Aviation Investigation Final Report

Location:	Defiance, Ohio	**Accident Number:**	CHI07FA305
Date & Time:	September 26, 2007, 10:33 Local	**Registration:**	N8341G
Aircraft:	Piper PA-32R-301T	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	1 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The airplane was in cruise flight about 7,000 feet mean sea level (msl). At 1032:27, air traffic control (ATC) instructed the pilot to descend from 7,000 feet to 3,000 feet msl, and the pilot acknowledged the descent instructions. ATC's last radar contact with the airplane was at 1032:53, and the airplane's altitude was about 6,500 feet msl. The pilot made no distress call and he did not indicate that the airplane was experiencing any mechanical difficulty. Witnesses reported hearing the airplane when it was in the clouds for about a minute with the sound of the engine getting louder and louder. When it descended out of the clouds, the airplane was in about a 45-degree nose down attitude and spinning rapidly. The oscillating engine noise grew increasingly louder as it descended, and it appeared that the airplane was missing part of one of its wings. The airplane suddenly nosed straight down and impacted the ground in a steep, nose down attitude. The left wing's fracture surfaces were consistent with an overstress fracture. The inspection of the airplane revealed no deficiencies that would have precluded normal operation. Weather radar depicted a narrow line of echoes in the vicinity of the accident site. A band of cumulus clouds was over or in the immediate vicinity of the accident site at the time of the accident with cumulonimbus type clouds to the west and southwest of the accident site. The weather radar spectrum width depicted an area of shear between 12 to 24 knots along the last known position of the accident airplane and the accident site. It indicated significant wind velocities and turbulence along the flight track.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's spatial disorientation when he encountered convective turbulence which resulted in a loss of control. This encounter resulted in an in-flight break up. Contributing to the accident was the convective turbulence in the clouds.

Findings

Occurrence #1: IN FLIGHT ENCOUNTER WITH WEATHER
Phase of Operation: DESCENT - NORMAL

Findings
1. (C) FLIGHT INTO ADVERSE WEATHER - ENCOUNTERED - PILOT IN COMMAND
2. (F) WEATHER CONDITION - TURBULENCE IN CLOUDS
3. (F) WEATHER CONDITION - TURBULENCE,CONVECTION INDUCED

Occurrence #2: LOSS OF CONTROL - IN FLIGHT
Phase of Operation: DESCENT - NORMAL

Findings
4. (C) AIRCRAFT CONTROL - NOT MAINTAINED - PILOT IN COMMAND
5. (C) SPATIAL DISORIENTATION - PILOT IN COMMAND

Occurrence #3: AIRFRAME/COMPONENT/SYSTEM FAILURE/MALFUNCTION
Phase of Operation: DESCENT - UNCONTROLLED

Findings
6. DESIGN STRESS LIMITS OF AIRCRAFT - EXCEEDED - PILOT IN COMMAND
7. WING,SPAR - FAILURE
8. WING,SPAR - OVERLOAD
9. WING,SPAR - SEPARATION

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

Findings
10. TERRAIN CONDITION - GROUND

Factual Information

HISTORY OF FLIGHT

On September 26, 2007, at 1033 eastern daylight time, a Piper PA-32R-301T, N8341G, sustained substantial damage when it impacted terrain about 7 miles west of Defiance, Ohio. The pilot, the sole occupant, received fatal injuries. The 14 Code of Federal Regulations Part 91 flight departed the Campbell Airport (C81), Grayslake, Illinois, at 0912, and was en route to Findlay Airport (FDY), Findlay, Ohio. Surface weather observations indicated that visual meteorological conditions prevailed at the time of the accident. The flight was on an instrument flight rules (IFR) flight plan.

Radar track data indicated that the airplane was in cruise flight about 7,000 feet mean sea level (msl). At 1032:27, Toledo Approach Control instructed the pilot to descend from 7,000 feet to 3,000 feet msl, and the pilot acknowledged the descent instructions at 1032:31. The Toledo Approach Control's last radar contact with the airplane was at 1032:53, and the airplane was about 6,500 feet msl. Toledo Approach Control reported that the pilot made no distress call and he did not indicate that the airplane was experiencing any mechanical difficulty.

A construction crew was installing a drainage culvert on Whetstone Road, located about 7 miles west of Defiance, Ohio, on the day of the accident. The witnesses reported that rain showers had moved through the area a few minutes prior to the accident. Low-level gray clouds were in the area all morning, with darker clouds to the east at the time of the accident. They could hear the airplane when it was in the clouds for about a minute with the sound of the engine getting louder and louder. Two of the witnesses observed the airplane when it descended out of the clouds. The airplane was traveling from the southeast to the northwest. The airplane was in about a 45-degree nose down attitude as it was descending, and the airplane was spinning rapidly. The oscillating engine noise grew increasingly louder as it descended, and it appeared that the airplane was missing part of one of its wings. The witnesses reported that the airplane suddenly nosed straight down and impacted the ground in a steep, nose down attitude.

PERSONNEL INFORMATION

The pilot was a 57-year-old private pilot with single-engine and instrument airplane ratings. He held a third-class medical certificate that was issued in December 2006. He had a total of about 1,949 hours of flight time. He completed a biennial flight review on March 4, 2007. He had flown about 52 hours in the accident airplane in the last 90 days, and 17 hours in the accident airplane in the last 30 days.

AIRCRAFT INFORMATION

The airplane was a single-engine Piper PA-32R-301T with a Lycoming 300-horsepower TIO-540-S1AD engine. The engine was overhauled on August 15, 2006, and had about 255 hours since the major overhaul at the time of the accident. The last annual maintenance inspection, conducted on August 17, 2007, indicated that the airplane had a total time of 3,720 hours. The estimated total time on the airplane at the time of the accident was about 3,747 hours.

METEOROLOGICAL INFORMATION

The National Weather Service (NWS) Surface Analysis Chart for 1100 depicted a cold front to the west of the accident site. The station models on the Surface Analysis Chart closest to the accident site depicted a cyclonic shift in the wind between Indiana and Ohio on either side of the cold front. Sky cover was broken to overcast along the route of flight, with several stations reporting visibility restriction in rain, mist, and haze. Temperatures ranged from the 50's degrees Fahrenheit (F) over Iowa and Illinois behind the cold front to the low 70's degree F across southern Indiana and Ohio ahead of the cold front.

Defiance Memorial Airport (DFI) was located approximately 5 miles northeast of the accident site. The airport was equipped with an Automated Surface Observation System (ASOS) and reported the following weather conditions surrounding the time of the accident:

DFI weather observation at 0953, automated, wind variable at 3 knots, visibility 6 miles in mist, ceiling broken at 1,000 feet, overcast at 1,400 feet, temperature 21 degrees Celsius (C), dew point temperature 19 degrees C, altimeter setting 30.01 inches of Mercury (Hg). Remarks: automated observation system, ceiling 700 variable 1,300 feet, sea level pressure 1015.7-hectopascals (hPa), temperature 21.1 degrees C, dew point 19.4 degrees C.

DFI weather observation at 1011, automated, wind variable at 3 knots, visibility 6 miles in mist, few clouds at 800 feet, ceiling broken at 1,400 feet, overcast at 2,200 feet, temperature 22 degrees C, dew point temperature 19 degrees C, altimeter setting 30.01 inches of Hg. Remarks: automated observation system.

DFI weather observation at 1053, automated, wind from 320 degrees at 9 knots, visibility 10 miles, ceiling broken at 1,000 feet, overcast at 3,600 feet, temperature 21 degrees C, dew point temperature 18 degrees C, altimeter setting 30.02 inches of Hg. Remarks: automated observation system, ceiling 900 variable 1,300 feet, sea level pressure 1016.3-hPa, temperature 20.6 degrees C, dew point 18.3 degrees C, 3-hour pressure tendency risen 0.8-hPa.

The Geostationary Operations Environmental Satellite number 12 (GOES-12) data depicted an enhanced area of clouds over northeastern and southern Ohio associated with cumulonimbus type clouds to the west and southwest of the accident site, with a general northeast-to-southwest band of low- and mid-level clouds extending over the region with the accident site

located near the leading edge of the band of mid-level clouds. The GOES-12 depicted that a band of cumulus clouds was over or in the immediate vicinity of the accident site at the time of the accident.

The closest NWS Weather Surveillance Radar-1988, Doppler (WSR-88D) was located approximately 55 miles west of the accident site. The WSR-88D base reflectivity images depicted a narrow line of echoes oriented in a northeast to southwest direction developing and moving eastward through the period. The line moved across DFI at 1019. At 1031, reflectivities of 25 to 30 decibels (dBZ) (very light - light to moderate turbulence and with possible lightning) were over the flight track of N8341G, with the maximum echoes of 45 dBZ (very strong turbulence with possible lightning) located 5 miles southwest of the accident site. The next scan at 1037, depicted the line of echoes immediately east of the accident site with an echo of 35 dBZ (light to moderate) located 1-mile east-southeast, and a cell of 50 dBZ ("intense" with severe turbulence, lightning) located approximately 3 miles south-southwest of the accident site. The images between 1031 and 1037 showed echoes of 25 to 35 dBZ or moderate intensity echoes along the flight path. At 1031, the echo over the flight track depicted reflectivities of less than 5 dBZ (weak), with the maximum echo of 40 dBZ (strong) located approximately 4 miles southwest. The WSR-88D spectrum width product at 1032:18 depicted an area of shear between 12 to 24 knots along the last know position of the accident airplane and the accident site, and it indicated significant wind velocities along the flight track.

WRECKAGE AND IMPACT INFORMATION

The airplane impacted the top edge of a drainage embankment that was between a cornfield and Whetstone Road. The airplane impacted the clay soil on a heading of about 240 degrees magnetic. The coordinates of the main wreckage site were 41 degrees 15.715 minutes north latitude and 084 degrees 28.594 minutes west longitude. The crush of the leading edges of both wings and the crush of the fuselage indicated an impact angle that was consistent with 80-degrees nose down, inverted attitude. The leading edges and main spars of both wings were crushed and bent aft. The impact of the wings created a ground scar about 8 - 12 inches deep. The front of the engine and propeller were found about four feet beneath the surface.

The outboard section of the left wing was found about 0.6 nautical miles (nm) from the main wreckage on a 133-degree magnetic bearing. The coordinates of the left wing section were 41 degrees 15.330 minutes north latitude and 084 degrees 27.915 minutes west longitude. Small pieces of the airplane were also found near the left wing section.

The airplane wreckage was removed from the field and taken to a hangar for inspection. Fuel was found pooled in the soil when the engine was extracted from the clay soil. The inspection of the engine revealed that the case halves were separated at the crankshaft flange, and the crankshaft and number 1 connecting rod and journal were exposed. The crankshaft was bent to the right about 45 degrees. The front end of the camshaft was broken off about 7.5 inches aft of the gear. The impact damage to the number 1 and 2 cylinders exposed both connecting rods. The engine could not be rotated. The dual magneto remained attached to the accessory

but was loose at the base and could be rotated. The left side magneto tower was separated. The aft side of the vacuum pump was separated and the fractured pump vanes were exposed. The remainder of the vacuum pump was removed from the engine and the shear shaft was intact. The fuel servo was fractured at its mount and the throttle and mixture settings could not be determined.

Visual inspection of the propeller revealed that blade "A" exhibited extensive leading edge gouges, blade twist to low pitch, and chordwise scratching. Blade "B" exhibited leading edge gouges near the blade tip and chordwise scratching. Blade "C" was bent forward at its mid-span and it exhibited spanwise scratching.

The fuselage was fragmented. The belly of the aircraft remained attached to the main spar box, which included the rear cabin floor, rear baggage floor and the forward cockpit floor. The instrument panel, including the tee bar, rudder pedal assemblies and the forward cabin door comprised a separate section of the wreckage. All radios and the majority of the instruments were destroyed. The control columns were separated, and all handles on the pilot and co-pilot's control yoke were broken off. The rudder pedal torque tube on the pilot's side was broken in half just outboard of the inboard pedal. The throttle quadrant was pushed forward into the instrument panel. The pilot's attitude gyro was found crushed and broken. The inspection of the gyro's rotor and rotor housing revealed rotational scoring.

The left wing separated from the main spar about 93 inches (at the upper spar cap) and 84 inches (at the lower spar cap) outboard of the wing root. The inboard section of the left wing was crushed aft starting at the wing root leading edge and continued outboard for 93 inches. This section of leading edge was crushed aft and exposed the main spar. The main spar was bent aft 30 degrees starting about 48 inches outboard of the wing root. The upper spar cap, at the fracture, was bent upwards at about a 45-degree angle. The fracture surface was clean and granular. The lower spar cap, at the fracture, was bent upward at about a 10-degree angle. That fracture surface was also clean and granular. The outboard 108 inches of the left wing was located about 0.6 nm west of the main wreckage. The outboard 108 inches of the wing broke upwards at the fracture surfaces. They were clean and granular in appearance. Aileron cable continuity was established from the aileron bell crank to the chain and sprocket assemblies in the cockpit.

The right wing remained attached to the fuselage and the main spar box. The leading edge between the wing root and the right main gear was crushed aft. Aileron cable continuity was established from the aileron bell crank to the chain and sprocket assemblies in the cockpit.

The empennage was separated from the fuselage just forward of the rear bulkhead. Elevator cable continuity was established from the balance weight forward to the tee bar assembly in the cockpit. The anti servo trim tab assembly and connecting rod remained attached to the tab and rear bulkhead. The jack screw measured 12 threads or 1 3/8 inches, which equated to a neutral to a slight nose up position. Rudder cable continuity was established between the rudder bell crank and the rudder bar assembly in the cockpit.

MEDICAL AND PATHOLOGICAL INFORMATION

An autopsy of the pilot was conducted at the Lucas County Coroner's Office, Toledo, Ohio, on September 28, 2007. The "Cause of Death" was noted as "Multiple Blunt Trama (Immediate)." A Forensic Toxicology Fatal Accident Report was prepared by the FAA Civil Aeromedical Institute. The results were negative for carbon monoxide, cyanide, and ethanol. Metoprolol was present in the kidney and liver.

The pilot's third-class medical certificate included a restriction that stated, "Not valid for any class after December 31, 2007." The pilot was required to submit to cardiovascular evaluations at 12-month intervals beginning on December 1, 2007, in order to maintain his medical certificate.

ADDITIONAL INFORMATION

The accident flight was the first leg of an "Angel Flight." Angel Flight provides free air transportation for charitable and medical needs. The pilot was en route to FDY to pick up a patient to transport him/her to a medical facility. The pilot's flight logbook indicated that the pilot had flown about 23 volunteer Angel Flights in the last 3 years.

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 With waivers/limitations	**Last FAA Medical Exam:**	December 1, 2006
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	March 1, 2007
Flight Time:	1949 hours (Total, all aircraft), 52 hours (Last 90 days, all aircraft), 17 hours (Last 30 days, all aircraft), 0 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	**Registration:**	N8341G
Model/Series:	PA-32R-301T	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	32R-8129046
Landing Gear Type:	Retractable - Tricycle	**Seats:**	6
Date/Type of Last Inspection:	August 1, 2007 Annual	**Certified Max Gross Wt.:**	3600 lbs
Time Since Last Inspection:	27 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	3720 Hrs as of last inspection	**Engine Manufacturer:**	Lycoming
ELT:	Installed, not activated	**Engine Model/Series:**	TIO-540-S1AD
Registered Owner:	Paul E. Harris	**Rated Power:**	300 Horsepower
Operator:	Paul E. Harris	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	DFI	**Distance from Accident Site:**	
Observation Time:	10:11 Local	**Direction from Accident Site:**	
Lowest Cloud Condition:		**Visibility**	6 miles
Lowest Ceiling:	Broken / 1400 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	3 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	0°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.01 inches Hg	**Temperature/Dew Point:**	22°C / 19°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Grayslake, IL (C81)	**Type of Flight Plan Filed:**	IFR
Destination:	Findlay, OH (FDY)	**Type of Clearance:**	IFR
Departure Time:	09:12 Local	**Type of Airspace:**	

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:		**Aircraft Fire:**	On-ground
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Fatal	**Latitude, Longitude:**	41.261943,-84.474723

Administrative Information

Investigator In Charge (IIC):	Silliman, James
Additional Participating Persons:	Dave Fraser; FAA Columbus FSDO; Columbus, OH Paul Lehman; Piper Aircraft Company; Vero Beach, FL
Original Publish Date:	September 26, 2008
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=66769