Aviation Investigation Final Report

Location:	Trout Creek, New York	**Accident Number:**	ERA24FA283
Date & Time:	June 30, 2024, 13:55 Local	**Registration:**	N85PG
Aircraft:	Piper PA46	**Aircraft Damage:**	Destroyed
Defining Event:	Loss of visual reference	**Injuries:**	5 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot filed an instrument flight rules (IFR) flight plan from the departure airport with an estimated time en route of 2 hours 47 minutes and a cruising altitude of 12,000 ft mean sea level (msl). The flight planning application the pilot used to file the flight plan provided weather briefing information, which included a convective SIGMET active for the time and route of flight and pilot weather reports (PIREPs) for turbulence and moderate chop; however, it could not be determined whether the pilot reviewed this information.

The flight departed about 45 minutes after the pilot's filed departure time. Flight track data and air traffic control communications showed that, about 1 minute after departing, the pilot contacted air traffic control (ATC) to obtain an IFR clearance. The controller cleared the pilot to his destination as filed, issued a climb to 10,000 ft msl, and provided a weather advisory for moderate and heavy precipitation along the route, which the pilot acknowledged. About 4 minutes later, the controller issued the pilot a climb to 12,000 ft msl, which the pilot acknowledged.

About that time, the controller began a position relief briefing with a relieving controller, which took about 2 minutes. About 2 minutes later, the new controller queried the pilot after observing that the flight had deviated left of course. The flight track data showed that, just before the query from the controller, the airplane deviated from its southwesterly ground track and began a 45-second, right 270° turn starting at an altitude of 9,800 ft msl. While in the turn, the airplane descended to an altitude of 8,700 ft msl before climbing back to an altitude of 9,800 ft msl when the airplane rolled out on an easterly ground track. About 1 minute after the query from the controller, the pilot responded, stating he had "lost" something, followed by a similar transmission 27 seconds later. This was the last transmission heard that could be attributed to the accident airplane. The airplane continued on a wavering east track for about 40 seconds, descending back down to 8,700 ft msl before climbing to 9,025 ft msl, after which the airplane entered a tight, right, descending spiral until track data was lost.

Postaccident examination of the engine and airframe found no evidence of any malfunction or failure that would have precluded normal operation of the airplane. All fracture surface and control cable separation features were consistent with overload failure. The distribution of the wreckage was consistent with an in-flight breakup of the airplane.

The pilot's recency and currency flying in actual instrument meteorological conditions (IMC) could not be determined. A pilot who had previously flown with the accident pilot reported that, during their last flight together (about 8 months before the accident), the accident pilot engaged the autopilot no later than 5,000 ft above ground level (agl) and continued to use the autopilot for nearly the entire flight. He also reported that, while en route, the pilot used a tablet computer to continue monitoring the weather, including looking at the weather radar. However, based on the accident flight's heading and altitude deviations were not consistent with the autopilot being engaged; thus, it is likely the pilot was hand-flying the airplane.

A convective SIGMET was active for the area and time of the accident. Weather radar near the time of the accident showed areas of light to heavy or extreme values of reflectivity consistent with convective activity. The cloud bases for the area were between 4,400 ft and 8,900 ft mean sea level (msl) with cloud tops between 12,500 ft and 14,500 ft msl. Based on the available weather information, the accident airplane likely entered IMC about 3 and a half minutes before the accident. Further, the accident airplane likely would have encountered moderate to severe turbulence, based on previous pilot reports and the proximity to the convective activity.

The reduced visibility, turbulence, flight without use of the autopilot, and distraction to regain the proper course would have been conducive to the development of spatial disorientation. The resulting ground track, rapid turning descent, and in-flight breakup were consistent with a loss of control as a result of spatial disorientation.

A review of the ATC services revealed that, although the controller who informed the pilot about moderate and heavy precipitation did not use standard phraseology and did not include an area of extreme precipitation, this did not contribute to the accident. Similarly, the relieving controller's use of nonstandard phraseology when providing the hazardous inflight weather advisory was not contributory.

Probable Cause and Findings

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

The pilot's loss of airplane control in flight due to spatial disorientation during a climb to cruise altitude in instrument meteorological conditions and turbulence, which resulted in the in-flight breakup of the airplane. Contributing to the accident was the pilot's continued flight into an area of known convective activity.

Findings

Personnel issues	Decision making/judgment - Pilot
Personnel issues	Weather planning - Pilot
Personnel issues	Aircraft control - Pilot
Environmental issues	Thunderstorm - Decision related to condition
Aircraft	(general) - Capability exceeded

Factual Information

History of Flight

Enroute-climb to cruise	Windshear or thunderstorm
Enroute-climb to cruise	Turbulence encounter
Enroute-climb to cruise	Loss of visual reference (Defining event)
Enroute-climb to cruise	Loss of control in flight
Enroute-climb to cruise	Part(s) separation from AC
Enroute-climb to cruise	Collision with terr/obj (non-CFIT)

On June 30, 2024, at 1355 eastern daylight time, a Piper PA-46-310P airplane, N85PG, was destroyed when it was involved in an accident near Trout Creek, New York. The private pilot and four passengers were fatally injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

The pilot filed an IFR flight plan from Albert S Nader Regional Airport (N66), Oneonta, New York, to West Virginia International Yeager Airport (CRW), Charleston, West Virginia. The flight plan indicated an en route time of 2 hours 47 minutes, the amount of fuel onboard as 5 hours 34 minutes, a cruising altitude of 12,000 ft msl, and a departure time of 1300.

A review of flight track data showed the airplane departed N66 at 1343 and was climbing on a southwesterly ground track when the pilot contacted ATC requesting an IFR clearance. A controller at the Boston Air Route Traffic Control Center (ARTCC) acknowledged, provided the pilot a discrete transponder code, and identified the airplane's location 5 miles southwest of N66. The controller then issued the pilot an IFR clearance to CRW "as filed" and issued an instruction to climb to 10,000 ft msl. The pilot acknowledged and continued to climb toward the southwest en route to LOPEZ, the first fix noted on the filed flight plan. The flight track in the climb included multiple deviations left and right of course, which continued for the duration of the flight.

At 1345, the controller reported to the pilot that there were areas of moderate to heavy precipitation off his right side that would continue for the next 30 miles and that it was "mostly clear after that." At 1349, the controller issued the pilot a climb to his filed cruising altitude of 12,000 ft msl. The pilot acknowledged and continued en route with no noticeable deviations in flight track heading until 1352.

Between 1349:55 and 1351:21, the controller who had been communicating with the pilot provided a position relief briefing to the relieving controller. (See the "Air Traffic Control Services" section for more information.)

At 1352, the airplane's flight track began a left turn from a heading of 208° to a heading of 166°. At 1353:28, the controller who had just assumed position duties queried the pilot stating, "it looks like you're deviating left for weather, and what fix do you want to go, uh, downstream to?" The pilot did not immediately respond. At 1353:22, the flight track had begun a right descending turn from a heading of 171° and altitude of 9,800 ft msl to a heading of 127° at 1354:07. During the turn, the airplane descended to its lowest altitude of 8,700 ft msl before climbing back up to 9,600 ft msl.

The controller twice more queried the flight before the pilot responded at 1354:05, stating, "yeah I lost." During this transmission, an unknown person was heard stating, "oh my god." At 1354:32, the pilot again stated, "yeah, Boston I, I, lost." This was the last discernable transmission that could be attributed to the accident flight.

The airplane then continued on an east-southeast heading with altitude deviations from 9,950 ft msl to 8,700 ft msl. At 1354:43, the airplane climbed from 8,800 ft msl to 9,025 ft msl before it began a steep right turn that tightened during the descent. The last flight track data point, at 1354:59, showed the airplane at an altitude of 6,500 ft msl. The main wreckage was located about 0.5 miles north of this data point.

A witness located east of the final portion of the flight track reported seeing the airplane going through dark clouds, then pitching up into the clouds before it "dove into a corkscrew downward." Another witness, also located east of the final portion of the flight track, reported seeing the airplane flying into the dark clouds before it pitched up and "did a backwards flip and spun."

Pilot Information

Certificate:	Private	**Age:**	76,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	Unknown
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	BasicMed With waivers/limitations	**Last FAA Medical Exam:**	April 26, 2019
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	(Estimated) 1460 hours (Total, all aircraft)		

Passenger Information

Certificate:		**Age:**	43,Female
Airplane Rating(s):		**Seat Occupied:**	Right
Other Aircraft Rating(s):		**Restraint Used:**	Unknown
Instrument Rating(s):		**Second Pilot Present:**	No
Instructor Rating(s):		**Toxicology Performed:**	
Medical Certification:		**Last FAA Medical Exam:**	
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:			

Passenger Information

Certificate:		**Age:**	42,Male
Airplane Rating(s):		**Seat Occupied:**	Unknown
Other Aircraft Rating(s):		**Restraint Used:**	Unknown
Instrument Rating(s):		**Second Pilot Present:**	No
Instructor Rating(s):		**Toxicology Performed:**	
Medical Certification:		**Last FAA Medical Exam:**	
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:			

Passenger Information

Certificate:		**Age:**	12,Male
Airplane Rating(s):		**Seat Occupied:**	Unknown
Other Aircraft Rating(s):		**Restraint Used:**	Unknown
Instrument Rating(s):		**Second Pilot Present:**	No
Instructor Rating(s):		**Toxicology Performed:**	
Medical Certification:		**Last FAA Medical Exam:**	
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:			

Passenger Information

Certificate:		**Age:**	10,Male
Airplane Rating(s):		**Seat Occupied:**	Unknown
Other Aircraft Rating(s):		**Restraint Used:**	Unknown
Instrument Rating(s):		**Second Pilot Present:**	No
Instructor Rating(s):		**Toxicology Performed:**	
Medical Certification:		**Last FAA Medical Exam:**	
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:			

The pilot held a private pilot certificate with ratings for airplane single-engine land and instrument airplane. No logbooks could be located for the pilot, therefore his recent experience operating in actual instrument meteorological conditions could not be determined.

Another pilot, a retired airline captain who had previously flown with the accident pilot, reported that the last time they flew together was in September 2023. He described that flight, stating that the accident pilot was prudent with his checking of the weather both en route and at the destination and that he had performed a thorough preflight inspection. He stated that the accident pilot used the autopilot once airborne, engaging it “no later than 5,000 [ft agl]” and continued to use the autopilot for nearly the entire flight. He also reported that, while en route, the pilot used a tablet computer to continue monitoring the weather, which included looking at the weather radar.

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	**Registration:**	N85PG
Model/Series:	PA46 310P	**Aircraft Category:**	Airplane
Year of Manufacture:	1985	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	46-8508066
Landing Gear Type:	Retractable - Tricycle	**Seats:**	6
Date/Type of Last Inspection:	June 24, 2024 Annual	**Certified Max Gross Wt.:**	4100 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	6024.5 Hrs as of last inspection	**Engine Manufacturer:**	CONTINENTAL AEROSPACE TECHNOLOGIES
ELT:	C91A installed, activated, did not aid in locating accident	**Engine Model/Series:**	TSIO-550-C
Registered Owner:	On file	**Rated Power:**	310 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:	OIC,1024 ft msl	**Distance from Accident Site:**	26 Nautical Miles
Observation Time:	13:55 Local	**Direction from Accident Site:**	327°
Lowest Cloud Condition:		**Visibility**	5 miles
Lowest Ceiling:	Broken / 6500 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	5 knots / None	**Turbulence Type Forecast/Actual:**	Convective / Convective
Wind Direction:	290°	**Turbulence Severity Forecast/Actual:**	Severe / Severe
Altimeter Setting:	29.9 inches Hg	**Temperature/Dew Point:**	26.7°C / 18.3°C
Precipitation and Obscuration:	Light - None - Haze		
Departure Point:	Oneonta, NY (N66)	**Type of Flight Plan Filed:**	IFR
Destination:	Charleston, WV (CRW)	**Type of Clearance:**	IFR
Departure Time:	13:42 Local	**Type of Airspace:**	Class E

Pilot's Preflight Weather Briefing

A representative from ForeFlight, the application the pilot used to file his flight plan, reported that the pilot received a weather briefing that was generated as part of ForeFlight's services but that there was no way to determine which briefing items the pilot had viewed.

A review of the briefing information the pilot received showed that it was generated at 1146 and included both a graphical depiction and textual description of convective SIGMET 90E, which was active for the time and route of flight (including the accident area). (Any Convective SIGMET implies severe or greater turbulence, severe icing, and low-level wind shear.) The briefing also included two PIREPs given near the accident area. One PIREP, which was submitted at 1044 by the crew of an Embraer E170 at 17,000 ft msl just east of the departure airport, reported turbulence of moderate chop. The other PIREP, which was submitted at 1035 by the crew of a Canada Regional Jet CRJ900 at 7,000 ft msl northwest of the departure airport, reported turbulence of moderate chop and included the remarks, "turb[ulence] in clouds, smooth in clear air."

Investigative Review of Meteorological Information

According to weather surveillance radar, when overlayed on the accident flight track, the accident occurred in a region characterized by light to heavy or extreme values of reflectivity.

Archived data from the Federal Aviation Administration's Corridor Integrated Weather System (CIWS) for the accident region at 1355 indicated that the area of reflectivity that was coincident with the accident location generally had echo tops around 15,000 ft msl, with maximum echo top values identified as 20,000 ft msl.

A High-Resolution Rapid Refresh (HRRR) model sounding for near the accident site at 1400 using an elevation of about 1,800 ft was retrieved from the National Oceanic and Atmospheric Administration's Air Resources Laboratory and analyzed by the RAwinsonde OBservation (RAOB) program. Broken or overcast clouds were identified by RAOB from about 4,400 through 8,900 ft msl with few clouds above that to roughly 12,500 ft msl. The freezing level was about 14,700 ft msl. Moderate clear air turbulence was identified between about 6,200 and 8,400 ft msl.

Geostationary Operational Environmental Satellite-16 visible and infrared data were obtained from an archive at the Space Science Engineering Center at the University of Wisconsin-Madison. The visible imagery depicted clouds over the accident region. Brightness temperatures of the underlying opaque cloud close to the accident location, not potentially contaminated by higher thin cloud, was closer to 273 Kelvin (0°C), which, when considering the 1400 HRRR sounding, corresponded to cloud top heights between roughly 12,500 and 14,500 ft msl.

At 1255, Convective SIGMET 03E was issued for an area that included the accident location. The Convective SIGMET warned of an area of severe thunderstorms with tops to flight level 450, hail to 1.5 inches, and surface wind gusts to 65 kts possible. The convective SIGMET polygon was moving from 270° at 20 kts.

Two longline disseminated PIREPs were reported within 25 miles of the accident location within 30 minutes of the accident time. One PIREP submitted at 1330 by the pilot of a Bellanca Viking at 4,000 ft msl reported a broken ceiling at 4,000 ft and moderate chop. The other PIREP submitted at 1405 by the pilot of a Dassault Falcon at 9,000 ft msl reported updrafts.

Air Traffic Control Services

As stated in the "History of Flight" section, the accident pilot received ATC services from the Boston ARTCC. From the pilot's initial contact to the time of the accident, the pilot was first in contact with an initial and then a relieving controller at the ZBW Delancy sector radar position (R24). At the time of the accident, on-the-job training was being conducted at the R24 position. According to the operational supervisor, the area's complexity and volume was higher than normal.

A review of ATC services by an NTSB ATC specialist revealed that the weather advisory the initial controller provided to the pilot at 1345:36 (during which the controller described "moderate and heavy precipitation off your right side for the next…30 miles") did not include depicted extreme precipitation and did not include required phraseology. For example, per FAA Order JO 7110.65AA, paragraph 2-6-4, controllers issuing pertinent observed weather information to potentially affected aircraft should "define the area of coverage in terms of azimuth (by referring to 12-hour clock) and distance from the aircraft and/or the general width of the area and the area of coverage in terms of fixes or distance and direction from fixes."

Between 1349:55 and 1351:21 (about 3 minutes before the last known communication from the accident flight), the R24 initial controller provided a changeover briefing to the relieving controller. During the time of the controllers' briefing, the accident pilot had just acknowledged his clearance to climb to his filed cruising altitude, and the flight was continuing en route with no noticeable heading deviations. The controller conducting the briefing described areas of weather to the relieving controller, stating that "it's not really that scary, the five papa golf went, uh, I mean, he just took off Oneonta and drove right through it, didn't really care," and that a different airplane had deviated around some weather.

At 1351:51, the relieving controller assumed position duties and broadcast an announcement to all aircraft on the frequency that "convective SIGMET 11E and 12E" were "valid until [1555 local time] and, uh, the New England eastern seaboard and coastal waters, more information is available on flight service frequencies." Less than 2 minutes later (and about 3 minutes before the accident), this controller first queried the accident flight.

The NTSB ATC specialist's review found, per FAA Order JO 7110.65AA, paragraph 2-6-6, controllers issuing a hazardous inflight weather advisory, including SIGMETs, should include the "specific weather phenomenon" in the advisory.

The review also found that no PIREPs were solicitated from or disseminated to the accident pilot. Per FAA Order JO 7110.65AA, paragraph 2-6-2, controllers should solicit PIREPs when

certain conditions exist or are forecast, including “thunderstorms and related phenomena” and “turbulence of moderate degree or greater.”

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:	4 Fatal	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	5 Fatal	**Latitude, Longitude:**	42.238795,-75.264537

The wreckage was dispersed over about 1.1 miles from the furthest piece found to the main wreckage site (see figure). The main wreckage consisted of the fuselage, engine, left wing and left flight control surfaces, and root of the right wing, including the right main landing gear. The main wreckage, was oriented on a 041° magnetic heading at an elevation of 1,932 ft msl in dense tree cover. There was no obvious flightpath or tree damage, which is consistent with a near-vertical impact.

The fuselage was found lying on its right side and partially buried in the ground at the base of several large trees. The cabin top had been cut and portions removed by first responders. The upper half of the cabin door and the emergency exit door were located adjacent to the fuselage, along with some of the cabin seats and cushions, and a number of interior trim panels. Portions of the flight control cables were visible through fractures in the lower fuselage skin, but the continuity from the wing spar to the cockpit controls could not be confirmed due to the extensive crushing of the fuselage.

The vertical stabilizer was found separated from the tailcone and located in the debris field about 5,800 ft from the fuselage, and the rudder was found separated from its hinges and located about 5,920 ft from the fuselage. The horizontal stabilizer, elevator, and trim tab were located in the debris field about 4,500 ft from the fuselage. The elevator remained attached to the horizontal stabilizer, and the elevator trim tab remained attached to the elevator. The left wing remained partially attached to the fuselage by the forward wing attach fitting. The left aileron and flap were separated from the wing and located in the debris field adjacent to the left wing and fuselage. The right wing outboard of the landing gear was found separated chordwise and located in the debris field about 3,600 ft from the fuselage. The right aileron and flap were also found separated from the wing and located in the debris field about 4,500 ft and 5,700 ft from the fuselage, respectively.

Control cable continuity to the elevator and rudder was confirmed from just aft of the main wing spar center section to their terminations in the tailcone. The left aileron drive cable was found separated from the sector and was continuous to the center section of the fuselage. The

balance cable remained attached to the left sector and was found separated at the side of the fuselage, and the separated cable strands exhibited a “broomstrawed” appearance, consistent with failure under overload. The right aileron drive cable remained attached to the sector and was continuous to a separation at the wing root. The separated cable strands also exhibited a “broomstrawed” appearance, consistent with failure under overload. The right side of the balance cable was found separated from the sector and was continuous from the left side of the fuselage to the swaged ball on the sector end of the cable. All fracture surfaces were consistent with overload failure.

The face of the vertical speed indicator was located, and a slap mark was observed in the area indicating a 4,000 ft-per-minute rate of descent. The gyros from the attitude indicator and electric turn coordinator were removed and examined. The electric gyro exhibited rotational scoring on both the gyro and the housing. The vacuum gyro in the attitude indicator exhibited rotational scoring on both the gyro and the housing.

The engine was found on its right side buried about 3 ft in the ground and remained attached to the fuselage. The Nos. 1, 3, and 5 cylinder heads and a majority of components on the right side of the engine exhibited severe impact damage. Both magnetos remained attached to the engine at all attachment points, and, after removal for examination, both sparked on all towers when rotated by hand and with an electric drill.

The left Nos. 2, 4, and 6 bottom spark plugs were removed and exhibited normal wear. The fuel manifold valve remained attached to the top of the engine, and the lines from the manifold valve to the Nos. 1, 3, and 5 cylinders were impact-separated from their injector nozzles. The Nos. 2, 4, and 6 fuel lines from the fuel manifold valve to the injectors remained attached and tight. Both vacuum pumps on the engine exhibited some impact marks on their cases. The drive couplings for both vacuum pumps were intact. The vacuum pumps were disassembled for examination, and the rotors and vanes were found to be intact inside each of the vacuum pumps.

Medical and Pathological Information

The New York (Delaware County) Medical Examiner ruled the cause of death for the pilot as multiple blunt force injuries and the manner of death for the pilot as accident.

The FAA Forensic Sciences Laboratory performed toxicological testing of postmortem specimens from the pilot. Losartan was detected in liver and muscle tissue. Losartan (Cozaar) is an ACE-II inhibitor-type antihypertensive used to treat high blood pressure and is acceptable for pilots.

Additional Information

Spatial Disorientation

In December 2014, the *FAA Safety Briefing* publication team produced a "Spatial Disorientation" information and resources document as part of the General Aviation Joint Steering Committee (now known as the General Aviation Joint Safety Committee) Safety Enhancement Topic (SE 34). The document stated, in part, the following:

"Instrument and VFR pilots are subject to spatial disorientation and optical illusions that may cause loss of aircraft control…. Sight, supported by other senses, allows a pilot to maintain orientation while flying. However, when visibility is restricted (i.e., no visual reference to the horizon or surface detected) the body's supporting senses can conflict with what is seen. When this spatial disorientation occurs, sensory conflicts and optical illusions often make it difficult for a pilot to tell which way is up.

Contributing to this phenomena are the various types of sensory stimuli: visual, vestibular (organs of equilibrium located in the inner ear), and proprioceptive (receptors located in the skin, muscles, tendons and joints). Changes in linear acceleration, angular acceleration, and gravity are detected by the vestibular system and the proprioceptive receptors and then compared in the brain with visual information.

In a flight environment, these stimuli can vary in magnitude, direction, and frequency, resulting in a 'sensory mismatch' that can produce illusions and lead to spatial disorientation."

According to FAA publication AM-400-00/1 (rev. 2/11), "Spatial Disorientation, Visual Illusions," spatial orientation refers to "our natural ability to maintain our body orientation and/or posture in relation to the surrounding environment at rest and during motion. Genetically speaking, humans are designed to maintain spatial orientation on the ground. The flight environment is hostile and unfamiliar to the human body; it creates sensory conflicts and illusions that make spatial orientation difficult, and, in some cases, even impossible to achieve. Statistics show that between 5 to 10% of all general aviation accidents can be attributed to spatial disorientation, and 90% of these accidents are fatal.

Spatial orientation in flight is sometimes difficult to achieve because the various types of sensory stimuli (visual, vestibular, and proprioceptive) vary in magnitude, direction, and frequency. Any differences or discrepancies between visual, vestibular, and proprioceptive

sensory inputs result in a “sensory mismatch” that can produce illusions and lead to spatial disorientation.

The flight attitude of an airplane is generally determined by the pilot’s visual reference to the natural horizon. When the natural horizon is obscured, attitude can sometimes be maintained by visual reference to the surface below. If neither horizon nor surface visual references exist, the airplane’s attitude can only be determined by artificial means such as an attitude indicator or other flight instruments. Surface references or the natural horizon may at times become obscured by smoke, fog, smog, haze, dust, ice particles, or other phenomena, although visibility may be above VFR minimums.”

Preventing Similar Accidents

Reduced Visual References Require Vigilance (SA-020)

The Problem

About two-thirds of general aviation accidents that occur in reduced visibility weather conditions are fatal. The accidents can involve pilot spatial disorientation or controlled flight into terrain. Even in visual weather conditions, flights at night over areas with limited ground lighting (which provides few visual ground references) can be challenging.

What can you do?

- Obtain an official preflight weather briefing, and use all appropriate sources of weather information to make timely in-flight decisions. Other weather sources and in-cockpit weather equipment can supplement official information.
- Refuse to allow external pressures, such as the desire to save time or money or the fear of disappointing passengers, to influence you to attempt or continue a flight in conditions in which you are not comfortable.
- Be honest with yourself about your skill limitations. Plan ahead with cancellation or diversion alternatives. Brief passengers about the alternatives before the flight.
- Seek training to ensure that you are proficient and fully understand the features and limitations of the equipment in your aircraft, particularly how to use all features of the avionics, autopilot systems, and weather information resources.
- Don’t allow a situation to become dangerous before deciding to act. Be honest with air traffic controllers about your situation, and explain it to them if you need help.
- Remember that, when flying at night, even visual weather conditions can be challenging. Remote areas with limited ground lighting provide limited visual references cues for

pilots, which can be disorienting or render rising terrain visually imperceptible. When planning a night VFR flight, use topographic references to familiarize yourself with surrounding terrain. Consider following instrument procedures if you are instrument rated or avoiding areas with limited ground lighting (such as remote or mountainous areas) if you are not.
- Manage distractions: Many accidents result when a pilot is distracted momentarily from the primary task of flying.

See https://www.ntsb.gov/Advocacy/safety-alerts/Documents/SA-020.pdf for additional resources.

The NTSB presents this information to prevent recurrence of similar accidents. Note that this should not be considered guidance from the regulator, nor does this supersede existing FAA Regulations (FARs).

Administrative Information

Investigator In Charge (IIC):	Young, Joshua
Additional Participating Persons:	Christopher Coleman; FAA/FSDO; Albany, NY Jon Hirsch; Piper Aircraft Inc.; Vero Beach, FL
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