Aviation Investigation Final Report

Location:	Woodbranch, Texas	**Accident Number:**	CEN21FA026
Date & Time:	October 25, 2020, 08:37 Local	**Registration:**	N26136
Aircraft:	Grumman AA5	**Aircraft Damage:**	Destroyed
Defining Event:	Loss of control in flight	**Injuries:**	2 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot and passenger took off on a cross-country flight. Air Traffic Control (ATC) and Automatic Dependent Surveillance-Broadcast (ADS-B) data showed that the pilot made a normal takeoff and climb to the south, and subsequent turn to the east. As the airplane climbed through 1,600 ft, the pilot established communications with the ATC controller and requested an IFR clearance to his destination airport. The ATC controller asked if they could maintain their own terrain and obstruction clearance until leaving 1,700 ft, to which the pilot responded in the affirmative. The ATC controller then cleared the pilot to his destination via radar vectors and instructed him to climb to 3,000 ft and fly a heading of 270°.

The airplane was in a left turn to a northeast heading when the ATC controller instructed the pilot to stop the turn and climb to 3,000 ft. The airplane climbed through 2,200 ft when the ATC controller advised the pilot of antennas in front of them and again instructed him to climb to 3,000 ft. However, the airplane climbed to 2,400 ft, continued to turn left, and then descended rapidly. The controller's Low Altitude Aural and Visual Alert activated as the airplane descended through 1,900 ft. The ATC controller informed the pilot of the alert, to check his altitude, and that he appeared to be in a spiraling left hand turn. He then instructed the pilot to level his wings and stop his descent. Simultaneous loss of radar and radio communications occurred with the airplane headed east. The ATC controller advised the pilot that radar contact was lost. There were no radio distress calls recorded.

A postaccident examination of the airplane, engine, and related systems revealed no mechanical anomalies that would have precluded normal operation. It is likely the pilot became disoriented when he entered instrument meteorological conditions (IMC) and subsequently failed to maintain control of the airplane.

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 control of the airplane due to spatial disorientation.

Findings

Personnel issues	Spatial disorientation - Pilot
Personnel issues	Aircraft control - Pilot
Aircraft	Directional control - Not attained/maintained
Environmental issues	Low ceiling - Contributed to outcome

Factual Information

History of Flight

Maneuvering	Loss of control in flight (Defining event)

On October 25, 2020, about 0837 central daylight time, a Grumman AA-5A airplane, N26136, was destroyed when it was involved in an accident near Woodbranch, Texas. The pilot and passenger were fatally injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

According to information provided by Air Traffic Control (ATC), the airplane took off on a cross-country flight in instrument meteorological conditions from runway 17 at the North Houston Airport (9X1) with a destination of Liberty, Texas (T78). Radar and Automatic Dependent Surveillance-Broadcast (ADS-B) data showed a normal takeoff and climb to the south and a subsequent left turn to the east. As the airplane climbed through 1,600 ft, the pilot established communications with ATC and requested an instrument flight rules (IFR) clearance to T78. The ATC controller asked if they were flying under visual flight rules at that time. The pilot replied in the affirmative. The ATC controller then asked the pilot if they could maintain their own terrain and obstruction clearance until leaving 1,700 ft, to which the pilot responded in the affirmative.

The ATC controller cleared the airplane to T78 via radar vectors and instructed the pilot to climb to 3,000 ft and fly a heading of 270°. The airplane made a left turn to a northeast heading when the controller instructed them to stop their turn and climb to 3,000 ft. The airplane climbed through 2,200 ft when the ATC controller advised the pilot of antennas in front of them and again instructed him to climb to 3,000 ft. The airplane climbed to 2,400 ft, continued a turn left, and then descended rapidly. At 0836:53, the controller's Low Altitude Aural and Visual Alert activated as the airplane descended through 1,900 ft. The ATC controller informed the pilot of the alert, to check his altitude, and that he appeared to be in a spiraling left hand turn. He then instructed the pilot to level his wings and stop his descent.

Simultaneous loss of radar and radio communications occurred with the airplane headed east. At 0837:54, the ATC controller advised the pilot that radar contact was lost. There were no radio distress calls heard from the pilot. The estimated flight path is depicted in Figures 1 and 2.

Figure 1. ADS-B Flight Track.

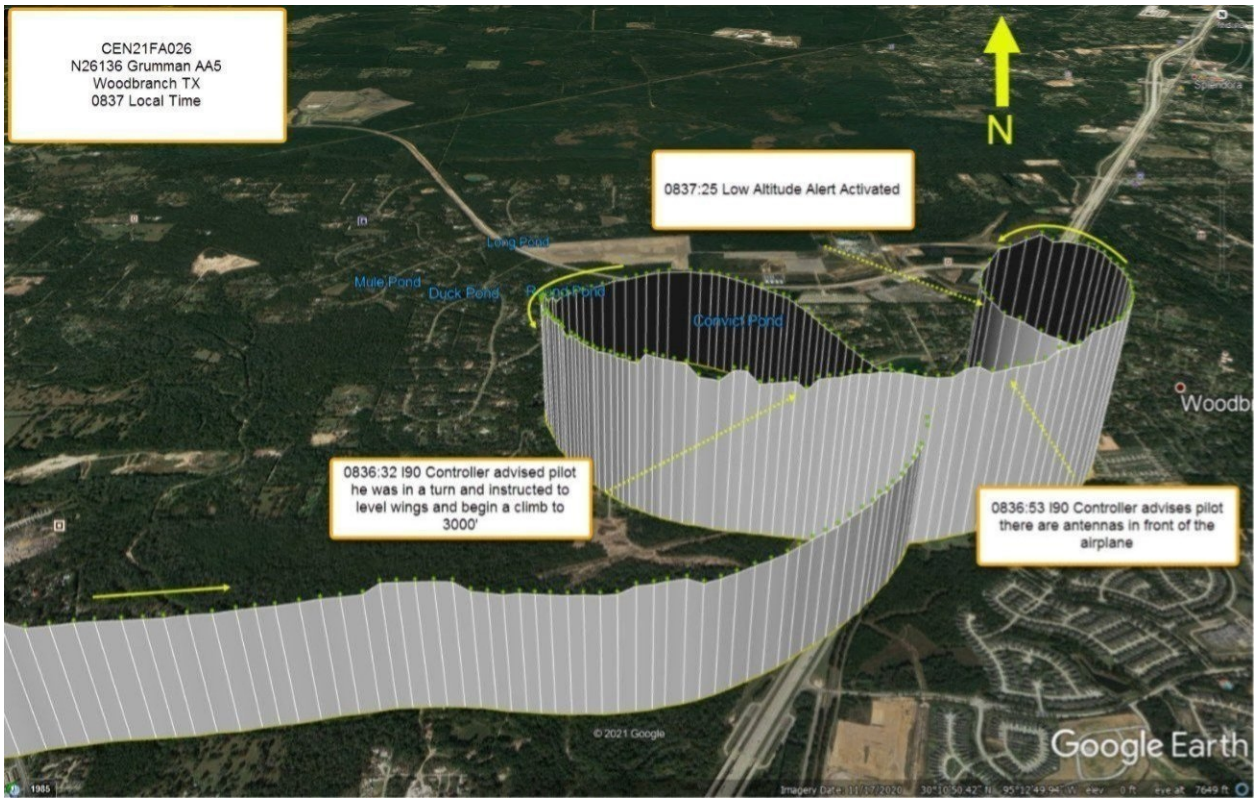

Figure 2. ADS-B Depiction of the End of the Flight Track.

Pilot Information

Certificate:	Airline transport; Commercial; Flight instructor	**Age:**	41,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	Unknown
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	Airplane single-engine	**Toxicology Performed:**	Yes
Medical Certification:	Class 1 None	**Last FAA Medical Exam:**	January 29, 2020
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	October 6, 2020
Flight Time:	(Estimated) 1650 hours (Total, all aircraft), 1065 hours (Total, this make and model), 1392 hours (Pilot In Command, all aircraft)		

Pilot-rated passenger Information

Certificate:	Student	**Age:**	46,Male
Airplane Rating(s):	None	**Seat Occupied:**	Right
Other Aircraft Rating(s):	None	**Restraint Used:**	Unknown
Instrument Rating(s):	None	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:		**Last FAA Medical Exam:**	
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:			

The pilot successfully completed a check flight for an Airline Transport Pilot certificate, single-engine land airplane rating, on October 6, 2020. The Designated Pilot Examiner (DPE) who gave the pilot his check flight reported that this was the pilot's second attempt for the certificate. The pilot failed the first attempt when he did not maintain proper course during an Instrument Landing System approach. The DPE reported that the second flight went well, the pilot met the tolerances and minimums, so the DPE passed him. Both check flights were done in the accident airplane. The pilot's logbooks were not recovered, so it was not known what the pilot's instrument currency was or when the pilot's last instrument proficiency check was conducted.

Aircraft and Owner/Operator Information

Aircraft Make:	Grumman	**Registration:**	N26136
Model/Series:	AA5 A	**Aircraft Category:**	Airplane
Year of Manufacture:	1977	**Amateur Built:**	
Airworthiness Certificate:	Normal; Utility	**Serial Number:**	AA5A0452
Landing Gear Type:	Tricycle	**Seats:**	4
Date/Type of Last Inspection:	October 5, 2020 Annual	**Certified Max Gross Wt.:**	
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	1502.8 Hrs as of last inspection	**Engine Manufacturer:**	Lycoming
ELT:	Installed	**Engine Model/Series:**	O-320-E2G
Registered Owner:	On file	**Rated Power:**	150 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument (IMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	6R3,150 ft msl	**Distance from Accident Site:**	14 Nautical Miles
Observation Time:	08:35 Local	**Direction from Accident Site:**	45°
Lowest Cloud Condition:		**Visibility**	2.5 miles
Lowest Ceiling:	Overcast / 300 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	/	**Turbulence Type Forecast/Actual:**	/
Wind Direction:		**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.01 inches Hg	**Temperature/Dew Point:**	15°C / 15°C
Precipitation and Obscuration:	Moderate - None - Mist		
Departure Point:	Porter, TX (9X1)	**Type of Flight Plan Filed:**	IFR
Destination:	Liberty, TX	**Type of Clearance:**	IFR
Departure Time:		**Type of Airspace:**	

An Automated Weather Observing System (AWOS) was located at Cleveland Municipal Airport (6R3) in Cleveland, Texas, which was located about 14 miles northeast of the accident location. At 0835, 6R3 reported 300 ft overcast ceiling, 2-1/2 mile visibility with mist, temperature and dew point 59° Fahrenheit (F), wind calm, and altimeter 30.01 in. of Mercury (HG).

The Automated Surface Observing System (ASOS) located at George Bush Intercontinental/Houston Airport (IAH) in Houston, Texas, located about 15 miles south-southwest of the accident location, at 0753 reported 800 ft overcast ceiling, 3 miles visibility with mist, temperature 63° F, dew point 59° F, wind 030° at 3 kt., and altimeter 30.00 in. HG.

The Terminal Doppler Weather Radar (TDWR) located near Houston, and approximately 24 miles west-southwest of the accident location at an elevation of 250 ft., assuming standard refraction and considering the approximate beam width of 0.55°, the 0.10° tilt would have "seen" altitudes above the accident location of between about 200 and 1,600 feet. The radar imagery at 0833 identified mostly negative values of reflectivity across the accident region.

Publicly longline-disseminated pilot reports (PIREPs) made within two hours of the accident time within 30 miles of the accident location reported cloud bases below 1,000 ft and cloud tops between 3,200 and 5,200 ft.

The Federal Aviation Administration reported that the pilot did not file a flight plan. However, after takeoff the pilot contacted ATC and tried to obtain an IFR clearance.

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:	1 Fatal	**Aircraft Fire:**	None
Ground Injuries:		**Aircraft Explosion:**	None
Total Injuries:	2 Fatal	**Latitude, Longitude:**	30.182166,-95.19281

The accident site was located in a wooded area which bordered a residential neighborhood, about 8 miles east of 9X1. A photograph of the accident scene is at Figure 3. The elevation of the accident site was about 95 ft and the terrain was predominately flat. The airplane wreckage showed evidence of a nearly vertical impact. Several trees in the immediate vicinity of the airplane's fuselage showed impact damage. One tree had a piece of airplane metal embedded in it. The airplane's engine was embedded in the ground. The forward fuselage, cabin, baggage compartment, aft fuselage, and empennage were crushed aft and fragmented. Both wings were separated from the fuselage and broken in several sections. The broken wing sections showed aft crush impact damage spanning the leading edges. The propeller was fractured torsionally at the flange and both blades showed S-bending, leading edge gouges, and chordwise scratches. A postaccident examination of the airframe, engine, and vacuum system revealed no mechanical malfunctions or failures that would have precluded normal operation. Further examination of the

attitude and heading indicators and the turn coordinator showed these instruments were functioning normally prior to the accident.

Figure 3. Accident Site. Boxes Shown Covers Sensitive Material

Medical and Pathological Information

An autopsy of the pilot was performed by the Montgomery County Forensic Services Department, Conroe, Texas. The cause of death was determined as multiple blunt force trauma.

Post-mortem toxicology testing performed by the FAA Civil Aerospace Medical Institute, Bioaeronautical Sciences Research Branch, Forensic Sciences, Oklahoma City, Oklahoma, detected Pheniramine in liver.

Pheniramine is a sedating antihistamine available over the counter in a number of oral and eye drop prescriptions for the treatment of symptoms from allergy or upper respiratory infections. There was no correlation between liver and antemortem blood levels.

An autopsy of the student pilot-passenger was performed by the Montgomery County Forensic Services Department, Conroe, Texas. The cause of death was determined as multiple blunt force injuries.

Post-mortem toxicology testing performed by the FAA Civil Aerospace Medical Institute, Bioaeronautical Sciences Research Branch, Forensic Sciences, Oklahoma City, Oklahoma, were negative for drugs and alcohol.

Additional Information

Weather-Related Accidents

The FAA Risk Management Handbook, FAA-H-8083-2, states:

Weather is the largest single cause of aviation fatalities. Most of these accidents occur to a GA operator, usually flying a light single- or twin-engine aircraft, who encounters instrument meteorological conditions (IMC) while operating under VFR. Over half the pilots involved in weather accidents did not receive an official weather briefing. Once the flight is under way, the number of pilots who receive a weather update from automated flight service station (AFSS) is dismal….

Scud running, or continued VFR flight into instrument flight rules (IFR) conditions, pushes the pilot and aircraft capabilities to the limit when the pilot tries to make visual contact with the terrain. This is one of the most dangerous things a pilot can do and illustrates how poor ADM [aeronautical decision making] links directly to a human factor that leads to an accident….

Continuing VFR into IMC often leads to spatial disorientation or collision with ground/obstacles. It is even more dangerous when the pilot is not instrument rated or current.

Spatial Disorientation

The FAA Civil Aerospace Medical Institute's publication, "Introduction to Aviation Physiology," defines spatial disorientation as a "loss of proper bearings; state of mental confusion as to position, location, or movement relative to the position of the earth." Factors contributing to spatial disorientation include changes in angular acceleration, flight in IFR conditions, frequent transfer from VFR to IFR conditions, and unperceived changes in aircraft attitude. This document states, "anytime there is low or no visual cue coming from outside of the aircraft, you are a candidate for spatial disorientation."

The FAA's Airplane Flying Handbook, FAA-H-8083-3B, describes hazards associated with flying when the ground or horizon is obscured. The handbook states in part the following:

The vestibular sense (motion sensing by the inner ear) can and will confuse the pilot. Because of inertia, the sensory areas of the inner ear cannot detect slight changes in airplane attitude, nor can they accurately sense attitude changes that occur at a uniform rate over a period of time. On the other hand, false sensations are often generated, leading the pilot to believe the attitude of the airplane has changed when, in fact, it has not. These false sensations result in the pilot experiencing spatial disorientation.

Administrative Information

Investigator In Charge (IIC):	Bowling, David
Additional Participating Persons:	Robert N. McGee; Federal Aviation Administration; Houston, TX
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Last Revision Date:	
Investigation Class:	Class 3
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=102185