Aviation Investigation Final Report

Location:	Bloomington, Illinois	**Accident Number:**	CHI02FA199
Date & Time:	July 21, 2002, 10:26 Local	**Registration:**	N12KA
Aircraft:	Beech E-90	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	2 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The airplane was destroyed by impact forces and post-impact fire when it impacted the terrain about 1/3 mile northeast of the departure end of runway 20 during takeoff. The airplane was cleared for a right turnout after takeoff, but witnesses observed the airplane climb to about 100 feet, veer left, enter a left bank, go inverted, and then impact the terrain in a nose low attitude. The airplane's left and right wings, fuselage, and cockpit were largely consumed by fire. Inspection of the airplane revealed the flaps and landing gear were retracted. There was aileron control continuity from the control yoke to the aileron bellcranks. There was elevator and rudder control cable continuity from the bellcranks at the forward bulkhead to the control surfaces. Inspections of the engines and propellers indicated the right engine and propeller was producing power in the middle to high power range at impact, and the left engine and propeller was producing power in the low to middle range of power at impact. The 60-year old pilot had flown 942 hours in the accident airplane, and was described as a very safety conscious, conservative pilot, who performed very thorough preflights and adhered to all checklists. The 22-year old pilot rated passenger had not received ground or flight instruction in the make and model of the accident airplane. The toxicology reports were negative for all substances tested. There were no remarkable findings in the autopsies.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be:
The cause of the accident is undetermined.

Findings

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

Findings
1. (C) REASON FOR OCCURRENCE UNDETERMINED

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

Findings
2. TERRAIN CONDITION - GROUND

Factual Information

HISTORY OF FLIGHT

On July 21, 2002, at 1026 central daylight time, a Beech E-90, N12KA, operated by Image Air, Inc., was destroyed when it impacted the terrain about 1/3 mile northeast of the departure end of runway 20 (7,000 feet by 100 feet, concrete) at the Central Illinois Regional Airport (BMI), Bloomington, Illinois. The airplane was departing from runway 20 and had climbed about 100 feet when it veered to the left, rolled inverted, and impacted the terrain in a nose low attitude. The private pilot and the pilot rated passenger received fatal injuries. The 14 CFR Part 91 personal flight was departing BMI with Cable Union (3CU), Wisconsin, as the destination airport. Visual meteorological conditions prevailed. The flight was on an instrument flight rules (IFR) flight plan.

The transcript of conversation between the pilot of N12KA and the Bloomington Air Traffic Control Tower (ATCT) indicated that N12KA received its IFR clearance at 1013. At 1013:18 the ground controller asked N12KA if he was ready for taxi. The pilot responded, "Ah, negative, we are going to go out here and do some run-ups (unintelligible)."

At 1018:53, N12KA informed ground control that he was ready to taxi. Ground control cleared the airplane to taxi to runway 20.

At 1024:06, N12KA informed tower control that he was ready for takeoff. The tower cleared N12KA for takeoff with instructions to turn right heading three six zero and climb and maintain 9,000. At 1024:33, N12KA acknowledged the takeoff and climb clearance.

A witness, who was a passenger of a commuter airplane waiting for takeoff from runway 20, reported the following:

"I first noticed the Beech aircraft when it crossed in front of our plane while taking off. It appeared to be at a decent takeoff speed when it left the ground. There was no indication while it was on the ground of any malfunctioning equipment. Once the plane left the ground is when I noticed there appeared to be something not quite right. The rear of the plane was swaying back and forth (like wagging its tail) and it was not gathering altitude very fast. There wasn't much wind at that time as the wind sock at the west end of the runway was at about a 45-degree angle. As I kept watching, the plane started to turn to the left and was still at a low altitude of approximately 50-75 feet. I was thinking to myself that it better get some more altitude or it may hit the control tower (that is what I perceived from the angle I was looking). The plane did gain a little more altitude but not much. It looked as though it was level with the top of the control tower.

The left wing suddenly tipped to the left and I could see the complete top of the plane and then the nose dropped as if it had stalled, and the plane went into a vertical dive. I lost sight of the plane due to a slight hill blocking my view, but as soon as the plane disappeared a large ball of fire erupted followed by thick black smoke."

Another witness reported seeing the airplane heading in a southeast direction when it appeared to enter a spin and rotate to the inverted position before it impacted the ground.

The airplane impacted the terrain outside the fenced airport property, about 1/3 mile northeast from the departure end of runway 20.

PERSONNEL INFORMATION

The 60-year-old private pilot held multi-engine land, single engine land, and airplane instrument ratings. He held a Third Class medical certificate. He had a total of about 1,740 hours of flight time. Approximately 1,200 hours were in multi-engine airplanes and approximately 942 were flown in N12KA. The pilot had flown N12KA approximately 40 hours in the last 90 days and 8 hours in the last 30 days.

The pilot attended FlightSafety's King Air C/E-90 Initial training course from February 23-27, 1998. He attended FlightSafety's King Air C/E-90 Recurrent training courses in June 1998, June 1999, and July 2000. On August 4, 2001, the pilot attended TechniFlite's Recurrent training program for King Air 90-series pilots.

A witness, who was employed by a major United States airline as a Boeing B-777 First Officer and was also the pilot's son, reported that the pilot was "exceptionally thorough" in all his preflight habits and flight preparations. He reported the pilot routinely did what he was supposed to do on every preflight. He reported the pilot would typically taxi to the ramp or the end of the ramp to do all his systems checks and the first flight of the day checks. He reported that in the last 2-3 years, the pilot was flying the airplane the way it was supposed to by flown, with good procedures and good judgment.

The operator of Image Air reported the pilot was a very safety conscious and conservative pilot. He reported the pilot performed very thorough preflight and engine checks, and it was not uncommon for the pilot to do two "walk around" inspections during the preflight. He reported the pilot normally performed his engine checks prior to taxi.

The 22-year-old pilot rated passenger held commercial and flight instructor certificates with single and multi-engine airplane, and instrument airplane ratings. He held a Second Class medical certificate. He had a total of about 998 hours of flight time, with approximately 27 hours of multi-engine flight time. The pilot rated passenger's flight logbook indicated that on February 15, 2002, he flew with the accident pilot in N12KA for 8.2 hours. He had not received ground school or flight training in King Air 90-series airplanes. He was currently employed by a fixed base operator where he provided ground school and flight instruction.

AIRCRAFT INFORMATION

The airplane was a twin engine Beech E-90 King Air, serial number LW-41, with a maximum gross weight of 10,100 pounds. The engines were 550 horsepower P&W PT6A-28 engines. The last maintenance inspection was a Phase 1 inspection and was conducted on June 18, 2002. The airplane had flown 18 hours since the last inspection and had a total time of 8,643 hours. An inspection of the maintenance records revealed that all avionic inspections and all Airworthiness Directives were current and complied with.

METEOROLOGICAL INFORMATION

At 1045, the weather conditions reported at BMI were: winds 250 at 10 knots, sky clear with 7 statute miles visibility, temperature 33 degrees C, dew point 24 degrees C, altimeter 30.03.

WRECKAGE AND IMPACT INFORMATION

The airplane impacted the terrain in a level, weed covered field outside of the airport boundary. A ground scar indicated the initial point of impact. The wreckage path covered approximately 65 feet from the initial point of impact to the main wreckage on an approximate heading of 100 degrees. The main airplane wreckage came to rest at coordinates 40 degrees 28.037 minutes north latitude, 088 degrees 54.457 minutes west longitude. The majority of the left and right wing, cockpit, cabin, and fuselage were destroyed or consumed by impact forces and fire.

Pieces of white paint and clear glass were located near the initial point of impact. The outboard section of the right wingtip approximately 3 feet in length was located 14 feet along the wreckage path. The green navigation lens was still attached to the wingtip. Two propeller blades that had separated from the right propeller hub were located next to a shallow impact area approximately 6 feet by 3 feet, located about 34 feet from the initial point of impact on about a 160 degree heading. The right propeller hub with two propeller blades still attached to the hub was located about 13.5 feet from the 2 right propeller blades. One of the left propeller blades that had separated from the left propeller hub was found next to another shallow impact area approximately 3 feet by 3 feet, located about 16 feet from the 2 right propeller blades. The left propeller hub with three propeller blades still attached to the hub was located about 9 feet from the left propeller blade.

A section of the right wing about 8 feet in length was found between the left propeller blade and the main wreckage. Its upper aluminum skin was consumed by fire. A section of the right aileron about 4 feet in length was found, and a majority of its structure had been consumed by fire.

The main wreckage was found lying upright and the nose of the aircraft was on about a 270 degree heading. Both engines had separated from their respective wings. The right engine was located in front of the nose of the airplane, and the left engine was found in front of the

left wing. The right wing from the wing root to the nacelle was identifiable, but the top of the wing was consumed by fire, revealing the sub-structure of the wing. The majority of the left wing was intact or identifiable, and located on the left side of the fuselage. The section of the left wing between the wing root and outboard of the engine nacelle received fire damage, and its upper skin was consumed by fire. The section from the left engine nacelle to the wingtip was not consumed by fire. The wingtip was intact with the red navigation light still attached and intact. The left flap and aileron were consumed by fire. The top of the airplane's fuselage, from the nose of the airplane to the rear bulkhead at the empennage, was consumed by fire. The interior of the cockpit and cabin was consumed by fire. The airplane's instruments were destroyed by fire and impact forces, and no pertinent information was obtained from the instruments or power quadrant.

The empennage was found aft of the fuselage. It had received fire damage that consumed part of its structure. The right horizontal stabilizer's spars were broken, but it was found with the rest of the empennage. The leading edge was consumed by fire. The vertical stabilizer remained intact with the rudder still attached. The rudder trim actuator extension measured approximately 9 1/4 inches, which equates to approximately 12 degrees tab left. The left horizontal stabilizer remained attached to the empennage. Its leading edge was consumed by fire. The elevator trim actuator extension measure approximately 1 to 1 1/16 inches, which equates to approximately 0-5 degrees tab down.

Examination of the flap actuators revealed they were in the retracted position, which corresponded to the flaps being in the retracted position. The landing gear actuators were found in the retracted position, which corresponded to the landing gear being in the retracted position.

The airplane was examined for flight control cable continuity. The left and right aileron control cables were intact and continuous. The right wing cables exhibited continuity to the right aileron bellcrank. The bellcrank was largely consumed by fire, but the cable ends retained parts of the bellcrank and their attaching bolts. The left wing cables remained attached to the left aileron bellcrank. The bellcrank was separated from its pivot, and was distorted and blackened. The left and right cables were still attached to each other at the aileron quadrant. The quadrant was consumed by fire. The aileron cables exhibited continuity from the aileron quadrant to the control column, and were connected to the chain attached to the control wheel sprocket. The chain and sprocket were intact. The control wheel interconnect cables and chains exhibited continuity, except where the chain was separated at the chain keeper on the right wheel sprocket. The interconnect cables and chains measured approximately 65 1/2 inches in length. The right wheel sprocket was broken from impact forces.

The elevator cables exhibited continuity from the bellcrank at the forward bulkhead in the cockpit to the aft elevator bellcrank. The elevator linkage from the aft bellcrank to the elevator horn was intact, and moved when the elevator was manipulated. The majority of forward bellcrank and the pushrod from the control column to the bellcrank was consumed by fire.

The rudder cables exhibited continuity from the bellcrank at the forward bulkhead in the cockpit to the rudder. The majority of the forward bellcrank was consumed by fire. The majority of the copilot's right rudder pedal was intact, but the left pedal was not located. The majority of the pilot's rudder pedals was consumed by fire.

The left and right engines were shipped to Pratt & Whitney Canada for engine teardowns. The left and right propellers were shipped to DuPage Airport, West Chicago, Illinois, for teardown and inspection by McCauley Propellers.

MEDICAL AND PATHOLOGICAL INFORMATION

Autopsies were performed on the pilot and pilot rated passenger at the Mclean County Coroner's Office, Bloomington, Illinois, on July 22, 2002.

Forensic Toxicology Fatal Accident Reports were prepared by the FAA Civil Aeromedical Institute. The reports concerning the pilot and pilot rated passenger were negative for all substances tested.

TESTS AND RESEARCH

The engines were examined at Pratt & Whitney Canada. The inspection report stated the following:

"The left hand engine displayed contact signatures to its internal components characteristic of the engine producing power at impact, likely in a low to middle range.

The right hand engine displayed contact signatures to its internal components characteristic of the engine producing power at impact, likely in middle to high power range.

There were no indications of operational dysfunction to any of the engine components, controls, and accessories examined." (See Pratt & Whitney Canada Accident/Incident Report No. 02-053)

The propellers were examined by McCauley Propellers. The inspection report stated the following:

"1. Propeller damage was a result of impact. There were no indications of any type of propeller failure prior to impact.

2. Propellers were rotating at impact and were not at or near the feather position.

3. Both propellers were being operated with power at impact. Overall impact damage found on the right propeller was more extensive than damage found on the left propeller, indicating that the right propeller was being operated under conditions of higher power than the left.

However, damage indications on the left propeller are indicative of impact with power settings higher than idle." (See McCauley report dated December 4, 2002)

The pressure switches used on the left and right engines used to activate the auto-feathering system of the propellers were sent to ITT industries in Valencia, California, for functional testing. The switches used on the right engine could not be functionally tested due to fire damage.

The inspection report concerning the left pressure switches stated the following:

"No overt damage to the switches or internal components thereof from the left assembly was observed. However, the reflow condition of the connector terminals of both switches coupled with the discoloration of the brass retainers indicates the switches from this side were also exposed to excessive heat……It was determined that excessive heat exposure, beyond performance specification, can result in the observed changes in setpoint. No other conclusions regarding the aircraft accident were evident from this analysis due to the condition of the switches received." (See ITT Aerospace Controls report dated February 14, 2003)

ADDITIONAL INFORMATION

A witness, who worked for Image Air, reported he observed the pilot preflighting N12KA. He reported the pilot exited the airplane on three occasions during the preflight and went back to the empennage and manipulated the elevator up and down.

There was no record of the accident pilot reporting any airplane discrepancy to anyone prior to departing on July 21, 2002.

The operator reported he and another pilot had flown N12KA on July 19, 2002, for a total of 1.7 hours. During that flight, both pilots were given flight check rides by a Federal Aviation Administration (FAA) operations inspector. The operator reported that all preflight and flight checklists were completed, and that the airplane functioned normally.

The FAA inspector reported, "On Friday July 19, 2002, I conducted 2 proficiency checks in accordance with 14 CFR Part 135.297 to 2 airmen employed by Image Air LLC. The checks were conducted in Beechcraft King Air, N12KA. During the course of these two flight checks I did not note any discrepancies with the aircraft. Engine start and preflight system checks were normal. Flight controls and general flight characteristics were also normal. Flight time was approximately 2 hours. The aircraft was flown through a range of maneuvers consisting of stalls, steep turns, various instrument approaches, balked landings and four takeoffs and landings."

The operator reported that the airplane was refueled on July 20th with 153 gallons of fuel. The accident pilot had scheduled a flight for Saturday, July 20th, but it was cancelled. The operator

reported the airplane was put back in the hangar on Saturday afternoon. There was no record of maintenance performed on the airplane on July 20th or July 21st.

Parties to the investigation included the Federal Aviation Administration, Raytheon Aircraft Company, Pratt & Whitney Canada, and McCauley Propellers.

Pilot Information

Certificate:	Private	**Age:**	60,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:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 3 Valid Medical--w/ waivers/lim	**Last FAA Medical Exam:**	December 18, 2001
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	August 4, 2001
Flight Time:	1740 hours (Total, all aircraft), 942 hours (Total, this make and model), 40 hours (Last 90 days, all aircraft), 8 hours (Last 30 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Beech	**Registration:**	N12KA
Model/Series:	E-90	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	LW-41
Landing Gear Type:	Retractable - Tricycle	**Seats:**	7
Date/Type of Last Inspection:	June 18, 2002 AAIP	**Certified Max Gross Wt.:**	10100 lbs
Time Since Last Inspection:	14 Hrs	**Engines:**	2 Turbo prop
Airframe Total Time:	8643 Hrs at time of accident	**Engine Manufacturer:**	Pratt & Whitney Canada
ELT:	Installed, not activated	**Engine Model/Series:**	PT6A-28
Registered Owner:	Image Air	**Rated Power:**	550 Horsepower
Operator:		**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	BMI,875 ft msl	**Distance from Accident Site:**	1 Nautical Miles
Observation Time:	10:45 Local	**Direction from Accident Site:**	340°
Lowest Cloud Condition:	Clear	**Visibility**	7 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	10 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	250°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.03 inches Hg	**Temperature/Dew Point:**	33°C / 24°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	(BMI)	**Type of Flight Plan Filed:**	IFR
Destination:	Cable Union, WI (3CU)	**Type of Clearance:**	IFR
Departure Time:	10:26 Local	**Type of Airspace:**	Class D

Airport Information

Airport:	Central Illinois Regional BMI	**Runway Surface Type:**	Concrete
Airport Elevation:	875 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	20	**IFR Approach:**	None
Runway Length/Width:	7000 ft / 100 ft	**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:	1 Fatal	**Aircraft Fire:**	On-ground
Ground Injuries:	N/A	**Aircraft Explosion:**	On-ground
Total Injuries:	2 Fatal	**Latitude, Longitude:**	40.467777,-88.91278

Administrative Information

Investigator In Charge (IIC):	SILLIMAN, JIM
Additional Participating Persons:	Bill Cooley; FAA-Springfield FSDO; Springfield, IL Brian Cassidy; Raytheon Aircraft ; Wichita, KS Tom Berthe; Pratt & Whitney Canada; South Burlington, VT Tom Knopp; McCauley Propellers; Vandalia, OH
Original Publish Date:	December 30, 2003
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=55311