Aviation Investigation Final Report

Location:	Murphy, North Carolina	**Accident Number:**	ERA11FA312
Date & Time:	May 25, 2011, 16:13 Local	**Registration:**	N77AR
Aircraft:	Beech 58	**Aircraft Damage:**	Substantial
Defining Event:	Fire/smoke (non-impact)	**Injuries:**	4 Fatal
Flight Conducted Under:	Part 135: Air taxi & commuter - Non-scheduled		

Analysis

After takeoff, the flight proceeded toward the destination airport and air traffic control communications were transferred between several facilities. While flying at 9,000 feet, the pilot attempted to establish contact with Knoxville Approach Control, but the controller did not reply. About 28 seconds later, the pilot broadcast on the same frequency that he needed to declare an emergency because of a fire but did not specify the location or extent of the fire. There were no further recorded radio transmissions from the pilot, and his declaration of a fire was the first and only transmission describing any abnormal event. Primary radar returns for the airplane depicted a turn to the northeast then north after which the returns were no longer noted. The airplane crashed in a wooded area located about 61 degrees and 3,140 feet from the last primary radar return, using straight line distance. No determination could be made regarding the airplane's flightpath between the last primary radar return and the accident site; however, witnesses described seeing the airplane turn sharply to the right then hearing an explosion.

Structural components consisting of the outer portion of the left wing, right wing outboard of the engine nacelle, vertical stabilizer, rudder, and both horizontal stabilizers were separated from the main wreckage, the farthest of which was located about 400 feet away. Examination of the fracture surfaces of the separated structural pieces revealed no evidence of preimpact failure or malfunction. The cockpit, cabin, instrument panel, nose compartment, empennage, and inboard sections of both wings were nearly consumed by the postcrash fire. The right wing's upper skin between stations 105 and 115 exhibited fire damage but the lower wing skin just inboard and aft of the structurally separated area did not exhibit any fire damage. This indicates that the fire damage to the upper skin occurred after the lower skin piece separated.

Examination of a recovered portion of the instrument panel glare shield revealed thermal

damage concentrated around two openings on the right side of the glare shield's surface. The bottom surface of the glare shield had a distinct area of thermal damage; the damage extended from the forward most area on the right side all the way aft. The severity of the thermal damage was more pronounced in the middle of this area.

Photographs of the combustion heater revealed a lack of extensive fire damage and insulation that still covered the conductor on several electrical wires. Further, the surrounding area of the airframe near the heater (for example, the nose landing gear door) did not exhibit extensive fire damage. Therefore, the combustion heater is an unlikely source of the pilot-reported in-flight fire, even though, according to the airplane's maintenance records, the combustion heater was beyond the recommended overhaul interval specified by the heater manufacturer.

The airplane's maintenance records indicated compliance with a 2008 airworthiness directive (AD) requiring replacement of the circuit breaker toggle switches with switches of an improved design. The AD resulted from reports of overheating of certain circuit breaker toggle switches used in various electrical systems throughout the affected airplanes. Although a portion of the circuit breaker panel from the accident airplane was severely damaged by fire, it did not reveal any signatures consistent with electrical arcing or any other electrical anomaly.

The time interval between the pilot's declaration of an emergency and the last radar return from the airplane was a little less than 1 minute, suggesting that the fire grew quickly without much of an incipient stage. These characteristics are consistent with a fuel-fed fire. Based on localized fire damage to the lower surface of the glare shield, the fire most likely occurred beneath the right side of the instrumental panel, an area that is near the direct-read oil pressure gauges. The exact source of the fire could not be determined because extensive fire damage precluded distinguishing between damage incurred in flight and postcrash.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: An in-flight fire that mostly likely occurred in the right front cockpit area behind the instrument panel and below the glare shield; the origin of the fire could not be determined because of the extensive fire damage.

Findings

Not determined	(general) - Unknown/Not determined

Factual Information

History of Flight

Enroute-cruise	Fire/smoke (non-impact) (Defining event)
Maneuvering	Fire/smoke (non-impact)
Uncontrolled descent	Collision with terr/obj (non-CFIT)
Post-impact	Fire/smoke (post-impact)

HISTORY OF FLIGHT

On May 25, 2011, about 1613 eastern daylight time, a Hawker Beechcraft Corporation 58, N77AR, collided with mountainous terrain near Murphy, North Carolina. The airline transport pilot and three passengers were fatally injured and the airplane sustained substantial damage. The airplane was registered to Aero Resources Corporation, and operated by Friendship Flying Service, Inc., under the provisions of 14 Code of Federal Regulations (CFR) Part 135 as an on-demand, non-scheduled, domestic passenger flight to Wendell H Ford Airport (K20), Hazard, Kentucky. Visual meteorological conditions prevailed in the area at the time of the accident and an instrument flight rules (IFR) flight plan was filed. The flight originated from Fulton County Airport (FTY), Atlanta, Georgia, about 1543.

The flight plan indicated 3 on board; however, the airplane operator reported that an additional individual asked the pilot before departure to be flown to K20.

According to a chronological summary of communications, at 1544, the pilot established contact with the Atlanta Terminal Radar Approach Control (Atlanta TRACON) and advised the controller that the flight had departed FTY and was at 1,700 feet. The flight was radar identified and the pilot was cleared to climb to 9,000 feet, which he acknowledged. Air traffic control communications were transferred to Atlanta Air Route Traffic Control Center (Atlanta ARTCC) and the pilot remained in contact with that facility from 1552 to 1611; normal communications were reported. At 1611, the pilot was advised to contact Knoxville Approach Control which he acknowledged.

According to a transcription of communications with Knoxville Approach Control, at 1611:50, the pilot established contact with the facility and advised the controller that the flight was at 9,000 feet. The controller did not answer the radio call from the pilot. At 1612:18, the pilot advised the controller, “Knoxville seven seven alpha romeo we gotta declare an emergency got a fire”; but he did not specify the location or magnitude of the fire. The controller asked the pilot if he was going to land at McGhee Tyson Airport (TYS), located in Knoxville, Tennessee. The pilot did not respond and there were no further recorded transmissions from the pilot.

According to a NTSB Radar Study that plotted radar targets and displayed key transmissions

from the pilot and controller, after the pilot declared an emergency and advised he had a fire, a total of 7 transponder returns were noted. The transponder returns were between 1612:24, and 1612:48. During those 7 returns, the flight proceeded in a north-northeasterly direction with a decrease in altitude noted. The last 2 transponder returns did not have altitude report or had an erroneous altitude report. After the last secondary transponder return, 2 primary radar returns were noted. The second to last primary radar return was noted east-northeast of the last secondary transponder return, and the last primary radar return was located north of the previous primary return. The accident site was located approximately 061 degrees and 3,100 feet from the last primary radar return using straight line distance. No determination was made as to what flight path was made between the last primary radar return and the accident site. The last primary radar return at 1612:57, was located at 35 degrees 11.055 minutes North latitude and 084 degrees 09.7686 minutes West longitude.

A witness reported to a Federal Aviation Administration inspector he heard a twin-engine airplane flying overhead his location, and observed the airplane flying straight and level about 1,500 feet above the mountains in a northwesterly direction. The witness reported hearing the engines accelerate and the airplane continued briefly then the right wing dipped and the airplane pitched nose down. While in the nose-low attitude the witness heard the engines accelerate more. He lost sight of the airplane over the ridge and heard an explosion seconds later. He could not see the registration markings or individuals inside, but reported he did not notice any smoke or flames coming from the airplane before losing sight behind the ridge.

Another witness who was located at the Unaka Community Cemetery, and who was outside, reported first hearing the airplane. He reported the sound was loud which was what caught his attention and was consistent with a low flying airplane. He pointed out that the airplane was flying towards his position at the cemetery from the approximate location of the Hiwassee Dam Lake (approximately 060 degrees). He did not notice any extreme nose low or nose high pitch position. He noted that the airplane made a “sharp right turn” confirming the direction of the turn. The airplane then went behind trees and he heard an explosion much like a “sonic boom.” He then saw a puff of black smoke. Immediately after the explosion he looked at his watch noting the time of 1618 hours local. Another individual came to the cemetery, and they both went towards the area where they thought the airplane had crashed. They went down Joe Brown Highway, then turned onto Allen Bell Road. They drove to a house close to the crash site and hiked down to a creek. They went into the creek and about 50 to 60 yards downstream, saw smoke to their left. They saw a wing on the right side of the creek as they were walking. When they were about 25 yards from the crash site, he reported there was an explosion. The smoke was intense, and about that time, 1 acre of woods were on fire. He looked at his watch and noted the tine he arrived on-scene was about 1640. He reported the weather conditions were clear and sunny.

Still another witness who was located at his house near the crash site reported hearing a low flying airplane with engine surging. He then heard a loud explosion which rattled his windows. He initially thought lightning had struck the house. He went onto his deck, and saw smoke. He and several individuals went to the crash site area and were on-scene about 10 minutes after

the crash. When they arrived he noted that the fuselage was on fire, which was not spreading fast. He did not notice anything on fire on his side of the creek. He heard an explosion on the side he was on. A noticed a lot of paperwork with no char marks. The witness reported that there was no rain or breeze at the time, and the clouds were scattered. About 30 minutes after the crash he noted a helicopter was overhead. He estimated the time of the accident about 1615.

PERSONNEL INFORMATION

The pilot, age 26, held commercial, airline transport pilot, and certified flight instructor (CFI) certificates. At the commercial level he had airplane single engine land rating, and at the airline transport pilot level he had airplane multi-engine land rating issued April 13, 2011. On the CFI, he had airplane single engine and instrument airplane ratings. He held a first class medical certificate with a limitation to wear corrective lenses issued July 12, 2010. On the application for his last medical certificate he listed 2,250 hours as his total flight time.

The pilot was hired by Friendship Flying Service, Inc., on March 1, 2009. Paperwork provided by the operator included the pilot's resume on which he listed a total time of 2,469 hours, 2,370 hours as pilot-in-command, and 652 hours in multi-engine airplanes. The operator submitted a request to the FAA on July 21, 2010, in accordance with the Pilot Records Improvement Act of 1996. The reply to the operator dated August 16, 2010, indicated no legal enforcement actions resulting in a finding of a violation. On July 19, 2010, the pilot submitted to a pre-employment urine test; the results were negative.

On September 30, 2010, the pilot completed basic indoctrination, general operation, and aircraft systems training under 14 CFR Part 135. Additionally, on September 30, 2010, October 2, 2010, and on October 4, 2010, he completed flight training consisting of a total of 5.4 hours. During the training flights, abnormal and emergency procedures training was performed which included training for aircraft fires on September 30th and October 4th flights.

The pilot's initial checkride in accordance with (IAW) 14 CFR Part 135.293, 14 CFR Part 135.297, and 14 CFR Part 135.299 occurred on October 5, 2010. The flight duration was recorded to be 1.9 hours and was performed in the accident airplane; the result was recorded to be "approved." The pilot's base month was October, and his next checkride IAW 14 CFR Part 135.297 occurred on April 13, 2011. The duration of the checkride and the results were recorded to be 2.2 hours and "approved"; respectively. That checkride was also flown in the accident airplane.

The pilot's first logged flight with the operator occurred on October 7, 2010. The operator reported that in the last 90 days with respect to their records, he flew 153 hours, of which 121 were in the accident make and model airplane, and in the past 30 days, he flew 72 hours, of which 57 were in the accident make and model airplane.

AIRCRAFT INFORMATION

The airplane was certificated in the normal category in accordance with Civil Air Regulations Part 3 (CAM 3), titled, "Airplane Airworthiness Normal, Utility, and Acrobatic Category", as amended May 15, 1956, and 14 CFR Part 23.1385(c), 23.1387(a), and 23.1387(e) of Federal Aviation Regulations.

The airplane was manufactured in 1976 by Beech Aircraft Corporation (later becoming Hawker Beechcraft Corporation) as model 58, and designated serial number TH-757. At the time of the accident, it was powered by two 285 horsepower Continental Motors, Inc., IO-520-C engines, and equipped with Hartzell PHC-J3YF-2UF constant speed full manual feathering propellers with FC7663 propeller blades. Electrical wiring consisting of MIL-W-5086/1 of the single wire type was installed in the cockpit and cabin areas of airplane. It was also equipped with a fire extinguisher, and the maintenance records reflect that a hand pump for an inflatable cabin door seal was installed.

A combustion type heater was installed in the center of the nose section of the airplane. The fuel supply for the combustion heater is routed from the left fuel tank to the wing root, where it makes a 90 degree change in direction forward and is routed along the left fuselage sidewall. The fuel line continues into the nose section of the airplane, where it makes a 45 degree right turn and connects to the heater boost pump installed on the aft end of the heater. The fuel supply is then routed from the fuel pump to the left side of the heater.

A dual (left and right) direct reading fuel flow and pressure gauge calibrated to indicate fuel flow was installed in the instrument panel above the throttle quadrant to the left of the audio panel. The gauge receives fuel pressure from a restrictor fitting attached to the engine fuel injection system’s fuel manifold that is located on top of the engine; the restrictor fitting is designed to prevent the escape of excessive fluid or gas in case of line failure. The gauge is plumbed from the restrictor fitting at the fuel manifold to a fitting on the firewall by a fire shielded flexible hose, and then from the fitting on the aft side of the firewall via aluminum lines which are routed inside the leading edge of both wings to each wing root. Rigid 1/4 inch outside diameter aluminum tubing connects at a union located at each wing root, then is routed forward along the lower fuselage sidewall into the cockpit, where each line is routed up to behind the instrument panel. The tubing for the left and right fuel pressure lines traverse behind the instrumental panel and connect to fittings on the dual fuel gauge.

Direct reading combination oil pressure/oil temperature/cylinder temperature gauges were installed for each engine and are side by side in the middle portion of the co-pilot’s instrument panel. The pressure portion of the gauge receives oil pressure from a restrictor fitting in each oil cooler that is located on the engine; the restrictor fitting is designed to prevent the escape of excessive fluid or gas in case of line failure. The oil pressure side of each gauge is plumbed from the restrictor fitting at the oil cooler to a fitting on the firewall by a flexible fire shielded hose, and from the fitting on the aft side of the firewall via aluminum lines routed inside the leading edge of both wings to the each wing root. Rigid ¼ inch outside diameter aluminum tubing connects at a union located at each wing, then is routed forward along the lower

fuselage sidewall into the cockpit, where it is then routed up behind the instrument panel. The tubing for the left and right oil pressure lines traverse behind the instrument panel and connect to fittings on the oil pressure gauge.

The airplane was inspected in accordance with (IAW) annual inspections, performed at 100-Hour intervals.

Airworthiness Directive (AD) 2004-21-05, with an effective date of November 19, 2004, pertaining to the model of the combustion heater installed in the airplane at the time of the accident was first complied with on December 10, 2004. The heater time since overhaul at that time was calculated to be approximately 1,483 hours. The AD specified in part that for the model of combustion heater installed upon the accumulation of 500 heater hours TIS, or within the next 100 hours TIS, to perform a pressure decay test of the combustion tube of the heater. The AD also specified a recurring pressure test of the combustion tube at intervals not-to-exceed 100 heater hours TIS or 24 calendar months, whichever occurs first.

The maintenance records reflect that the last annual inspection was performed on April 21, 2011. The airplane hour meter reading at that time was recorded to be approximately 3,197, and the airplane total time at that time was reported to be approximately 11,915 hours. Airworthiness Directive 2004-21-05 was recorded to be complied with at the last annual inspection and the heater hour meter at that time was recorded to be 872.9 hours; the next recurring inspection of the heater IAW AD 2004-21-05 was due at heater hour meter reading 972.9 hours.

The maintenance records further reflect that an overhauled combustion heater, model B4500, part number (P/N) 81D94-3EL, serial number (S/N) 11751144, was installed in the airplane on September 22, 2000. At that time the heater hour meter reading was 432.0 hours. There were no further entries indicating the heater was removed or replaced. On April 20, 2006, the heater hour meter was removed and replaced. The reading on the removed hour meter was 2271.7, and the reading on the new hour meter was 0000.0. At that time the heater had accrued approximately 1,840 hours since overhaul. On November 22, 2006, the heater hour meter was repaired, and on January 23, 2007, an entry in the airframe maintenance records indicates a new heater hour meter was installed; although, the entry did not specify the reading from the removed hour meter, nor the reading of the installed hour meter. An entry dated April 6, 2007, indicates that the heater hour meter was 90.1. Although the exact heater accrued time in service (TIS) since installation following overhaul could not be determined because of the inadequate record entry on January 23, 2007, the recorded logbook information suggest it had accrued as of the last annual inspection approximately 2,713 hours TIS since the last overhaul.

Documents provided by the combustion heater manufacturer specify that the heater is recommended to be overhauled every 1,500 heater hours TIS, or if the pressure decay test fails. The maintenance manual for the make and model airplane indicates that the type of combustion heater installed at the time of the accident (extended life) is required to be overhauled after 1,500 hours of heater operation.

The cockpit was equipped in part with circuit breaker toggle switches which were installed on the pilot's side left lower sub panel.

Raytheon Aircraft Company Service Bulletin (SB) 24-3735, dated August 2005, with an effective code for the accident airplane by make, model, and serial number, announced replacement of circuit breaker toggle switches with improved internal isolation, which were designed to eliminate issues related to reports of circuit breaker toggle switches becoming overheated.

Federal Aviation Administration (AD) 2008-13-17, with an effective date of August 6, 2008, effective for the accident airplane by make and model, required replacement of the circuit breaker toggle switches with improved design circuit breaker toggle switches which were designed to prevent failure of the circuit breaker toggle switch, which could result in smoke in the cockpit and the inability to turn off the switch. Compliance with the AD was required to be accomplished within the next 12 months after August 6, 2008.

An entry in the airframe maintenance records dated November 25, 2008, indicated compliance with AD 2008-13-17, and references to Hawker Beechcraft Corporation SB 24-3735, although the entry had the last 2 numbers transposed. The hour meter reading at that time was recorded to be 2,265.4, which correlated to airplane total time of approximately 10,984.

Although the airplane hour meter was destroyed in the accident, documents provided by the operator indicate the airplane hour meter reading at the beginning of the accident flight was approximately 3,230, which correlated to airplane total time of approximately 11,949 hours, or an elapsed time of 965 hours since compliance with AD 2008-13-17.

The pilot who flew the accident airplane on 2 revenue flights the day before the accident reported no airframe system, airframe, or engine discrepancies on either flight which lasted about 1.2 hours each. He reported using almost every system in the airplane with the exception of propeller de-ice.

METEOROLOGICAL INFORMATION

A surface observation weather report taken at McGhee Tyson Airport (TYS) at 1553, or approximately 20 minutes before the accident indicates the wind was from 190 degrees at 21 knots with gusts to 26 knots. The visibility was 10 miles, and the skies were clear. The temperature and dew point were 34 and 12 degrees Celsius respectively, and the altimeter setting was 29.85 inches of Mercury. The accident site was located approximately 38 nautical miles and 192 degrees from TYS.

Witnesses in the area consistently reported that it was not raining at the time but scattered clouds existed.

COMMUNICATIONS

The pilot was in contact with the Knoxville Airport Air Traffic Control Tower Radar East control position. There were no reported communication difficulties.

FLIGHT RECORDERS

The airplane was not equipped, nor was it required to be equipped with any devices that record and retain non-volatile memory.

WRECKAGE AND IMPACT INFORMATION

Examination of the accident site revealed the airplane crashed in a wooded area located near a residential area. An extensive postcrash fire that encompassed an estimated 5 acres was noted in the area of the main wreckage impact location. No damage to buildings or structure was noted.

The cockpit, cabin, instrument panel, nose compartment, empennage, and inboard sections of both wings were nearly consumed by the postcrash fire. Major structural components consisting of the right wing outboard of the engine nacelle, wingtip of the left wing, vertical stabilizer, rudder, and horizontal stabilizers were located away from the main wreckage. The majority of the separated structural components were located about 178 feet from the main impact location, while the left horizontal stabilizer was located about 400 feet west of the main wreckage location, and a section of elevator was located about 470 feet north-northwest from the main wreckage location.

The combustion heater was observed by FAA in an area that encompassed the postcrash fire and it was photographed; however, the heater was not recovered with the wreckage. Subsequent attempts to locate the heater were unsuccessful.

The main ground impact point with wing carry thru structure was found inverted at located 35 degrees 11.295 minutes North latitude and 084 degrees 09.214 minutes West longitude. Also located in that area were a semi-circular gear from the landing gear gearbox, flap drive cables, fuel selector handles and valves, and a section of the rear fuselage root containing the dorsal/rear bulkhead, and both main landing gear doors. An electrical wire which passed through a lighting hole on the left bottom forward carry thru spar exhibited a ball on the end of the wire; this wire was retained for further examination. Additionally, 2 large electrical wire bundles were located in this area; the wire bundles and the pilot’s circuit breaker panel were retained for further examination. All identified wires in that area were inspection and retained if any exhibited evidence of arching on any length of the wire, or on fractured ends.

Although the cockpit was consumed by the postcrash fire, the cockpit controls were identified. Inspection revealed the pitch control cables remained connected at the control column but the aileron chain was separated from the aileron sprocket. The throttle quadrant was structurally separated; therefore, the control positions were not considered reliable.

Insulation with white backing was found near the intersection of Joe Brown Highway and Allen Bell Road. The insulation was yellow in color and slightly burned. The insulation location was about 0.47 nautical mile and 1.06 degrees from the main carry-thru spar location.

Observed parts were documented as to their location and retained for further examination.

Following recovery of the wreckage, re-examination of the wreckage was performed by a NTSB fire and explosion specialist, the NTSB investigator-in-charge, a representative of the FAA, and also a representative of the airframe manufacturer. All identified wreckage was visually examined for evidence of an in-flight fire. Examination of the engines and propellers was performed by representatives of the respective engine and propeller manufacturer.

Examination of the left wing revealed it was consumed from the wing root to the separation point. The engine assembly and firewall were structurally separated. The main spar lower spar cap was fractured approximately 28 inches outboard of the wing attach point, while the main spar upper spar cap was fractured approximately 15 inches outboard of the wing attached point. The upper and lower wing attach bolts were in-place. The spar web between the fracture points at the upper and lower spar caps exhibited extensive heat damage.

One flap actuator from an unknown side was located and found to be extended approximately 2.1825 inches, which equates to flap retracted position.

Examination of the right wing following recovery of the airplane revealed the aft spar upper and lower spar caps were fractured 29 inches inboard of the inboard edge of the aileron, and at the inboard edge of the aileron, respectively. No evidence of preexisting cracks were noted in the fracture surfaces. Upward bulging of the upper skin was noted just aft of the main spar between wing station (WS) 115 and approximately 128; both fuel caps were in-place. A 45-degree compression wrinkle was noted on the upper wing skin between WS 154 and WS 184, while a 45 degree compression wrinkle was noted at the forward right corner of WS 154. The upper wing skin was burned through between the forward and aft spars at WS 105 to WS 115, and conduit of the navigation lights was damaged between WS 108 and WS 115, which was immediately forward of the aileron bellcrank. The lower wing skin between wing stations 66 and 94 which was just inboard of the damage to the upper wing skin was structurally separated but did not exhibit any evidence of fire damage on the interior surface. The aileron bellcrank was separated and the hole where it attaches was elongated and exhibited slight fire damage. The first stringer aft of the main spar between WS 115 and WS 99 was fractured and 7 rivets were pulled through, while the 3rd stringer aft of the main spar at WS 115 had conduit burn through and the stringer was feathered. The upper wing skin of the right wing was cut to access the navigation light wiring conduit. The navigation light conduit was noted to be clamped at WS 175. No obvious discrepancies were noted with the remaining components of the fuel supply of fuel vent system.

Examination of the right horizontal stabilizer leading edge revealed an indentation at the

outboard end. The spar was rotated approximately 180 degrees. The main spar of the left horizontal stabilizer was fractured with evidence of bending overload; the top spar cap was displaced rearward, and the rear spar was fractured at the attach point. A section of the left elevator was not located at the site or recovered.

Examination of the vertical stabilizer revealed the rudder was separated and comprised of 2 pieces. The right side of the vertical stabilizer had rubber transfer on the exterior surface consistent with contact by the rubber fairing strip on the inboard edge. The rubber transfer location was consistent with the inboard edge displaced upwards approximately 37 degrees. The rudder trim tab actuator was extended approximately 4.125 inches, which equates to 5 degrees rudder trailing edge tab left. The right elevator trim tab actuator was extended approximately 1.9375 inches, which is beyond selectable limits.

Examination of the main cabin door revealed soot was noted on the bottom edge of the door starting after the door latch rod, or about 13 inches aft of the door leading edge. The inner door panel was absent, and fire damage was noted on the interior skin of the lower portion of the door. The upper latch hook and upper latch hook receiver were not damaged, and the forward latch bolt was not deformed.

Examination of both engines was performed by a representative of the engine manufacturer with Safety Board oversight. The examination of the left engine revealed impact damage which separated all accessories except the left magneto, alternator, and fuel manifold valve. The aft sections of the crankcase halves were missing which allowed visible access to the aft camshaft and crankshaft gears. Impact damage precluded rotation of the crankshaft; however, inspection of the engine and engine accessories revealed no evidence of preimpact failure or malfunction. Inspection of the fuel manifold valve revealed a restrictor fitting was installed in the fuel pressure outlet, and inspection of the oil cooler revealed the remains of a restrictor fitting. A flexible hose contained the remaining portion of the restrictor fitting. Inspection of the engine firewall revealed no evidence of an in-flight fire.

Examination of the right engine revealed impact and fire damage. The starter and fuel manifold valve were separated. The oil sump was crushed, and heavy fire damage was observed in all areas. Both magnetos were separated, and the exhaust and intake pipes were crushed. The No. 6 cylinder rocker cover was impact damaged, and the rocker covers for the Nos. 1 and 3 cylinders were separated. Heavy impact damage was observed on cylinder heads of the Nos. 1 and 3 cylinders. The alternator was partly separated, and the ignition harness was burned. The cylinders were examined using a lighted borescope, and normal combustion deposits were observed on the piston heads and the cylinder domes; all valves were in place. Impact damage precluded rotation of the crankshaft; however, inspection of the engine and engine accessories revealed no evidence of preimpact failure or malfunction. The oil filter which was impact damaged was cut open to inspect the filter element which did not contain any ferrous particles. The fuel pump was in place and heat and impact damaged. The return line from the metering unit and the vapor return line were separated, and the low pressure set screw was impact damaged. The unit was disassembled and no internal damage was observed. The

interior of the fuel pump was corroded and rusted. The top of the fuel manifold was missing. Impact damage was observed on the interior of the unit. The diaphragm and spring were missing, and dirt was observed in the screen. The restrictor was observed in the outlet line and inspection of the oil cooler revealed the remains of a restrictor fitting. A flexible hose contained the remaining portion of the restrictor fitting. Inspection of the engine firewall revealed no evidence of an in-flight fire.

Examination of both propellers was performed by a representative of the propeller manufacturer with Safety Board oversight. The examination of the left propeller revealed it separated from the engine and the propeller mounting studs had stripped out of the hub and remained in the engine flange. All three blades were at a high blade angle, each at a slightly different angle. The piston/cylinder assembly had separated from the hub and the pitch change rod was fractured. The spinner dome was fragmented and hydroformed over the cylinder on the front and side, and the bulkhead was fragmented and deformed. Cycling of the pitch change mechanism was not possible; the air valve was fractured and did not retain an air charge. The cylinder was dented and the attachment threads were damaged. The piston was not removed from the cylinder. The observable portion was unremarkable. Disassembly of the propeller revealed the pitch change rod was fractured on the forward side of the fork, and bent on the aft side of the fork. It was also bent and fractured between the piston and front side of the hub; which is consistent with the piston position being in the operating range and not in the feathered position. The fork was intact and unremarkable. The feather spring and spring guides were not observed. The piston/cylinder/spring were not disassembled to lack of tooling. Inspection of the low pitch stop revealed an impact impression; the feather stop and start locks were not observed. The hub was internally damaged due to inward movement of the blades and preload plates. Two of the hub through bolts were bent and were cut to facilitate disassembly. The mounting flange bolts holes were stripped and the cylinder attachment flange was fractured. Examination of the preload plates revealed multiple impact marks to the number L1 preload plate rom fork contact. Marks were from +4/32 to -6/32 inch from the hub parting line, which equates to approximately 52 to 42 degrees blade angle, respectively. An impact mark on the L2 preload plate from fork contact was noted -5/32 inch from the hub parting line, which equates to approximately 43 degree blade angle. Multiple impact marks on the L3 preload plate from fork contact were noted +2/32 to -6/32 inch from the hub parting line, which equates to approximately 50 to 42 degrees blade angle, respectively. Examination of the propeller blades revealed the No. 1 propeller blade was mildly bent forward at mid blade, was curled aft approximately 90 degrees at the tip, and did not exhibit leading edge twisting or significant leading edge damage. The No. 2 propeller blade was bent aft about midspan, while the No. 3 propeller blade was bent forward approximately 45 degrees beginning about 1/3 span. The Nos. 2 and 3 propeller blades did not exhibit leading edge twisting or have any significant leading edge damage.

The examination of the right propeller revealed two propeller blades remained secured by the propeller hub and were at a low pitch position, while the third blade identified as (R2) had separated from the hub and its counterweight had separated from the blade. The cylinder/piston/spring assembly were separated from the hub but was retained within the

spinner dome. The spinner dome was crushed over the cylinder indicating frontal and side impact, and was fragmented. Cycling of the pitch change mechanism was not possible; the air valve was fractured and did not retain an air charge. The mounting flange studs and nuts were intact; the engine crankshaft was fractured aft of the mounting flange. The piston was in a low pitch position when the cylinder was damaged; the piston was not removed from the cylinder. Only the aft side was observed and it appeared
unremarkable. The pitch change rod had multiple fractures; it was fractured on both sides of the fork and at two places between the piston and hub, while the fork was not fractured. The low pitch stop had impact damage, and the feather stop and start lock mechanism were not observed. The cylinder attachment flange was fractured, while the mounting flange was intact. A piece of the aft hub half was fractured adjacent to R2 blade (which had separated from the hub). The hub was internally damaged due to inward movement of the blades and preload plates. Inspection of the preload plates revealed an impact mark on the R1 plate +5/32 inch from the hub parting line, which equates to approximately 53 degree blade angle. The R2 preload plate had an impact mark from fork contact +7/32 inch from the hub parting line, which equates to approximately 55 degree blade angle, and the R3 preload plate had multiple impact marks from fork contact between -1/32 to -6/32 inch from the hub parting line, which equates to approximately 47 to 42 degree blade angle, respectively. All three blades did not have tearing at the tips. They did not have leading edge damage or evidence of rotational scoring. The No. 1 propeller blade was bent forward approximately 20 degrees with a large radius bend at mid-blade; the counterweight and pitch change knob were intact. The No. 2 propeller blade was bent aft at the shank and bent further aft at 1/3 radius, and was twisted toward low pitch. The blade counterweight was missing and the pitch change knob was fractured. The No. 3 propeller blade was bent aft approximately 70 degrees at mid –blade; the counterweight and pitch change knob were intact.

According to the NTSB Fire Factual Report, the portions of the aircraft that were found outside of the main wreckage area, with a few exceptions, were not affected by the post crash fire. These components consisted mostly of portions of the flight control surfaces associated with the horizontal stabilizer and wings. Most of these components had heavy operational fouling on the interior surfaces, but did not exhibit fire/soot patterns consistent with an in-flight fire. The outer portion of the right wing which came to rest with the outboard portion in an elevated position sustained fire damage on the ground and on the wing consistent with a small pool fire beneath the wing resulting from fuel draining out of the wing structure.

A portion of the combustion heater's heat shield was found entangled with part of the aircraft's nose structure. The heat shield did not exhibit any more thermal damage than the rest of the structure in the vicinity it was found. The combustion heater's blower motor was found separate among the smaller portions of the aircraft debris. The blower motor had sustained relatively little thermal damage, leaving the label still intact and insulation on the power supply wires. Although the combustion heater was not recovered, examination of two photographs that were supplied by the FAA depict the aircraft's combustion heater having sustained thermal and impact damage and was laying on the ground in an area of burnt underbrush. Those photos show some of the heater's wiring which appears to have undamaged insulation

still covering the conductors. Additionally, a fuel line attached to the heater depicted in one of the photos had a bright red “fuel” sticker attached to it.

The NTSB Fire Factual Report further indicates that a few portions of window material, believed to be either the pilot’s or co-pilot’s front cabin side window, had evidence of sooting and thermal damage on the interior facing surfaces. The thermal damage consisted of incipient melting rendering the plastic window material hazy. On the larger portion, the sooting appeared to have a faint flow pattern. The fracture surfaces of these portions of window did not exhibit thermal damage, which is consistent with the window being intact while it was exposed to a high temperature environment. The aircraft’s cabin fire extinguisher that was located in the vicinity of the main wreckage but had not been exposed to the post crash fire exhibited damage consistent with impact forces. The fire extinguisher felt light when held by hand, and was retained for further examination. The aircraft had a double door (utility door) on the right side for access to the aft passenger area. The aft most portion of the double door (utility door) was found to have no evidence of soot or thermal damage on either the exterior or interior surfaces. The portion of the bezel surrounding the window also did not exhibit evidence of soot or thermal damage. Also, the bezel for the pilot’s window had no evidence of soot or thermal damage.

Items retained for further examination by the NTSB Materials Laboratory included six (6) pieces of window material, the Halon fire extinguisher, a portion of the instrument panel glare shield, a portion of a circuit breaker panel, two (2) bundles of burned electrical wires, heavy gauge battery/starter wire, an electrical connector stud with attached wires, a portion of stranded wire, and a portion of shielded wire.

According to the NTSB Materials Laboratory Factual Report, the six pieces of window material appeared to originate from different parts of the aircraft. Three pieces are approximately ½ inch thick, which is consistent with belonging to the windshield. These pieces of the windshield exhibit areas of thermal damage on both the interior and exterior facing surfaces. The areas of thermal damage had irregular shape with a brown pyrolyzed appearance. Some of the fracture surfaces on these pieces have been eroded due to thermal exposure; however, it could not be determined with certainty at what point in the accident the thermal damage was sustained by the windshield pieces. The remaining three pieces of window material are approximately ¼ inch thick and are consistent with the cockpit windows. Two of the pieces have mating fracture surfaces and have curvature consistent with being from the right hand side cockpit window. Additionally, along the bottom of the portion of window formed by the two pieces is a formed edge which would have been in contact with the window frame. A similar formed edge exists along the top. Drawing dashed line extensions coincident with these two edges shows approximately where this portion of window originated from with regard to the overall window geometry. The three pieces of cockpit window exhibited thermal damage to the interior surface only. This damage consisted of incipient melting of the plastic window material and a black soot adhesion to the surface. The line of demarcation between the thermally damaged and undamaged areas on the portion of the window consisting of parts marked A and B was very distinct. The portion of the window exhibited flow patterns with an aft and upward

direction. The fracture surfaces all along the periphery of all three of the pieces were clean with no indication of post fracture thermal exposure. The piece labeled “C” did not mate to the other two parts and did not have any features that could distinguish its origin. The thermal damage it sustained was of the same nature and degree as the other two pieces.

The halon fire extinguisher was manufactured by Amerex® and designated model C352. It had a service tag on it recording the total weight of the fire extinguisher as 5 lb on 4/13/2011 by Stevens Aviation, Inc., of Nashville, TN. The total gross weight of the fire extinguisher according to the manufacturer is 4 pounds 14 ounces ±4 ounces when charged. The accident fire extinguisher weighed 2 pounds 2.7 ounces, which is consistent with the fire extinguisher being empty. The cylinder portion of the fire extinguisher had some dents and scrapes but no apparent perforations. The neck of the cylinder was bent off axis and the valve mechanism attached to the cylinder neck had sustained impact damage. The pressure indicator gauge was missing and the threaded nipple previously attaching the gauge to the valve body was partially pulled from the threaded hole in the valve body. The extinguisher’s handle and pin were missing. The piston plunger which actuates the extinguisher’s valve did not appear to have sustained any damage. Overall the fire extinguisher did not have any thermal damage.

Examination of the portion of the instrument panel glare shield recovered from the tree canopy revealed the top surface was mostly intact with little evidence of thermal damage or sooting. Thermal damage was concentrated around two openings on the surface of the glare shield on the right hand side. The bottom surface of the glare shield had a distinct area of thermal damage consistent with incipient melting and pyrolysis; the damage extended from the forward most area on the right hand side all the way to the aft part. The severity of the thermal damage was more pronounced in the middle of this area.

The portion of the circuit breaker panel was severely damaged by fire; most of the circuit breakers were missing and the remaining circuit breakers were damaged beyond evaluation. The portion of the circuit breaker panel did not reveal any signatures consistent with electrical arcing or any other electrical anomaly.

The two bundles of burned electrical wire collected during the on-scene investigation were found tangled in the remains of the instrument panel and main spar carry through. Both of the wire bundles were examined under good lighting for evidence of electrical arcing; however, no evidence of arcing was discovered in either of the wire bundles.

Inspection of the heavy gauge cable consistent with a battery cable or starter cable revealed it sustained severe thermal damage turning the copper strands that form the cable brittle. One end of the cable had a fractured electrical connector and the other end was connected to a portion of a threaded stud and contactor leg. The contactor leg had a region where it appears melting took place forming an irregular feature on the surface.

The landing gear dynamic brake relay was located among the recovered wreckage and inspection of it revealed extensive fire damage. Two bare stranded non-fractured electrical

wires were observed from the landing gear actuator drive motor to their dynamic brake relay electrical stud connections. Each stud connection had a solid cooper wire connected to the stud. Inspection of one of the studs revealed the solid copper wire appeared to have a fused connection between it and another conductor wire attached to the electrical stud; the fused area was silver in color and had a solder like appearance. Examination of the fused area by X-ray spectroscopy revealed a composition high in tin and lead.

A portion of stranded wire approximately 13 inches long with an average diameter of approximately 0.120 inch was inspected; the insulation was missing along its entire length. There was evidence of oxidation and the copper strands comprising the wire had become brittle, consistent with exposure to a high temperature environment. One end of this portion of wire had an electrical connector crimped on that was attached to a threaded stud. The other end of the portion of wire exhibited a small region where the copper strands had melted and fused together consistent with electrical arcing. There was a sharp demarcation in thermal damage between the melted end of the wire and the strands just before the end, also consistent with electrical arcing. No determination could be made as to where the stranded wire was from.

Inspection of the portion of shielded wire approximately 4 inches long revealed the shielding on the wire had become oxidized and brittle, consistent with high temperature exposure. Underneath the shielding were three solid conductors. On one end of this portion of shielded wire the ends of the conductors had melted and had formed beads consistent with electrical arcing. No determination could be made as to where the shielded wire came from.

MEDICAL AND PATHOLOGICAL INFORMATION

Postmortem examinations of the pilot and passengers were performed by the Wake Forest University School of Medicine, Department of Pathology, Winston- Salem, North Carolina. The reports for all occupants indicated the major findings indicated multiple blunt force injuries and no visible soot was noted in the airways for three of the occupants, and no visible soot was noted in the trachea of the fourth occupant.

Forensic toxicology was performed on specimens of the pilot and passengers by the FAA Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma, and also by the Office of the Chief Medical Examiner, Chapel Hill, North Carolina. The toxicology report for the pilot by FAA indicated putrefaction of the specimens was noted. Testing for carbon monoxide and cyanide was not performed. Ethanol was detected in the kidney (58 mg/dL), liver 44 mg/dL), and spleen (20 mg/dL), while no ethanol was detected in the muscle specimen. N-Propanol (4 mg/dL) was also detected in the kidney specimen. The toxicology report for the pilot by Office of the Chief Medical Examiner indicates the submitted muscle specimen was unsuitable for carbon monoxide testing, while the result was positive for ethanol (80 mg percent). A note indicates the specimen was received in a leaking container, and the condition was listed as “Decomposed.” Copies of the toxicology reports are included in the NTSB public docket for this case.

The toxicology reports by the Office of the Chief Medical Examiner for all passengers indicated the submitted muscle specimens were unsuitable for carbon monoxide testing. The results were positive in varying amounts between 70 mg percent to 150 mg percent for ethanol. Copies of the toxicology reports are included in the NTSB public docket for this case.

TEST AND RESEARCH

On June 1st, or approximately 7 days after the accident, the Safety Board was provided a video taken by an individual who is an airframe and powerplant mechanic with inspection authorization who works in the same building as where the accident airplane in based. The 29 second video depicts the accident airplane, a blue colored stain on the hangar floor at the outer aft portion of the left wing, a blue colored stain on the bottom surface of the left wing,skin near a static wick, and also stains aft of the tank sump drain. The stains were consistent with the dye used in 100LL fuel. Postaccident inspection of the recovered outer portion of the left wing revealed the same fuel stains recorded in the video. The individual reported that he also noticed a leak from the right wing evidenced by a sticky/guey stain on the floor. He notified an individual who also operated the airplane on another 14 CFR Part 135 certificate about the fuel leak, and was informed the airplane was just out of maintenance and discounted the information about the fuel leak.

Beechcraft personnel reported that with respect to the newer design circuit breaker switches, which are installed in the pilot's left lower subpanel, on October 27, 2011, they had received 10 reports via the FAA Field Condition Report (FCR) system. All 10 reports were associated with the same flight school and in all 10 reports compliance with AD 2008-13-17 by installation of improved circuit breaker switches had been previously complied with. Further review of the 10 FCR's submitted revealed although not all document cycles, several of the reports list hours and estimated cycles indicating 4 cycles every flight hour. The factual description of condition that generated the FCR's indicated the installed switches ceased to energize the circuit when toggled to the "On" position in eight cases, while two reports described switches that were hot to the touch. There was no mention in either of the two cases that the switch was incapable of de-energizing the circuit. Of the 10 reports, the lowest estimated cycle amount was 192, and the highest estimated cycle amount was 6,000, while the average estimated cycle amount was calculated to be approximately 3,009.

The single pole toggle/thermal switch circuit breaker designated as W31 series manufactured by Tyco Electronics lists a longevity based on number of cycles. The endurance cycling was listed to be 6,000 cycles at 100 percent of rating, or 10,000 mechanical cycles. The switch can't be reset against overload, but is considered "trip-free" indicating that the tripping mechanism cannot be over-ridden by the operating control.

Review of CAM 3 section 3.671, pertaining to instrument lines revealed, "Powerplant instrument lines shall comply with the provisions of section 3.550. In addition, instrument lines carrying inflammable fluids or gases under pressure shall be provided with restricted orifices

or other safety devices at the source of the pressure to prevent escape of excessive fluid or gas in case of line failure. Section 3.690 states in part that with respect to fuses or circuit breakers, protective devices shall be installed in the circuits to all electrical equipment. Section 3.694 pertaining to switches indicates that they shall be capable of carrying their rated current and shall be of such construction that there is sufficient distance or insulating material between current carrying parts and the housing so that vibration in flight will not cause shorting.

As discussed in the HISTORY OF FLIGHT section of this report, the pilot radioed the Knoxville ATCT Radar East control position controller at 1612:18, and advised, "…we gotta declare an emergency got a fire." There were no further recorded radio communications from the pilot. Secondary transponder returns continue approximately every 4 or 5 seconds when examined for a period of 24 seconds beginning at 1612:24, and ending at 1612:48.

The Pilot's Operating Handbook and FAA Approved Airplane Flight Manual (POH/FAA AFM) contains a checklist titled, "ELECTRICAL SMOKE OR FIRE" in the emergency procedures section. That checklist states the following:

Action to be taken must consider existing conditions and equipment installed:

1. Battery and Alternator Switches - OFF

WARNING

Electrically driven flight instruments will become inoperative.

2. Oxygen - AS REQUIRED
3. All Electrical Switches - OFF
4. Battery and Alternator Switches - ON
5. Essential Electrical Equipment - ON (Isolate defective equipment:

NOTE

Ensure fire is out and will not be aggravated by draft. Turn off CABIN HEAT switch and push in the CABIN AIR control. Open pilot's storm window, if required.

A direct reading dual (left and right) fuel flow and pressure indicator was installed during manufacture on Beech 58 and 58A model airplanes serial numbers TH-001 thru TH-1193; the accident airplane was serial number TH-757. During manufacture of the same make and model airplane from serial number TH-1194 and after, an electrically controlled dual (left and right) fuel flow indicator is installed.

A search of the NTSB database pertaining to investigations of the accident airplane model from 1982 to March 2013, in which probable cause had been determined and in-flight fire or

explosion was listed as a cause, factor, or finding, revealed a total of 6 accident investigations. Review of the 6 accidents revealed two did not specify in-flight fire in the narrative or sequence of events, while 4 of the 6 did specify in-flight fire in the narrative or sequence of events. One of the reports NTSB Case (BFO94FA121) identified the origin of the in-flight fire prior to the in-flight breakup could not be identified. Another report (NTSB Case # MIA00FA221) identified the source of the in-flight wire to a shorted electrical wire behind the pilot's side of the instrument panel which caused over temperature and cracking of the aluminum fuel line for the direct reading left fuel flow and pressure indicator gauge. Yet another report (SEA02FA023) attributed the in-flight fire in the left engine compartment to a chafed alternator wire, while another report (NTSB Case # ATL07LA065) identified evidence of an in-flight fire in the right wing, although the source of the in-flight fire could not be determined.

An additional accident investigation performed by NTSB pertaining to the accident make and model airplane (NTSB Case ERA10LA357), involved an explosion in the right wing during engine start. The NTSB Factual Report indicates that after takeoff the right wing fuel cap became unsecured from the fuel filler port and an estimated 11 gallons of fuel vented from the tank. The pilot returned and landed uneventfully, secured the engines and then the right fuel cap. The pilot restarted the left engine then during restart of the right engine an explosion occurred. The investigation determined issues with the right wing fuel filler cap attributed to age.

FAA Special Airworthiness Information Bulletin (SAIB) CE-22-28, dated April 8, 2011, with the purpose of informing owners and operators of Beech 55, 56, and 58 series airplanes about reports of Beech Baron airplanes experiencing in-flight fire and/or ignition of combustible flammable fluids or vapors in the outboard wing. The SAIB indicates that since 2007, there were 2 reports of fire or explosion of a wing during flight, and 2 events that occurred on the ground during engine start. The SAIB indicates to pay attention to electrical wiring in areas where fuel leakage or seepage may occur, to ensure positive clearance between lines carrying flammable fluid or vapor, oxygen lines, and electrical wiring, and to pay particular attention to fuel tanks, fuel lines, fuel caps, and fuel vent lines for leaks and seepage, and to also inspect fuel vent lines for condition, ensure fuel vent lines and hoses are connected and properly clamped, and for proper installation.

An individual who was at the departure airport and helped the passengers into the airplane reported that he and/or another individual helped load luggage into the nose baggage compartment. In doing so, an electrical wire the length of the nose baggage compartment was noted to be hanging down and the pilot repeatedly told them to be careful with the wire.

ORGANIZATIONAL AND MANAGEMENT INFORMATION
ADDITIONAL INFORMATION

Operational control for the accident flight was by Friendship Flying Service, Inc., an on-demand airplane passenger/cargo operation, Certificate Number F9FA628H, with an original certificate issue date of August 19, 1996. At the time of the accident, there were two Beech 58 airplanes

on their certificate including the accident airplane. The air carrier certificate is held by the Louisville, Kentucky Flight Standards District Office.

Pilot Information

Certificate:	Airline transport; Commercial; Flight instructor	**Age:**	26,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	Airplane single-engine; Instrument airplane	**Toxicology Performed:**	Yes
Medical Certification:	Class 1 With waivers/limitations	**Last FAA Medical Exam:**	July 12, 2010
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	April 13, 2011
Flight Time:	3025 hours (Total, all aircraft), 893 hours (Total, this make and model), 2716 hours (Pilot In Command, all aircraft), 153 hours (Last 90 days, all aircraft), 72 hours (Last 30 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Beech	**Registration:**	N77AR
Model/Series:	58	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	TH-757
Landing Gear Type:	Retractable - Tricycle	**Seats:**	6
Date/Type of Last Inspection:	April 21, 2011 Annual	**Certified Max Gross Wt.:**	5400 lbs
Time Since Last Inspection:	34 Hrs	**Engines:**	2 Reciprocating
Airframe Total Time:	11915 Hrs as of last inspection	**Engine Manufacturer:**	CONT MOTOR
ELT:	Installed, activated, did not aid in locating accident	**Engine Model/Series:**	IO-520-C
Registered Owner:	AERO RESOURCES CORP	**Rated Power:**	285 Horsepower
Operator:	FRIENDSHIP FLYING SERVICE INC	**Operating Certificate(s) Held:**	On-demand air taxi (135)
Operator Does Business As:		**Operator Designator Code:**	F9FA

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	TYS,981 ft msl	**Distance from Accident Site:**	38 Nautical Miles
Observation Time:	15:53 Local	**Direction from Accident Site:**	12°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	21 knots / 26 knots	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	190°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.85 inches Hg	**Temperature/Dew Point:**	34°C / 12°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Atlanta, GA (FTY)	**Type of Flight Plan Filed:**	IFR
Destination:	Hazard, KY (K20)	**Type of Clearance:**	IFR
Departure Time:	15:43 Local	**Type of Airspace:**	

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:	3 Fatal	**Aircraft Fire:**	Both in-flight and on-ground
Ground Injuries:	N/A	**Aircraft Explosion:**	On-ground
Total Injuries:	4 Fatal	**Latitude, Longitude:**	35.188056,-84.15361

Administrative Information

Investigator In Charge (IIC):	Monville, Timothy
Additional Participating Persons:	Hector Vazquez; FAA/FSDO; Charlotte, NC Paul Yoos; Hawker Beechcraft Corporation; Wichita, KS John T Kent; Continental Motors, Inc.; Mobile, AL Thomas McCreary; Hartzell Propeller, Inc.; Piqua, OH
Original Publish Date:	October 29, 2013
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=79220