Aviation Investigation Final Report

Location:	Benton Harbor, Michigan	**Accident Number:**	CHI02FA231
Date & Time:	August 4, 2002, 13:35 Local	**Registration:**	N316PM
Aircraft:	Piper PA-46-350P	**Aircraft Damage:**	Substantial
Defining Event:		**Injuries:**	3 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The single-engine airplane experienced a loss of engine power during cruise flight at flight level 190 (19,000 feet) and impacted the terrain while performing a forced landing to a nearby airport. Visual meteorological conditions prevailed at the time of the accident with clear skies and unrestricted visibilities. The pilot reported the loss of engine power about 16 minutes prior to the accident and requested clearance to the nearest airport. Air traffic control (ATC) issued vectors to the Southwest Michigan Regional Airport (BEH). About 10 minutes prior to the accident, the airplane was positioned approximately 1.3 nm north of BEH at 13,500 feet. The pilot elected to follow ATC vectors verses circling down over BEH. ATC provided vectors for runway 27 at BEH. Witnesses to the accident reported seeing the airplane "spiraling down and crashing into the ground." The wreckage was located on the extended runway 27 centerline, about 1.12 nm from the runway threshold. The distribution of the wreckage was consistent with a stall/spin accident. Approximately four minutes before the accident, the airplane was on a 9.5 nm final approach at 6,700 feet. Between 9.5 and 5.3 nm the airspeed fluctuated between 119 and 155 knots, and the descent rate varied between 1,550 and 2,600 feet/min. Between 5.3 nm and the last radar return at 1.5 nm the airspeed dropped from 155 to 78 knots. According to the Pilot Operating Handbook (POH) the accident airplane should be flown at best glide speed (92 knots) after a loss of engine power. An average engine-out descent rate of 700 feet/min is achieved when best glide speed is maintained during engine-out descents. An engine teardown inspection revealed that the crankshaft was fractured at the number five crankpin journal. Visual examination of the crankshaft (p/n 13F27738, s/n V537920968) showed a fatigue-type fracture through the cheek, aft of the number five crankpin journal. The exact cause of the crankshaft failure could not be determined, due to mechanical damage at the fatigue initiation point. The fracture features for the accident crankshaft was consistent with 14 previous failures of the same part number. The engine manufacturer determined the failures were most likely due to the overheating of the steel during the forging process.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's failure to maintain airspeed above stall speed resulting in a stall/spin. Additional causes were the pilot not maintaining best glide airspeed and optimal glidepath following the loss of engine power. A factor to the accident was the engine failure due to the fatigue failure of the crankshaft.

Findings

Occurrence #1: LOSS OF ENGINE POWER(TOTAL) - MECH FAILURE/MALF
Phase of Operation: CRUISE

Findings
1. (F) ENGINE ASSEMBLY,CRANKSHAFT - FAILURE
2. (F) ENGINE ASSEMBLY,CRANKSHAFT - FATIGUE

Occurrence #2: FORCED LANDING
Phase of Operation: EMERGENCY DESCENT/LANDING

Findings
3. (C) PROPER GLIDEPATH - NOT MAINTAINED - PILOT IN COMMAND

Occurrence #3: LOSS OF CONTROL - IN FLIGHT
Phase of Operation: APPROACH

Findings
4. (C) AIRSPEED - NOT MAINTAINED - PILOT IN COMMAND
5. STALL/SPIN - ENCOUNTERED - PILOT IN COMMAND

Occurrence #4: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: DESCENT - UNCONTROLLED

Findings
6. TERRAIN CONDITION - GROUND

Factual Information

HISTORY OF FLIGHT

On August 4, 2002, at 1335 eastern daylight time (edt), a Piper PA-46-350P, N316PM, owned and piloted by a private pilot, impacted the terrain on the extended centerline of runway 27, 1.12 nautical miles (nm) from the approach end, at the Southwest Michigan Regional Airport (BEH), Benton Harbor, Michigan. The pilot was performing a forced landing after experiencing a total loss of engine power during cruise flight. The aircraft was substantially damaged. The pilot and his two passengers were fatally injured. Visual meteorological conditions prevailed at the time of the accident. The personal flight was operating under the provisions of 14 CFR Part 91 on an instrument flight rules (IFR) flight plan. The flight departed Joe Foss Field Airport (FSD), Sioux Falls, South Dakota, at 1100 edt, and had the intended destination of Toledo Express Airport (TOL), Toledo, Ohio.

According to information provided by the Federal Aviation Administration (FAA), the pilot of N316PM contacted Sioux Falls Departure Control at 1101 and was instructed to turn on course and climb to 10,000 feet. At 1102, N316PM was told to contact Minneapolis Air Route Traffic Control Center (ARTCC) and was subsequently cleared to climb to flight level 190 (19,000 feet). At 1213, N316PM was told to contact Chicago ARTCC. At 1319, N316PM reported a loss of engine power and requested clearance to the nearest airport. Chicago ARTCC issued a descent clearance from flight level 190 to 11,000 feet. At 1321, Chicago ARTCC cleared N316PM to BEH.

At 1321:57 (hhmm:ss), Chicago ARTCC contacted South Bend Approach Control (Approach Control) and informed them of the engine failure and that N316PM was going to land at BEH. At 1322:34, Approach Control informed Chicago ARTCC that they had radar contact with N316PM. At 1324:08, N316PM established radio contact with Approach Control.

At 1324:24, the pilot of N316PM reported that he did not have BEH in sight and that he was attempting to acquire the airport on his global positioning system (GPS) receiver. At 1324:30, Approach Control replied that N316PM was "three miles northwest of [BEH]" and asked if the pilot wanted "vectors to stay there, or you want to do it on your own?" The pilot of N316PM replied "ah, why don't you just kinda ah let us, give us vectors around to [BEH] please." At 1324:40, Approach Control confirmed that he would provide radar vectors and told N316PM to turn left to a heading of 070.

At 1325:53, the pilot of N316PM told Approach Control that his rate-of-descent was 1,000 feet/min. Approach Control confirmed the transmission and told N316PM to expect runway 27 at BEH. At 1327:25, Approach Control told N316M to turn right to a heading of 140. At 1329:24, the pilot of N316PM reported descending through 8,000 feet. At 1329:31, Approach

Control told N316PM to turn right to a heading 270. At 1330:33, Approach Control told N316PM to fly heading 280.

At 1330:58, Approach Control told N316PM that the airplane was on an eight mile final for runway 27. The pilot of N316PM replied that he still did not have the airport in sight. Approach Control replied that the airport was "twelve o'clock, and ah seven miles." At 1331:43, the pilot of N316PM reported again that he had not visually acquired the airport. At 1332:39, Approach Control announced the airport was "twelve o'clock, six miles." At 1332:44, the pilot of N316PM reported having the airport in sight. At 1332:47, Approach Control inquired if the airplane had sufficient altitude to reach the airport and the pilot of N316PM replied "ah, think we'll be okay." Aircraft radar track data indicated N316PM was at approximately 3,800 feet at 1332:44.

At 1333:08, N316PM was cleared for the visual approach to runway 27 at BEH. The pilot of N316PM replied "six papa mike we're cleared for the visual Benton Harbor and we're planning on two seven, have the field in sight." At 1334:05, the pilot told Approach Control that he was changing to the local airport advisory frequency. No additional communications were received from N316PM. A transcription of the voice communications between South Bend Approach Control and N316PM is included with the docket material associated with this factual report.

Aircraft radar track data for the period before and after the reported accident time was obtained from the South Bend Approach Control and Chicago ARTCC. The obtained data indicated a single aircraft transmitting a discrete transponder beacon code (3614) maneuvering near BEH before the time of the accident. At 1325:22, the airplane was positioned about 1.3 nm north of BEH at 13,500 feet. The aircraft then traveled northeast about 5.0 nm prior to turning to the southeast. At 1327:58, the airplane was positioned about 7.0 nm northeast of BEH at 10,400 feet. The airplane continued southeast for another 5.0 nm prior to turning onto the extended runway 27 centerline.

At 1331:15, the airplane was established in-bound for runway 27 and was about 9.5 nm from the runway threshold at 6,700 feet. The airplane continued on a westerly heading for the remainder of the radar data. At 1333:32, the airplane crossed over the locator outer marker, 4.8 nm east of the runway threshold, at 2,600 feet. At 1334:28, the airplane was positioned about 2.8 nm east of the runway at 1,900 feet.

The last radar return, recorded at 1335:29, was about 1.5 nm east of the runway at 1,300 feet. The last radar position was about 0.4 nm east of the accident site. Plots of the radar track data, along with a copy of the source data, are included with the docket material associated with this factual report.

According to a local law enforcement incident report, there were five witnesses to the accident. Two of the witness reported seeing the airplane "spiraling down and crashing into the ground." The three other witnesses were driving on Territorial Road when they noticed the accident airplane traveling on a westerly heading with its propeller not rotating. The witnesses reported seeing the airplane dive towards the ground before losing sight of the airplane. The

incident report is included with the docket material associated with this factual report.

PERSONNEL INFORMATION

According to FAA records, the pilot, age 57, held a private pilot certificate with airplane single-engine land and instrument airplane ratings. FAA records show the pilot's last medical examination was completed on July 9, 2001, when he was issued a third-class medical certificate with the limitation "Holder shall possess glasses that correct for near vision."

The pilot's current flight logbook was reviewed and total flight times were calculated as of the accident flight. The pilot had a total flight experience of 2,407.8 hours, all of which were in single-engine airplanes. The pilot had logged 2,343.9 hours as pilot-in-command (PIC). The pilot had accumulated 116.8 hours in actual instrument conditions and 6.8 hours in simulated instrument conditions.

The pilot had flown 230.4 hours during the past year, 31.2 hours during the prior 90 days and 12.6 hours during previous 30 days. The accident flight was 2.6 hours in duration and was the only flight time accumulated during the previous 24 hours. The pilot's first flight in a Piper PA-46-350P was logged on September 30, 2001, and he had accumulated 164.7 hours in the PA-46-350P.

The pilot obtained simulator and flight instruction for the Piper PA-46-350P between November 6, 2001 and November 9, 2001. According to the pilot's logbook, he received 3.2 hours of instruction in the accident airplane and 9.5 hours of instruction in a PA-46-350P flight training device. The pilot received instruction on visual flight rules procedures and emergencies, as well as instrument approaches and procedures.

The pilot's last endorsement for a flight review was logged on May 18, 2000. According to regulation 14 CFR Part 61.56, a flight review or its equivalent must be obtained every 24 calendar months for a pilot to act as PIC. An endorsement must be made for a satisfactory flight review or equivalent training.

Portions of the pilot's flight records are included with the docket information associated with this factual report.

AIRCRAFT INFORMATION

The accident airplane was a Piper PA-46-350P, Malibu Mirage, serial number 4636317. The Malibu Mirage is an all-metal airplane that incorporates a semimonocoque fuselage and empennage design. The airplane is equipped with a pressurized cabin, wing flaps, spoilers, a constant speed propeller, and retractable tricycle landing gear. The airplane is configured to seat six occupants, including two cockpit positions and four cabin positions. The airplane has a certified maximum takeoff weight of 4,340 lbs.

The accident airplane was issued a standard airworthiness certificate on November 1, 2001. The accident pilot purchased the airplane on November 8, 2001. The FAA issued an aircraft registration certificate to the accident pilot on January 18, 2002. The aircraft had accumulated a total time of 187.2 hours at the time of the accident. The last maintenance performed on the accident airplane was on August 2, 2002, at 184.6 hours. This maintenance included the servicing of the hydraulic reservoir and performing a landing gear extension/retraction operational test.

The airplane was equipped with a 350 horsepower Textron Lycoming TIO-540-AE2A engine, serial number L-11015-61A. The TIO-540-AE2A is a six-cylinder, 540 cubic inch displacement, turbocharged, horizontally opposed reciprocating engine. The engine was manufactured on June 29, 2001, and was installed on the accident airplane during airframe production. The engine had accumulated a total time of 186.9 hours at the time of the accident. The last inspection of the engine was performed on May 14, 2002, at 168.9 hours total time. This inspection included an oil change and an oil sample analysis. According to the oil analysis report, the aluminum content of the submitted sample was "slightly high" and another sample should be tested at the next oil change. A review of the engine maintenance records found no history of operational problems.

The propeller was a three-bladed Hartzell HC-I3YR-1E/7890K.

Airplane history and maintenance documentation is included with the docket material associated with this factual report.

METEOROLOGICAL INFORMATION

The closest weather reporting station to the accident site was located at the Southwest Michigan Regional Airport (BEH), Benton Harbor, Michigan, about 1.12 nm west of the accident site. The airport is equipped with an Automated Surface Observing System (ASOS). The following weather conditions were reported prior to and at the time of the accident:

At 1315 edt: Wind calm, visibility unrestricted at 10 statute miles (sm), sky clear, temperature 31 degrees Celsius, dew point 22 degrees Celsius, altimeter setting 30.13 inches-of-mercury.

At 1325 edt: Wind 170 degrees true at 5 knots, visibility unrestricted at 10 sm, sky clear, temperature 31 degrees Celsius, dew point 22 degrees Celsius, altimeter setting 30.12 inches-of-mercury.

At 1335 edt: Wind variable direction at 4 knots, visibility unrestricted at 10 sm, sky clear, temperature 31 degrees Celsius, dew point 22 degrees Celsius, altimeter setting 30.12 inches-of-mercury.

COMMUNICATIONS

The pilot was communicating with the South Bend Approach Control at the time of the accident. A transcription of the voice communications between Approach Control and N316PM is included with the docket material associated with this factual report.

AERODROME INFORMATION

The Southwest Michigan Regional Airport (BEH) is located about two miles northeast of Benton Harbor, Michigan. The airport has three asphalt runways: 09/27 (5,109 feet by 100 feet), runway 13/31 (3,662 feet by 100 feet) and runway 18/36 (2,498 feet by 100 feet). The general airport elevation is listed as 643 feet mean sea level (msl).

The elevation of the runway 27 threshold is listed as 642.8 feet msl. Runway 27 also incorporates a secondary (displaced) threshold, positioned 571 feet from the approach end of the runway. Runway 27 is serviced by an instrument landing system (ILS) used for precision instrument approaches. The locator outer marker is positioned 4.8 nm from the runway threshold. A medium intensity approach lighting system precedes the runway threshold.

There are high-voltage power lines that run perpendicular to the extended runway 27 centerline. One of the tower structures is located near the extended centerline, about 1.0 nm from the runway threshold, and extends to 755 feet msl.

FLIGHT RECORDERS

The accident airplane was not equipped, nor was it required to be equipped, with a cockpit voice recorder (CVR) or flight data recorder (FDR). However, the airplane was equipped with a Flightcom DVR 300i (Digital Voice Recorder Clock). The system is voice-activated and digitally records to a five-minute continuous loop that captures all audio transmitted to the pilot's headset. The unit is to be used with a 9-volt backup battery that preserves the five-minute recording for approximately 1 to 2 months. When inspected at the accident site, the backup battery was not installed.

WRECKAGE AND IMPACT INFORMATION

The National Transportation Safety Board's on-scene investigation began on August 4, 2002.

A global positioning system (GPS) receiver was used to identify the position of the accident site as 42-degrees 07-minutes 39.4-seconds north latitude, 86-degrees 23-minutes 42.4-seconds west longitude. The aircraft impacted an established apple orchard. The wreckage was located on the extended runway 27 centerline, about 1.12 nm from the runway threshold. The main wreckage was positioned approximately 400 feet from the high-voltage power lines that run parallel to Tower Road, a north/south road. The GPS elevation of the accident site was 680 feet msl.

The wreckage was surveyed using an impulse laser unit with prism pole. The first evidence of

ground contact was about 71 feet northeast of the main wreckage in high grass/vegetation. An 18 foot swath through the high vegetation, orientated on a 260-degree magnetic heading, preceded the initial ground impact. The first ground impact occurred 40 feet northeast of the main wreckage, followed by an impact crater that contained one propeller blade. The main wreckage was located 33 feet southwest of the impact crater, orientated on a southerly heading.

The main wreckage consisted of the fuselage, empennage, left and right wings, and all flight control surfaces. The forward cockpit area was offset from the fuselage about 42 degrees left of centerline. The left wing was found separated from the fuselage and was positioned inverted, next to the left side of the fuselage. The right wing remained partially attached to the fuselage. The empennage remained attached to the fuselage. Flight control continuity was established from the individual flight control surfaces to the forward cockpit area. The landing gear, wing flaps, and spoilers were found in a fully retracted position.

The engine remained attached to the fuselage firewall by its mount assembly. The crankcase contained a crack between the right rear sump flange and the forward side of the number six cylinder deck. The crankshaft was seized. The engine was removed from the wreckage and shipped to the manufacturer for additional examination and testing. (See Engine Teardown Examination in the Test And Research section below)

MEDICAL AND PATHOLOGICAL INFORMATION

An autopsy was performed on the pilot on August 5, 2002, at the Lakeland Medical Center, St. Joseph, Michigan.

Toxicology samples for the pilot were submitted to the FAA Civil Aeromedical Institute, Oklahoma City, Oklahoma. A Forensic Toxicology Fatal Accident Report was prepared and the results were negative for all tests performed.

TESTS AND RESEARCH

Engine Teardown Examination:

The engine was examined on August 9, 2002, at the Textron-Lycoming factory located in Williamsport, Pennsylvania. The teardown inspection was supervised by National Transportation Safety Board investigators. The engine teardown revealed that the crankshaft was fractured at the number five crankpin journal. The crankshaft was submitted to the Textron-Lycoming materials laboratory for further investigation.

Visual examination of the crankshaft (p/n 13F27738, s/n V537920968) showed a fatigue-type fracture through the cheek, aft of the number five crankpin journal. Fractographic examination indicated crack propagation by a fatigue mechanism, initiated from the rear fillet radius of the number five crankpin journal. The fracture origin was identified approximately 0.040-inch

below the fillet radius surface. The origin was examined by scanning electron microscope and was found obscured by mechanical damage.

The crankshaft base metal chemistry was consistent with AMS 6414 steel, as specified by the applicable engineering drawing. Metallographic examination of the fracture origin found normal microstructures for properly heat-treated and nitrated AMS 6414 steel. Core hardness, case hardness and case depth measurements at the origin area conformed to engineering requirements. The exact cause of the crankshaft fracture could not be determined, due to the mechanical damage at the fatigue initiation point.

Glide Performance Study:

A review of the aircraft radar track data was completed to determine the glide performance for the accident flight. The primary source of the radar data was provided by the ASR-8 radar system located in South Bend, Indiana. The ASR-8 system is located approximately 25 nm south of the accident site.

The horizontal distance between the individual radar returns and the runway 27 threshold were calculated. The altitude value (feet msl) for the individual radar returns were plotted verses the calculated distance (nm) from the runway threshold. The glide profile for the accident airplane was plotted against a no-wind glide profile, as contained in the POH. In addition, glide profiles for headwind components of 10, 20, and 30 knots were plotted for comparison.

Atmospheric wind data was obtained from the White Lake, Michigan, 0800 edt upper air sounding. Surface wind data was obtained from the ASOS system located at the Southwest Michigan Regional Airport (BEH). The headwind component was calculated using the aircraft heading between two sequential radar returns and the reported wind velocity/direction. The headwind component (knots) for the individual radar returns was plotted verses the calculated distance (nm) from the runway threshold.

At 1331:15, the accident airplane was established in-bound to runway 27 and was approximately 9.5 nm from the runway threshold at 6,700 feet msl (6,057 feet above threshold elevation). According to the referenced plots, the glide range of a Piper Malibu Mirage when flown at published best glide speed with a 30 knot headwind is 9.5 nm. The aircraft's headwind component at 6,700 feet msl was approximately 25 knots.

The referenced plots indicate that the accident airplane was not on a uniform, stable, descent profile.

At 1334:28, the accident airplane was approximately 2.8 nm from the runway threshold at 1,900 feet msl (1,257 feet above threshold elevation). According to the referenced plots, the glide range for a Piper Malibu Mirage when adjusted for the recorded winds aloft exceeded the distance remaining to the runway.

The last radar return was at 1335:29, with the airplane positioned approximately 1.5 nm from the runway threshold at 1,300 feet msl (657 feet above threshold elevation). According to the referenced plots, the glide range of a Piper Malibu Mirage when flown at published best glide speed with a 10 knot headwind is approximately 1.5 nm. There were no appreciable winds at 1,300 feet msl and lower.

The accident airplane's calibrated airspeed (knots) and descent rate (feet/min) were calculated and plotted verses the distance from the runway threshold. In addition, the following Pilot Operating Handbook (POH) values were plotted for comparison: best glide speed (92 knots), stall speed with flaps and landing gear up (70 knots) and average engine-out descent rate (700 feet/min).

Approximately 9.5 nm from the runway, the airplane was traveling 119 knots and had a descent rate of 1,550 feet/min. The airspeed continued to increase to about 152 knots around 7.0 nm from the runway threshold, during which time a maximum descent rate of 2,600 feet/min was achieved. Between 7.0 and 5.3 nm the airspeed fluctuated between 145 and 155 knots, and the descent rate varied between 1,600 and 2,450 feet/min. Between 5.3 nm and the last radar return at 1.5 nm the airspeed dropped from 155 to 78 knots.

Plots of the aircraft radar track data and glide profile are included with the docket material associated with this factual report.

By definition, the best glide speed listed in a POH maximizes the ratio of lift to drag for a given airplane make/model. Flight at best glide speed will result in the maximum glide range or minimize the loss of altitude for a specific horizontal glide distance (glide angle). Flight above or below the best glide speed will produce a lift-drag ratio less than the maximum and will result in a reduction in glide performance in calm wind conditions. When the headwind or tailwind component is large in comparison to the specified glide speed (wind velocity greater than 25 percent of the glide speed) an adjustment to the listed glide speed must be made to maximize the horizontal glide distance. The glide performance section of "Aerodynamics For Naval Aviators" is included with the docket material associated with this factual report.

ADDITIONAL INFORMATION

According to Textron-Lycoming, the accident crankshaft (p/n 13F27738) was originally certified in 1965 and is installed in over 30,000 engines. The average failure rate is 3-4 failures per year for all causes. Crankshafts are not life limited, and are replaced on condition inspection. Crankshafts are inspected at engine overhaul (recommended every 1,800 to 2,000 operating hours) and the fleet average crankshaft life is between 6,000 and 10,000 hours.

The failure of the accident crankshaft (s/n V537920968) was consistent with 14 previous failures of the same part number. The FAA issued an Emergency Airworthiness Directive (AD) 2002-04-51 on February 11, 2002, which recalled 399 crankshafts installed in TIO-540 series turbocharged engines rated 300 horsepower and higher. Subsequently, Textron-Lycoming had

identified the cause of the fractures to be material related, and determined that the failures were confined to six specific heat codes forged over a 9-month period in 1999.

The accident crankshaft was outside the identified heat codes, and therefore outside the effectivity of AD 2002-04-51. On August 16, 2002, AD 2002-17-53 was issued by the FAA, which superseded the previous AD. The AD required the immediate removal from service of all crankshafts manufactured between March 1999 and March 2002 installed in 300 horsepower and higher TIO-540 series engines. AD 2002-19-03, issued on September 16, 2002, expanded the affected population to include engines that had been field modified with turbochargers, and extended the affected manufacturing period to all crankshafts forged between March 1997 and October 2002. The above referenced ADs resulted in approximately 1,600 engines being removed from service for crankshaft inspection or replacement.

The root cause for the crankshaft failures has not been determined, mainly due to mechanical damage sustained to the fracture surfaces. One crankshaft fracture contained an origin that was not damaged by mechanical smearing. This origin was examined by scanning electron microscopy and it contained a planar, grain-like structure that measured approximately 0.010-inch across. The 0.010-inch grain size is about ten times larger than the specification grain size for AMS 6414 type steel. A ductile dimpled, "honeycomb", structure was found in subsequent Charpy testing of failure crankshafts. Textron-Lycoming determined that these "honeycomb" structures are formed due to overheating of the steel during the forging process, and that their presence indicate non-homogenous material properties which have an adverse impact on fatigue strength.

Since March 2002, all p/n 13F27738 crankshafts have been press-forged using an induction heating process. The press-forging method is more automated, and includes a pyrometer check to ensure proper forging temperature. Quality assurance oversight is provided by Textron-Lycoming personnel who now are present at all forgings, and scanning electron microscope inspection of every crankshaft forging.

The NTSB Powerplant Group Chairman Factual Report and supplemental material, included with the docket material associated with this factual report, contains additional information concerning the crankshaft failure history and subsequent mitigation efforts made by the manufacturer and the FAA.

The wreckage was released to a representative of the owner on July 13, 2004.

Parties to the investigation included the FAA, Piper Aircraft, and Textron-Lycoming Engines.

Pilot Information

Certificate:	Private	**Age:**	57,Male
Airplane Rating(s):	Single-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 Valid Medical--w/ waivers/lim	**Last FAA Medical Exam:**	July 9, 2001
Occupational Pilot:	UNK	**Last Flight Review or Equivalent:**	May 18, 2000
Flight Time:	2408 hours (Total, all aircraft), 165 hours (Total, this make and model), 2344 hours (Pilot In Command, all aircraft), 31 hours (Last 90 days, all aircraft), 13 hours (Last 30 days, all aircraft), 3 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	**Registration:**	N316PM
Model/Series:	PA-46-350P	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	4636317
Landing Gear Type:	Retractable - Tricycle	**Seats:**	6
Date/Type of Last Inspection:	November 1, 2001 Annual	**Certified Max Gross Wt.:**	4340 lbs
Time Since Last Inspection:	187.2 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	187.2 Hrs at time of accident	**Engine Manufacturer:**	Textron Lycoming
ELT:	Installed, activated, did not aid in locating accident	**Engine Model/Series:**	TIO-540-AE2A
Registered Owner:	On file	**Rated Power:**	350 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	BEH,643 ft msl	**Distance from Accident Site:**	1 Nautical Miles
Observation Time:	13:35 Local	**Direction from Accident Site:**	275°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	4 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:		**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.12 inches Hg	**Temperature/Dew Point:**	31°C / 22°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Sioux Falls, SD (FSD)	**Type of Flight Plan Filed:**	IFR
Destination:	Benton Harbor, MI (BEH)	**Type of Clearance:**	IFR
Departure Time:	10:00 Local	**Type of Airspace:**	Class E

Airport Information

Airport:	Southwest Michigan Regional BEH	**Runway Surface Type:**	Asphalt
Airport Elevation:	643 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	27	**IFR Approach:**	None
Runway Length/Width:	5109 ft / 100 ft	**VFR Approach/Landing:**	Forced landing

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:	2 Fatal	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	3 Fatal	**Latitude, Longitude:**	42.127498,-86.394996

Administrative Information

Investigator In Charge (IIC):	FOX, ANDREW
Additional Participating Persons:	Robert C Koneful; Federal Aviation Administration - South Bend FSDO; South Bend, IN Gregory Erikson; Textron - Lycoming; Wayne, IL Charles Little; The New Piper Aircraft, Inc.; Chino Hills, CA Paul Lehman; The New Piper Aircraft, Inc.; Vero Beach, FL Carol Horgan; National Transportation Safety Board (NTSB); Washington, DC
Original Publish Date:	October 28, 2004
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=55428

The National Transportation Safety Board (NTSB) is an independent federal agency charged by Congress with investigating every civil aviation accident in the United States and significant events in other modes of transportation—railroad, transit, highway, marine, pipeline, and commercial space. We determine the probable causes of the accidents and events we investigate, and issue safety recommendations aimed at preventing future occurrences. In addition, we conduct transportation safety research studies and offer information and other assistance to family members and survivors for each accident or event we investigate. We also serve as the appellate authority for enforcement actions involving aviation and mariner certificates issued by the Federal Aviation Administration (FAA) and US Coast Guard, and we adjudicate appeals of civil penalty actions taken by the FAA.

The NTSB does not assign fault or blame for an accident or incident; rather, as specified by NTSB regulation, "accident/incident investigations are fact-finding proceedings with no formal issues and no adverse parties … and are not conducted for the purpose of determining the rights or liabilities of any person" (Title 49 *Code of Federal Regulations* section 831.4). Assignment of fault or legal liability is not relevant to the NTSB's statutory mission to improve transportation safety by investigating accidents and incidents and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report (Title 49 *United States Code* section 1154(b)). A factual report that may be admissible under 49 *United States Code* section 1154(b) is available here.