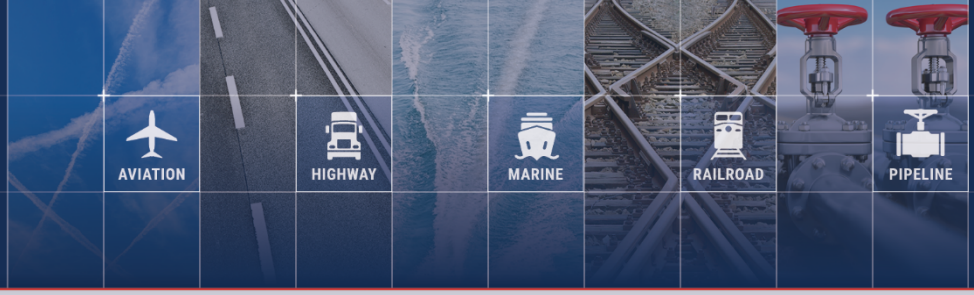

Aviation Investigation Factual Report

Location:	Winfield, West Virginia	**Accident Number:**	NYC06FA079
Date & Time:	March 17, 2006, 22:37 Local	**Registration:**	N18LL
Aircraft:	Beech 56TC	**Aircraft Damage:**	Substantial
Defining Event:		**Injuries:**	1 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Factual Information

HISTORY OF FLIGHT

On March 17, 2006, at 2237 eastern standard time, a Beech 56TC, N18LL, was substantially damaged when it impacted terrain in Winfield, West Virginia. The certificated private pilot was fatally injured. Night visual meteorological conditions prevailed for the flight that departed Dawson Community Airport (GDV), Glendive, Montana, destined for St. Paul Downtown Airport (STP), St. Paul, Minnesota. An instrument flight rules flight plan was filed for the personal flight conducted under 14 CFR Part 91.

All times listed in this report are eastern standard time.

The accident occurred on the last leg of a multiple day cross-country trip. During the multiple day trip, the pilot operated the airplane at cruise altitudes up to 27,000 feet.

Earlier on the day of the accident, the pilot flew uneventfully from Havre City Airport (HVR), Havre, Montana to GDV. The airplane was fueled before departing HVR, and again after arriving at GDV. The pilot then departed on the accident flight at 1843, for STP.

According to communications and radar data, all communications were normal until the pilot was advised by air traffic control (ATC) that he was 400 feet higher than assigned. In response he stated, "Lima Lima roger, I was just trying to look behind me and it's the first time I've ever noticed that I'm making contrails."

After receiving climb clearance from Salt Lake Air Route Traffic Control Center (ARTCC) the flight was handed off to the Minneapolis ARTCC. The pilot reported on Minneapolis Center frequency at 1858, leaving FL240 for FL270. The airplane leveled at FL270 at 1903.

At 1937, the pilot queried ATC if they heard his previous transmissions stating, "Did you hear me call in a few times?" This was the last transmission received from the pilot.

Multiple attempts to make contact with the pilot were unsuccessful, and at 1952, ATC realized that radio contact had been lost. At 2011, they began to prepare for the airplane to begin its descent for landing at STP; however, at 2027, the airplane had not started to descend, nor join the arrival course. Instead, it continued on a southeasterly heading. At 2040, the airplane overflew St. Paul and assistance was requested from the North American Aerospace Defense Command (NORAD).

At 2049, fighter airplanes "scrambled" to intercept the accident airplane. At 2055, two airliners flying over the airplane attempted to look into the cockpit, but were unsuccessful. At 2106, the

pilots of the intercepting fighter airplanes acquired the accident airplane on radar, with visual acquisition occurring at 2114. After closing with the airplane, they observed that the airplane's position lights, strobes, and rotating beacon were illuminated, and the interior lights appeared to be at a "dim setting." They also attempted to look into the cockpit, but were unable to visually observe the pilot. Multiple attempts to gain the pilot's attention by firing flares and doing an afterburner flyby were unsuccessful.

At 2146, two more fighter aircraft were "scrambled" by NORAD to relieve the original intercepting flight, which was running low on fuel. The replacement fighters began tracking the airplane at 2204, and also attempted to gain the pilot's attention by firing flares. These pilots also noted in the darkness, that the airplane's interior lights were on, but could not see the pilot or discern any movement. About 2234, the airplane began to descend, and at 2237, ATC lost radar contact with the airplane.

Witnesses who lived adjacent to the accident site reported that about 2250 they heard a "boom," similar to "a bomb exploding," outside of their residence. After stepping outside, they observed two fighter airplanes pass overhead. A short time later, an emergency medical service helicopter circled their house, landed, and then departed.

At approximately 2319 they discovered the wreckage of the airplane on a hill behind their residence.

The accident occurred during the hours of darkness. The wreckage was located at 38 degrees, 30.792 minutes north latitude, 81 degrees, 53.933 minutes west longitude.

PERSONNEL INFORMATION

The pilot held a private pilot certificate, with ratings for airplane single and multi engine land, and instrument airplane. His most recent FAA third class medical certificate was issued on September 15, 2004. According to his pilot logbooks, he had accrued 2,469 total hours of flight experience, and 757 hours in the accident airplane make and model.

AIRCRAFT INFORMATION

The aircraft was a twin-engine turbo-charged, six-place non-pressurized airplane manufactured in 1968. It came equipped from the factory with an onboard oxygen system. The airplane's most recent annual inspection was completed on March 27, 2005, and at that time had accumulated 2,670.9 total hours of operation.

METEOROLOGICAL INFORMATION

A weather observation taken about 17 minutes after the accident at Yeager Airport (CRW), Charleston, West Virginia, located about 10 nautical miles southeast of the accident site, recorded the winds as 300 degrees at 8 knots, visibility 10 miles, sky clear, temperature 39

degrees Fahrenheit, dew point 19 degrees Fahrenheit, and an altimeter setting of 30.24 inches of mercury.

WRECKAGE AND IMPACT INFORMATION

The main wreckage came to rest at an elevation of 590 feet, perpendicular to a 20-degree downslope. It was oriented on a heading of 360 degrees magnetic.

The entire wreckage was contained in a single area approximately 3 feet aft of the point of impact. No ground scarring, except for three indentations, 12 to 14 inches deep, corresponding to the positions of the propellers and nose of the airplane, were noted.

Varying degrees of impact damage were present. Compression damage and an associated crush line were visible on the right outer wing panel, and were measured at a 20-degree angle, perpendicular to the chordline. The aft fuselage section exhibited compression damage aft of the cabin on the left side, and was displaced approximately 2 degrees to the left of the cabin area.

Examination of the airplane and engines revealed no evidence of preimpact malfunction, and examination of the combustion heater revealed no evidence of leakage.

MEDICAL AND PATHOLOGICAL INFORMATION

A postmortem examination was performed on the pilot by the State of West Virginia's Office of the Chief Medical Examiner.

Toxicological testing of the pilot was conducted at the FAA Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma.

TESTS AND RESEARCH

The pilot, who was bearded, was found strapped into the left front seat of the airplane wearing an oxygen mask. A pulse oximeter was discovered laying on the ground 6 feet outboard of the left wingtip.

In addition to the installed oxygen system on the airplane, a portable oxygen system was found during the wreckage examination. A nasal cannula was connected to the airplane's oxygen system and found on the seat next to the pilot. The mask the pilot was wearing was connected to the portable oxygen system, which was found next to the pilot, on the floor of the cabin. The regulator valves of both systems were open approximately halfway, and both were depleted.

Oxygen Equipment

Testing of the airplane's installed and portable oxygen systems revealed that all of their components were functional.

According to the Baron 56TC Owner's Manual, the installed oxygen system consisted of a 114-cubic foot capacity cylinder located in the nose baggage compartment. The system had six outlets. The regulator was an altitude compensating type, which limited system operation to altitudes above 8,000 feet. Above this altitude a sensing element would increase oxygen flow to each occupant from 50 psi to 70 psi as altitude increased. When use of the oxygen was discontinued, it was "absolutely necessary" that the system be turned "OFF" by closing the control valve on the console as the orifice in the altitude compensating regulator, would not completely close off all oxygen flow and could result in depletion of the oxygen supply.

The portable oxygen system consisted of a 33-cubic foot capacity cylinder, rated for 2,216 PSI. It was not manufactured for the use of aviators breathing oxygen. It was manufactured in October of 2001 for industrial use, and was modified with the addition of an oxygen system compatible fitting. Visual inspection of the inside of the cylinder revealed light surface corrosion. Testing of the valve assembly revealed no anomalies and no restrictions to flow.

The attached non-altitude compensating regulator was manufactured in 1971. It was single stage, and the flow rate was not adjustable. It was not approved for aviation use and was manufactured for the medical industry. When tested in its found configuration, the regulator would provide 3.2 liters of oxygen per minute. Further examination revealed that an in-line restrictor orifice was installed and it was limiting the output of the regulator. After removal of the restrictor orifice, the regulator would flow in excess of 6 liters of oxygen per minute.

An adjustable flow meter was installed in the oxygen line between the restrictor orifice and the oxygen mask. The flow meter was calibrated and equipped with dual graduated scales that ran the length of the face of the meter. The left side of the meter was for use of a nasal cannula, and the scale went up to 18,000 feet. The right side of the meter was for use of an oxygen mask, and the scale went up to 25,000 feet. When tested with the restrictor orifice in place, the meter would read 22,000 feet. After removal of the restrictor orifice it read above 25,000 feet.

The oxygen mask was a dilution rebreather type. Literature found in the wreckage showed it was rated for use "at or below 30,000 feet." A search of the manufacturer's website revealed the information found in the wreckage was out of date. According to the mask manufacturer, approximately two years prior to the accident, in order to meet the intent of the altitude requirements in Technical Standard Order (TSO) C-103, they derated maximum usable altitude of the mask to 25,000 feet, even though it was designed to operate to 30,000 feet.

Pilot's Journal and Logbook

A review of an electronic journal kept by the pilot revealed he would attempt to fly "high" in an effort to get more "efficiency from the engines," and would use the oximeter to monitor his

blood oxygen levels. He stated that below 80% oxygen saturation, "I notice a degradation of my cognitive ability."

The pilot also described using a nasal cannula at altitudes exceeding 18,000 feet, and in one entry at 23,000 feet, he added that his blood oxygen level stayed "in the 90s." He stated that the oxygen mask was "more effective at getting oxygen into my lungs and blood but less comfortable and needs to be briefly pulled away for drinking or eating." He did not use oxygen at or below 12,000 feet to remain "comfortable."

According to the pilot's logbook, he had also flown up to 31,000 feet using "mask and cannula." During another flight his oxygen mask hose became disconnected, so he stuck the hose in his mouth, and continued the flight.

ADDITIONAL INFORMATION

According to 14 CFR Part 23.1447, the use of a nasal cannula was restricted to below 18,000 feet. Operations above that altitude required crewmembers to use an oxygen mask.

The oxygen duration chart in the airplane's Owner's Manual was based on a mask type no longer manufactured. No supplemental information was provided by the airplane manufacturer for other mask brands, nor was there an advisory stating the data was only valid for the type of mask supplied when the airplane was delivered.

In 1993 the FAA changed 14 CFR Part 23.1441 to require the use of demand type oxygen systems between 25,000 and 40,000 feet, but since the accident airplane was manufactured prior to this regulation it did not apply.

According to AC 61-107A-Operations of Aircraft At Altitudes Above 25,000 Feet MSL And/Or Mach Numbers (MMO) Greater Than .75, "Altitude hypoxia poses the greatest potential physiological hazard to a flight crewmember while flying in the high-altitude environment."

The advisory circular described the dangers of hypoxia, stating that, "The onset of hypoxic symptoms may seriously affect safety of flight and may well occur even in short period exposure, at altitudes from 12,000 to 15,000 feet. The ability to take corrective measures may be totally lost in 5 minutes at 22,000 feet. However, that time would be reduced to only 7 to 10 seconds at 40,000 feet and the crewmember may suffer total loss of consciousness soon thereafter."

It also stated that, "Oxygen systems should be checked periodically to ensure that there is an adequate supply of oxygen and that the system is functioning properly. This check should be performed frequently with increasing altitude. If supplemental oxygen is not available, an emergency descent to an altitude below 10,000 feet should be initiated."

It advised that, "careful flight planning is critical to safe high-altitude flight" and "oxygen

duration charts must be considered." Preflight inspections should include a thorough examination of the aircraft oxygen equipment, "including available supply," and an operational check of the system. Furthermore, "Pilots who fly at those altitudes should not have beards and moustaches because air can easily seep in through the border of the mask," and "When possible, additional oxygen should be provided to allow for emergency situations." Additionally, it advised that when using continuous flow oxygen systems above 25,000 feet "very careful attention to system capabilities is required."

Oxygen Servicing

Examination of the hangar where the airplane was stored revealed an aircraft oxygen tank and an industrial oxygen tank plumbed together, and strapped to a two-wheeled dolly. A survey of the airports that the airplane operated from during the multiple day trip, revealed no evidence the airplane's oxygen system or portable bottle had been serviced.

Pilot Information

Certificate:	Private	**Age:**	56,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):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	September 1, 2004
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	September 1, 2005
Flight Time:	2469 hours (Total, all aircraft), 757 hours (Total, this make and model), 2383 hours (Pilot In Command, all aircraft), 26 hours (Last 90 days, all aircraft), 16 hours (Last 30 days, all aircraft), 9 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Beech	**Registration:**	N18LL
Model/Series:	56TC	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	TG-65
Landing Gear Type:	Retractable - Tricycle	**Seats:**	6
Date/Type of Last Inspection:	March 1, 2005 Annual	**Certified Max Gross Wt.:**	5990 lbs
Time Since Last Inspection:	87.4 Hrs	**Engines:**	2 Reciprocating
Airframe Total Time:	2766.7 Hrs at time of accident	**Engine Manufacturer:**	Lycoming
ELT:	Installed, not activated	**Engine Model/Series:**	TIO-541-E1B4
Registered Owner:	On file	**Rated Power:**	380 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Night
Observation Facility, Elevation:	CRW,981 ft msl	**Distance from Accident Site:**	10 Nautical Miles
Observation Time:	22:54 Local	**Direction from Accident Site:**	135°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	8 knots / None	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	300°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.23 inches Hg	**Temperature/Dew Point:**	4°C / -7°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Glendive, MT (GDV)	**Type of Flight Plan Filed:**	IFR
Destination:	St. Paul, MN (STP)	**Type of Clearance:**	IFR
Departure Time:	16:43 Local	**Type of Airspace:**	

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Fatal	**Latitude, Longitude:**	38.513332,-81.898887

Administrative Information

Investigator In Charge (IIC):	Gunther, Todd
Additional Participating Persons:	John M Riggs; FAA/FSDO; Charleston, WV Timothy D Rainey; Raytheon Aircraft Company; Wichita, KS James M Childers; Textron Lycoming; Williamsport, PA
Report Date:	April 16, 2007
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=63358