine 5014), his airplane entered the clouds about 300 to 400 feet above the ground. He said that the clouds were solid up to about 7,500

to 8,000 feet mean sea level (MSL), where he broke out before entering another layer about 9,000 feet MSL. He reported encountering hard rain during the departure, but no ice or turbulence. He stated that the visibility below the clouds was good.

Another Alpine Air flight took off from the same runway about two minutes after the accident flight (Alpine 5006), but with an assigned initial departure heading of 120 degrees. According to the pilot of that flight, the visibility below the clouds was good, and he encountered very little rain. He could not recall at what altitude he entered the clouds.

Witnesses who were in the general area of the crash at the time of impact reported the precipitation as either a light steady rain or a drizzle. One individual said that about 10 minutes after the accident it started to rain hard. All the witnesses reported low or very low clouds in the area, with some reporting areas of fog underneath the clouds. Although some witnesses said there were some light breezes in the area, none reported strong or gusty winds at the time of impact.

#### WRECKAGE AND IMPACT INFORMATION

The center of the primary impact crater was about 15 feet north of a cinderblock building on the north side of Jerrie Lane, about 100 yards west of Main Street (State Highway 87/312). From that point wreckage and cargo were spread along a path on a magnetic heading of about 196 degrees. Some pieces of small dense cargo traveled along the impact/wreckage track to a distance of over 630 feet from the initial impact point.

The primary crater measured about 20 feet from north to south, and about 15 feet from east to west. The center of the crater was about four feet deep, and mounds of displaced dirt up to one foot high had been thrown up beyond the southwest side of crater's edge. There was a separate crater adjacent to the north end of the primary crater. This crater was about two feet deep at its center, and measured about four feet north to south, and about six feet east to west. The airplane's right engine was lying partially exposed just within the northwest edge of this crater. The airplane's left engine, which was buried about four feet below the surface, was located along the southwestern edge of the primary crater, about 10 feet north of its southern end. The only other readily identifiable components within the primary crater were nose ballast weights, an oxygen bottle, and a portion of the cockpit area. A shallower elongated depression about 15 feet long extended to the northwest of the primary crater. This depression was about three feet wide and one foot deep at its southeast end, and about four inches wide and two inches deep at its northwest end. The depression contained material that was identified as wing leading edge aluminum and part of the deicing boot from the right wing.

There were numerous other small pieces of fuselage structure and system components in or immediately adjacent to the boundary of the primary crater. Most could not be identified as coming from a specific location on the airframe. Much of the airplane's structure had come to rest within the footprint of the cinderblock building, but most of that structure had been torn into small pieces and then severely damaged and/or melted by the intense post-crash fire. Some small portions of structure were found on top of a building located about 200 feet down track from the initial crater. A portion of the aft cargo door was found on the ground near the south wall of the aforementioned building, about 300 feet from the primary crater. The door hinge, which was still connected to both the top of the cargo door and to the fuselage structure above the cargo door, was partially crushed and deformed, and could not be moved/rotated. Further inspection determined that it was in the down/door closed position when the impact

deformation occurred.

The largest readily identifiable portion of airplane's structure was the remains of the outboard half of the left wing. This structure was about ten feet southeast of the edge of the primary crater, just inside the north limit of the building. It was buried by a considerable amount of cinderblocks from the north wall. Most of this structure was severely torn, twisted, and deformed, but much of it survived the fire without melting.

What remained of the right wing structure had traveled about 40 feet past the primary crater, and was lying near the center of the west half of the building. Most of the right wing structure had either disintegrated into small pieces and/or was destroyed by the intense fire.

A vehicle, which was reportedly parked at the point of impact, had been thrown about 30 feet southwest of its previous location. A section of the cab area of a pickup truck that was parked near the east edge of the crater was deformed downward at an angle of about 60 to 70 degrees. About 70 feet of the north wall of the cinderblock building had been destroyed, with many of the individual cinder blocks being thrown between five and thirty feet to the southwest. A severe post-crash fire had consumed or severely damaged much of what was within the western half of the building, and the building's entire roof had collapsed. The southern wall of the building had collapsed toward the south.

Portions of the vertical and horizontal stabilizers were located about 50 feet from the primary crater, lying about 10 feet southwest of the remnants of the right wing. Sections of the left and right elevators and the rudder were found near the same location. Both left and right elevator trim tab actuators were recovered and determined to be beyond limits in the tab down direction. The rudder trim tab was recovered and determined to be beyond limits tab to the right.

While separating the airplane wreckage from the remains of the building structure, both main landing gear actuators were located. Both actuators were in the fully extended position, which corresponds with the landing gear being in the fully retracted position. The left outboard flap actuator, one of four on the airplane, was also recovered intact. The actuator rod was measured at two inches, which corresponds with the flaps in the fully retracted position. The aileron trim tab, which is located on the left aileron, was recovered. It was measured to be between five and seven and one-half degrees tab down (range is sixteen and one-half degrees up to sixteen and one-half degrees down.)

A portion of the airstair entry door was recovered, and further inspection revealed deformation of its eccentric latch post consistent with the door being pulled from the closed/latched position on impact. Remnants of the three over-wing escape hatches were located, but no determination of their position at the time of impact could be determined (Note: In addition to being latched in place, the over-wing hatches are made additionally secure by the positive pressure inside the fuselage).

Both engines were severely damaged by the impact sequence (see photos 11 and 12). They were both retrieved from the primary impact crater along with the engine components that had separated and come to rest away from the crater. All recovered engine components were washed down with a high-pressure stream of water, and then collated on the bed of a utility trailer in preparation for further inspection. All engine and propeller components were then taken to the facilities of Arlin's Aircraft Service in Belgrade, Montana, where they underwent further detailed inspections.

The left hand engine gas generator case housing displayed severe compressional deformation

both forward and aft of the engine mount collar. Although the gas generator case-mounted accessories were in place, they had all suffered severe impact damage. The compressor inlet case had disintegrated, which exposed the compressor housing. The accessory gearbox housing had completely disintegrated, and miscellaneous gearing, oil pressure and oil scavenge pumps were collected separately. Neither the accessory gearbox input gear shaft, nor any of the recovered accessory gearing displayed any indication of operational distress.

The left engine compressor rotor was displaced aft and toward the 10:00 o'clock position due to the deformation of the gas generator case. The compressor first stage blades were fractured at their roots due to contact with the adjacent shroud. The first stage compressor vanes displayed severe circumferential deformation, rubbing, and tearing due to contact with the second stage rotor and blades. The rotor spacer and the first and second stage shrouds displayed severe circumferential rubbing and scoring. The number one bearing, which was recovered separately, showed no indication of operational distress. Severe impact damage and deformation precluded access to the interior of the combustion and turbine sections. The turbine exhaust duct was fully compressed into the gas generator case. The right hand exhaust stub remained attached, and was deformed into the gas generator case. The exhaust stub did not display any external pockmarks or dimples. The first stage gearing of the reduction gearbox showed no evidence of operational stress. The first stage sun gear was displaced forward into the second stage gear set due to impact deformation of the exhaust duct and the power turbine shaft housing. The forward face of the sun gear displayed severe circumferential machining, with frictional heat discoloration and material smearing. The second stage carrier-to-propeller shaft splines mounting webs were fractured in torsion, and the fractured webs displayed severe circumferential rubbing and deformation. The propeller shaft mounting flange was fractured in torsion and bending.

The reduction gearbox chip detector was not recovered. The oil filter housing had fractured from the accessory gearbox, but the filter was preserved and was found to be free of metallic debris. Impact damage to the housings of the fuel filter and the P3 filter precluded removal and inspection.

The left propeller hub had fractured from the propeller shaft in a manner consistent with bending and torsion. The airfoil portion of all four blades had separated and the remnants that were recovered could not be identified as to position. The non-airfoil portion of the blade stub was still attached to the hub's blade collar at two locations. The other two blades had separated at the hub collar itself. The feathering spring and feathering spring cylinder had fractured from the hub spider and were recovered separately.

The right engine gas generator case housing also displayed severe compressional deformation both forward and aft of the engine mount collar (see photos #11 and #12). The gas generator case-mounted accessories were still in place, but all had suffered severe impact deformation. The compressor inlet case had disintegrated exposing the compressor housing. The accessory gearbox housing had completely disintegrated, and miscellaneous gearing, oil pressure and oil scavenge pumps were collected separately. None of the recovered gearing displayed any evidence of operational distress. The high-pressure fuel pump and the fuel control unit were fractured from their mounting pads and recovered separately.

The compressor rotor was displaced directly aft due to impact deformation of the gas generator case. The first and second stage compressor blades were fractured at their roots due to contact with their adjacent shrouds and stators. The first and second stage vanes displayed severe

circumferential deformation, rubbing, and tearing due to contact with the second stage rotor and blades. The rotor spacer and the first and second stage shrouds displayed severe circumferential rubbing and scoring. The number one bearing housing was intact. Severe impact damage and deformation precluded access to the interior of the combustion and turbine sections. The turbine exhaust duct was completely axially compressed into the gas generator case. The right hand exhaust stub remained attached and was deformed into the gas generator case. The stub did not display any evidence of external pockmarks or dimples.

The right engine reduction gearbox forward housing and second stage gearing were separated from the gearbox rear flange. The forward housing had disintegrated. The first stage gearing did not show any indication of operational distress. The first stage sungear was displaced forward into the second stage gear set due to impact deformation of the exhaust duct and the power turbine shaft housing. The sungear's forward face displayed severe circumferential machining, with frictional heat discoloration and material smearing. The second stage gearing did not display any indication of operational distress. The second stage carrier-to-propeller shaft splines mounting webs were fractured in torsion, and the webs displayed severe circumferential rubbing and material deformation.

The reduction gearbox chip detector was not recovered. Impact damage to the oil filter and filter precluded removal and inspection. The P3 filter was impact fractured exposing the filter element, which appeared to have only post-impact contamination.

The right propeller remained attached to the propeller shaft. The airfoil portion of all four blades had separated. The non-airfoil stubs of three of the blades remained in their hubs. One blade stub had separated from its retaining clamp, and was located separately. The servo piston was fractured from the hub and not recovered. The feathering spring and the feathering spring cylinder had fractured from the hub spider and were recovered separately.

At the conclusion of the NTSB inspection at the facilities of Arlin's Aircraft Service, the propeller components were sent to the facilities of Hartzell Propeller Inc., in Piqua, Ohio, for a further FAA directed/monitored teardown inspection. The objective of that inspection was to determine the angle of each propeller blade at the time of impact, and to determine whether there was any evidence of anomalies associated with the propeller assemblies. Due to the extent of impact damage the blade angle position of each blade could not be positively determined. To the extent to which it could be completed, the inspection did not reveal any discrepancies that would have precluded normal operation of the propellers.

While digging through the wreckage before it was removed from the accident site, the remains of the instrument panel-mounted warning annunciator panel was recovered. During the follow-up inspection all remaining lenses (red in color) were removed from the face of the panel in order to gain access to any light bulbs that remained. Each remaining light bulb (each annunciator segment normally has two bulbs) was inspected for evidence of filament stretch, which would indicate the possible illumination of that warning bulb at the time of impact. Eighteen bulbs or bulb bases were recovered. In only one of the bulbs was the filament stretched and not broken into small pieces. This bulb was located in the far right column of the panel, three rows from the top. The lens that covered this bulb did not have any wording on it, and a review of both the systems description in the Beech 1900C Airplane Flight Manual, and an inspection of other Beech 1900C airplanes at Alpine Air confirmed that this annunciator was not connected to any airplane system, and only illuminates during testing of the panel. The filament of the other bulb in that specific annunciator was fractured into small pieces.

## MEDICAL AND PATHOLOGICAL INFORMATION

A review of the pilot's FAA medical records revealed that he had no current disqualifying medical issues, and he did not report taking any prescription medications on his last First Class Medical, which was taken on January 8, 2008.

Due to the amount of energy released when the airplane impacted the ground and the cinderblock building, it was not possible to perform an autopsy or toxicology examination on the pilot.

## WITNESS DESCRIPTIONS

The IIC interviewed a number of witnesses who heard the airplane in the 60 seconds prior to the impact, and four individuals who saw the airplane after it came out of the overcast cloud layer.

According to a witness who lived about a block west of the impact site, while watching TV she heard an airplane that sounded "loud and low." This individual therefore got up and walked a few feet over to the window in order to look outside. Just before she got to the window, she saw what appeared to be white headlights from the airplane illuminate the window curtains. She then reached up and opened the curtains, and looked out the window (which faced almost directly toward the impact site). At that point she clearly saw the airplane below the clouds, in what she later determined was a nose down attitude of about 45 degrees. She said that she not only saw the lights from the airplane, but also could clearly make out that it was painted white or light colored. She reported that it was heading straight in a general southerly direction, was upright, not in a bank to either side, and was not turning. She said that a few seconds after she first saw it, it disappeared below the trees, and then she heard the impact. This individual did not hear anything that sounded abnormal, except for the fact that the engine sounds appeared to be so loud and low.

Near the end of the interview, this individual mentioned that as she later thought back on the event she was thinking that she might have seen sparks coming from the airplane. She ultimately decided this was probably her mind "playing tricks" as she tried to mentally replay the sequence of events. In the end she concluded that she had not really seen sparks.

A second witness, who was located north of the accident site, said that he just happened to look out a window as the airplane came out of the bottom of the clouds. This individual said that it was not turning, and appeared to be descending about 60 degrees nose down. He said that he at first thought the airplane was inverted, but in playing it back in his head immediately after the impact, he became convinced that it was not inverted. He said that it all happened very fast, and that he only saw the airplane for a few seconds. He said that he did not notice any of the airplane's lights, but because of the reflection of the ground lights in the area, he could clearly make out the airplane's structure. He also reported that he heard the airplane's engines and propellers, and that nothing sounded abnormal to him. This person did not remember seeing any indication of fire or sparks.

The third and fourth visual witnesses were in a car together driving south on Main Street, about one block northeast of the impact site. The individual who was on the passenger side of the car (closest to the impact site) said he caught the airplane's movement out of the corner of his eye, and at first thought it was a shooting star. He then turned toward it and instantly

realized it was an airplane. He reported that because of the rain and darkness he could barely make out the structure of the airplane, but he could clearly see a flashing white strobe light and two other colored lights. One colored light looked red, and the other appeared to be blue. He estimated that less than five seconds after he first saw the airplane "it hit the ground." This individual did not estimate the descent angle, except to say, "it was coming in steep."

The statement of the driver of the car was consistent with that of the passenger, except for the fact that the driver saw a little less of the event because she was driving. Both of these individuals reported that they had all the windows in the car rolled up, and did not remember hearing the airplane's engines or propellers. Neither recalled seeing any flames coming from the airplane.

Another individual, who was located about two blocks northwest of the impact site, reported that he was sitting in his living room when he heard a noise that he at first thought was a "hopped-up car." He then quickly realized that the noise was from an airplane. This individual did not see the airplane, but reported that his living room was lit up by "flashing red and white lights." He said that the noise seemed to be moving from the northeast to the southwest. He further reported that another individual sleeping in another room in the house was awakened by the loud noise. This second person also reported seeing the reflection of the flashing lights. These two individuals said that a few seconds after they first heard the airplane, they heard a "big thud," and then about 20 seconds later they heard what sounded like a large explosion.

Another individual, who was located about two to three blocks northeast of the impact site reported hearing the airplane coming. This individual stated that he was a pilot, and that he had thousands of hours flying airplanes that used the same make of engines as those on the accident aircraft. This individual said that after first hearing the airplane, he looked outside, but did not see the airplane or its lights. This individual stated that everything sounded normal about the airplane's engines and propeller. He further reported that the propellers sounded like they were at a constant pitch, that there was no change in the engine sounds, and that everything sounded as if it was, "making good steady power." The only thing that seemed unusual to this individual was the fact that the airplane sounded low, and that it appeared to be moving fast.

One person who was located about a mile north of the impact site reported being awakened from a "deep sleep." The only descriptive information that this person was able to give was that the airplane's engines sounded to them like they were at a high rpm, and that the impact, "did not sound very loud." This individual did not see the airplane or its lights.

## TESTS AND RESEARCH

The FAA provided the IIC a compact disc (CD) that contained the audio of the transmissions between Billings Tower and the pilot, and also the transmissions between Billings Approach Control and the pilot. That CD was submitted to the NTSB Vehicle Recorder Division for further analysis. The analysis of the background sounds during each period of time that the pilot was transmitting did not reveal any unusual sounds, nor any evidence of sudden or abrupt changes in propeller or engine RPM.

The analysis did reveal that at the very end of the pilot's last transmission, where the call sign was cut short to "Alpine Five Thousand," instead of the full "Alpine Five Thousand Eight," there was the same transmitter turn-off signature as heard at the end of the previous transmission. This sound sequence is consistent with either the pilot releasing the transmit

button before he was finished speaking, or with an anomaly in an aircraft system terminating the transmission while the pilot was still talking.

## History of Flight

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

## Pilot Information

Certificate:	Airline Transport; Commercial	Age:	40, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	Seat Occupied:	Left
Other Aircraft Rating(s):	None	Restraint Used:	Seatbelt, Shoulder harness
Instrument Rating(s):	Airplane	Second Pilot Present:	No
Instructor Rating(s):	None	Toxicology Performed:	No
Medical Certification:	Class 1 Without Waivers/Limitations	Last FAA Medical Exam:	01/04/2008
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	01/31/2008
Flight Time:	4770 hours (Total, all aircraft), 362 hours (Total, this make and model), 162 hours (Last 90 days, all aircraft), 67 hours (Last 30 days, all aircraft), 3 hours (Last 24 hours, all aircraft)		

## Aircraft and Owner/Operator Information

Aircraft Make:	BEECH	Registration:	N195GA
Model/Series:	1900C	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	No
Airworthiness Certificate:	Transport	Serial Number:	UB-65
Landing Gear Type:	Retractable - Tricycle	Seats:	2
Date/Type of Last Inspection:	05/02/2008, AAIP	Certified Max Gross Wt.:	16600 lbs
Time Since Last Inspection:		Engines:	2 Turbo Prop
Airframe Total Time:	34651 Hours at time of accident	Engine Manufacturer:	P&W CANADA
ELT:	Installed, not activated	Engine Model/Series:	PT6A-65B
Registered Owner:	ALPINE AVIATION INC	Rated Power:	1173 hp
Operator:	ALPINE AVIATION INC	Operating Certificate(s) Held:	Commuter Air Carrier (135)
Operator Does Business As:	Alpine Air Express	Operator Designator Code:	TIMA

## Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument Conditions	Condition of Light:	Night/Dark
Observation Facility, Elevation:	KBIL, 3652 ft msl	Distance from Accident Site:	3 Nautical Miles
Observation Time:	0053 MDT	Direction from Accident Site:	235°
Lowest Cloud Condition:	Scattered / 600 ft agl	Visibility	10 Miles
Lowest Ceiling:	Overcast / 1000 ft agl	Visibility (RVR):	
Wind Speed/Gusts:	18 knots / 24 knots	Turbulence Type Forecast/Actual:	/
Wind Direction:	80°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:		Temperature/Dew Point:	8°C / 6°C
Precipitation and Obscuration:	Light - Rain; No Obscuration		
Departure Point:	Billings-Logan, MT (KBIL)	Type of Flight Plan Filed:	IFR
Destination:	Great Falls, MT (KGTF)	Type of Clearance:	IFR
Departure Time:	0721 MDT	Type of Airspace:	

## Airport Information

Airport:	Billings-Logan International (KBIL)	Runway Surface Type:	
Airport Elevation:	3652 ft	Runway Surface Condition:	
Runway Used:	N/A	IFR Approach:	None
Runway Length/Width:		VFR Approach/Landing:	None

## Wreckage and Impact Information

Crew Injuries:	1 Fatal	Aircraft Damage:	Destroyed
Passenger Injuries:	N/A	Aircraft Fire:	On-Ground
Ground Injuries:	N/A	Aircraft Explosion:	On-Ground
Total Injuries:	1 Fatal	Latitude, Longitude:	45.833611, -108.472500

## Administrative Information

Investigator In Charge (IIC):	Orrin K Anderson	Report Date:	01/29/2009
Additional Participating Persons:	Rick Kaufman; Federal Aviation Administration; Helena, MT Thomas Berthe; Pratt & WhitneyCanada; Montreal, Canada, Brian Weber; Hawker Beechcraft; Wichita, KS Bob Hendrickson; FAA, AAI-100; Washington, DC		
Publish Date:	08/05/2011		
Investigation Docket:	NTSB accident and incident dockets serve as permanent archival information for the NTSB's investigations. Dockets released prior to June 1, 2009 are publicly available from the NTSB's Record Management Division at <a href="mailto:pubinq@ntsb.gov">pubinq@ntsb.gov</a> , or at 800-877-6799. Dockets released after this date are available at <a href="http://dms.nts.gov/pubdms/">http://dms.nts.gov/pubdms/</a> .		

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

The Independent Safety Board Act, as codified at 49 U.S.C. Section 1154(b), precludes the admission into evidence or use of any part of an NTSB report related to an incident or accident in a civil action for damages resulting from a matter mentioned in the report. A factual report that may be admissible under 49 U.S.C. § 1154(b) is available [here](#).