National Transportation Safety Board
Aviation Accident Final Report

Location:	NEW ORLEANS, LA	**Accident Number:**	FTW98FA170
Date & Time:	04/02/1998, 2232 CST	**Registration:**	N21LL
Aircraft:	Piper PA-28-235	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	3 Fatal, 1 Minor
Flight Conducted Under:	Part 91: General Aviation - Personal		

Analysis

The airplane impacted a lake following an uncontrolled descent after the pilot experienced spatial disorientation at night. The pilot was an instrument approach to runway 18R when he reported to air traffic control that he had a 'full failure;'. One minute later he reported a 'static failure,' and shortly afterwards he stated that the 'DG' was out of order. Air traffic control then lost radio and radar contact with the airplane. The controller who was tracking the airplane stated that it appeared as if the airplane was 'going around in circles,' just before it disappeared from the radar scope. A survivor was rescued from the lake the following morning and reported that the pilot tapped on the instrument 'with the blue horizon' and stated that 'this instrument is not working.' A post-accident examination of the vacuum pump, by the NTSB Materials Laboratory, revealed that the vacuum pump failed in-flight. Post accident examination of the electrically driven turn coordinator did not produce sufficient evidence to determine whether or not it was functioning at impact.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's inability to maintain control of the airplane after experiencing spatial disorientation. Factors were the total failure of the vacuum pump, fog, drizzle, and night conditions.

Findings

Occurrence #1: AIRFRAME/COMPONENT/SYSTEM FAILURE/MALFUNCTION
Phase of Operation: APPROACH

Findings
1. (C) ENGINE ACCESSORIES,VACUUM PUMP - FAILURE,TOTAL
2. FLIGHT/NAV INSTRUMENTS,ATTITUDE INDICATOR - INOPERATIVE
3. FLIGHT/NAV INSTRUMENTS,DIRECTIONAL GYRO - INOPERATIVE

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

Findings
4. WEATHER CONDITION - FOG
5. WEATHER CONDITION - DRIZZLE/MIST
6. LIGHT CONDITION - NIGHT
7. (C) AIRCRAFT CONTROL - NOT MAINTAINED - PILOT IN COMMAND
8. SPATIAL DISORIENTATION - PILOT IN COMMAND

Occurrence #3: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: DESCENT - UNCONTROLLED

Findings
9. TERRAIN CONDITION - WATER

Factual Information

HISTORY OF FLIGHT

On April 2, 1998, at 2232 central standard time, a Piper PA-28-235 single engine airplane, N21LL, was destroyed when it impacted Lake Pontchartrain during an uncontrolled descent, near New Orleans, Louisiana. The airplane was owned by Altair Aviation Inc., and operated by North American Flight Academy of Denton, Texas. The instrument rated commercial pilot and two passengers sustained fatal injuries. One passenger received minor injuries. Night instrument meteorological conditions prevailed for the Title 14 CFR Part 91 flight, for which an IFR flight plan was filed. The personal cross country flight originated from the Denton Municipal Airport, Denton, Texas, at 1855.

On April 2, 1998, at 2225, N21LL accepted a clearance from New Orleans Approach Control for the ILS runway 18R approach at the Lakefront Airport, New Orleans, Louisiana. Subsequently, at 2228, the pilot reported to New Orleans Approach Control that he had a "full failure." One minute later the pilot stated that he had a "static failure," and at 2230 he stated that his "DG" was "out of order." At 2231, New Orleans Approach Control lost radio contact with N21LL. At 2232, New Orleans Approach Control lost radar contact with N21LL. The last radar return showed the airplane at 800 feet above Lake Pontchartrain. The controller who was tracking N21LL stated that it appeared as if the airplane was "going around in circles" at the time the airplane disappeared from the radar scope. Search and rescue teams reported that the airplane came to rest on the bottom of Lake Pontchartrain, which is between 15 and 20 feet deep, in an inverted position

On April 3, 1998, approximately 1030, a survivor was rescued from the lake 3 miles from Goose Point, Lacombe, Louisiana. The survivor reported that the flight's destination was the Lakefront Airport, New Orleans, Louisiana. She stated that the flight was normal until "late" in the flight when the pilot tapped on the instrument "with the blue horizon" and stated that it was "not working."

PERSONNEL INFORMATION

The pilot held a valid second class medical certificate, dated May 23, 1997. According to the medical application he had accumulated a total of 300 flight hours. A renter information form was provided by the operator. The form was signed by the pilot in September of 1996, although the only aircraft check-out recorded on the sheet occurred on April 2, 1998. The form indicated that the pilot had accumulated a total of 202 flight hours, of which 30 hours were in complex type airplanes. Additionally, the form stated that the pilot had completed a biennial flight review in August of 1997. According to a family member the pilot had accumulated a total of approximately 450 flight hours.

On September 9, 1997, the pilot obtained a commercial pilot certificate. The certificate indicated that the pilot held single-engine land, multi-engine land, and instrument ratings. Attempts to locate the pilots flight logbook, to verify instrument and night flight time, were unsuccessful.

The surviving passenger, who was seated in the left rear seat, stated that the purpose of the flight was for her daughter to visit the Tulane University in Louisiana, where she was a prospective student. The surviving passengers daughter, who sustained fatal injuries, was seated in the right front seat. The passenger seated in the right rear seat, who sustained fatal

injuries, was an alumni of the Tulane University, and was going to accompany the mother and daughter during their tour of the university.

AIRCRAFT INFORMATION

The yellow and green, 1969 Piper PA-28-235, serial number 28-11235, underwent an annual inspection on March 4, 1998, and had accumulated a total of 3,503.32 hours at the time of the accident. The last altimeter and static check (as required by 14 CFR Part 91.411) was performed on December 8, 1997. The airplane was powered by a 235-horsepower Lycoming O-540-B4B5 engine. The engine had accumulated a total of 1,602.6 hours since major overhaul, as of March 4, 1998. Additionally, the airplane was equipped with a Hartzell model number HC-C2YK-1BF, two bladed, constant speed propeller.

The airplane was equipped with an engine driven dry air pressure vacuum pump. The vacuum pump provided power to the directional gyro (heading indicator) and the artificial horizon (attitude indicator). The vacuum pump was an Airborne model number 211CC, serial number 7J4527. According to the aircraft logbook, the pump was installed on the engine on September 27, 1982, and had accumulated a total of 1,241.5 hours at the time of the accident. Additionally, the vacuum system was not equipped with a backup power source.

METEOROLOGICAL INFORMATION

On April 2, 1998, at 1907, the pilot received a standard IFR weather briefing and filed an IFR flight plan for a flight from Denton, Texas, to the Lakefront Airport, New Orleans, Louisiana, with the Fort Worth Flight Service Station.

At 2226, a pilot, who executed the ILS runway 18R approach at the Lakefront Airport, reported that he broke out of the cloud layer while descending through 700 feet.

At 2230, a pilot, who was in the vicinity of the airport, reported that the cloud tops were "about eight [or] nine thousand [feet]."

At 2251, approximately 19 minutes after the accident occurred, the weather observation facility located at the Lakefront Airport recorded the following conditions: winds from 160 degrees at 8 knots, visibility 3 miles, light rain and mist(fog), ceiling 600 feet broken, 1500 feet overcast, temperature 73 degrees Fahrenheit and dewpoint 72 degrees Fahrenheit. The remarks portion of the sequence report stated: ceiling 500 feet variable 800 feet.

At 2253, approximately 21 minutes after the accident occurred, the weather observation facility located at the New Orleans International Airport (Moisant Field), located approximately 15 nautical miles southwest of the accident site, recorded the following conditions: winds from 160 degrees at 8 knots, visibility 2 miles, light rain and mist(fog), ceiling 600 feet broken, 1,500 feet overcast, temperature 73 degrees Fahrenheit and dewpoint 72 degrees Fahrenheit. The remarks portion of the sequence report stated: surface visibility 3 miles.

COMMUNICATIONS

The following times and accounts were extracted from an FAA certified transcript of radio communications between New Orleans Approach Control and the pilot of N21LL.

2225:03: N21LL was cleared for the ILS runway 18R approach at the Lakefront Airport. The pilot acknowledged the clearance and was then informed by the controller that the airplane which had just executed the ILS 18R approach broke out at seven hundred feet.

2228:02: The controller asked N21LL if the airplane was established on the localizer, and the pilot responded, "negative." The controller stated that the approach clearance was cancelled and instructed the pilot to fly a heading of 270 degrees and maintain an altitude of two thousand feet.

2228:20: The pilot of N21LL stated "Mam, I have a full failure at this time and I'm climbing straight up, I hope."

2229:15: The pilot of N21LL stated "I'm just trying to keep this thing straight up, I'm having a static failure."

2230:06: The pilot of N21LL stated "Turning to a heading of two seven zero degrees and my DG is out of order."

2231:25: The pilot of N21LL reported that the airplane was "crashing."

Multiple attempts by the controller at New Orleans Approach Control to contact the pilot were unsuccessful.

See the attached FAA certified radio communications transcript for additional details.

RADAR

According to radar data provided by the New Orleans Air Traffic Control Facility, the last image of the aircraft was observed at 800 feet, North 30 degrees 13.70 minutes Latitude and West 090 degrees 01.00 minutes Longitude, approximately 8 miles north of the Lakefront Airport..

See the attached FAA certified radar data for additional details.

MEDICAL AND PATHOLOGICAL INFORMATION

An autopsy was performed on the pilot on April 10, 1998, by the St. Tammany Parish Coroner's Office, located in Covington, Louisiana. Toxicological test results were negative.

WRECKAGE AND IMPACT INFORMATION

On April 3, 1998, at 0711, a wheel and small debris were recovered, by search and rescue personnel, from Lake Pontchartrain, at North 30 degrees 13.70 minutes and West 090 degrees 01.00 minutes, 8 miles north of the Lakefront Airport, New Orleans, Louisiana. On April 13, 1998, airplane was recovered from the lake and transported to a hangar at the Lakefront Airport, where an examination of the airframe and engine was conducted.

The engine cowling separated from the airframe. The cabin floor separated from the main spar of the airframe, and the remainder of the cabin area and the fuselage stayed intact. The right main landing gear was attached to the right wing structure, and the right wing remained attached to the fuselage by control cables only. The right wing (outboard section) was crushed inward from the leading edge to the center of the wing, and the right wing tip separated from the wing. The left main landing gear separated from the left wing, and the left wing separated from the fuselage. The center of the left wing was buckled upwards in the shape of a "V," and the left wing tip separated from the wing. The flaps and ailerons remained attached to their respective wings. Both flaps were in the retracted position. The left aileron cable was severed at the wing root and exhibited signs of tensile overload. The right aileron cable was severed in multiple areas and exhibited signatures of tensile overload. The empennage separated from the fuselage and remained intact. Control cables for the rudder and elevator were severed in

multiple areas and exhibited signatures of tensile overload.

The propeller remained attached to the engine, and the propeller blades remained attached to the hub. Both propeller blades were loose in the propeller hub and exhibited "S" bending.

The engine was not attached to the engine mounts, but remained attached to the firewall. The engine crankshaft was rotated and each of the six cylinders exhibited "thumb compression." Valve action and continuity to the accessory gears was confirmed. The muffler and exhaust pipes leading into the muffler were crushed. The vacuum pump, magnetos, oil filter and engine driven fuel pump were attached to the engine accessory housing assembly. The engine driven fuel pump was removed, and the pump sucked and pumped fuel when operated by hand. The vacuum pump was removed and examined at the NTSB Materials Laboratory in Washington, D.C. See the Tests and Research section of this report for additional details. The investigation did not produce any evidence that the engine was not capable of operating and producing power prior to impact.

TESTS AND RESEARCH

The vacuum pump was examined at the NTSB Materials Laboratory in Washington, D.C. The rotor pieces did not exhibit rotational scoring. One of the rotor pieces had a gouge on the vane slot surface. The internal surface of the pump body exhibited evidence of rotational scoring and had two areas where the scoring had created depressions. One of the pump vanes separated through its center and the fracture surface was smooth and had a polished appearance, "as if the two surfaces [had] been rubbing along eachother." The fracture surfaces of the other vanes and rotor parts were rough and had a matte appearance. The vacuum pump drive shaft was separated in two segments. The fracture surface of the shaft exhibited stretching of the material in one direction due to overheating, "which is indicative of torsional overstress." See the NTSB Materials Laboratory Factual Report for additional details.

The electrical driven turn coordinator was examined at the NTSB Materials Laboratory in Washington D.C. The external housing exhibited no evidence of impact damage and was not compromised. A functional test of the turn coordinator revealed that the gyro would not function due to an open circuit. Although several of the wires emanating from the circuit card were separated and exhibited evidence of either tensile overload or mechanical cutting. The internal components of the gyro assembly were not damaged, yet severe corrosion was present. Approximately 2 ounces of gray sediment was found inside the instrument. No circumferential score marks were noted. The main bearing spun freely with no binding noted. The inclinometer portion of the instrument was intact and filled with fluid. The ball moved freely during manual rotation of the instrument. Additionally, there was no evidence of "needle slap" marks. See the NTSB Materials Laboratory Factual Report for additional details.

SURVIVAL ASPECTS

The four place airplane was equipped with lap belts, but was not equipped with shoulder harnesses. The airplane was not equipped with a floatation raft. The surviving passenger stated that she does not remember how she exited the airplane, however she does recall "a force that pushed her upwards." The airplane is equipped with one cabin door exit, which is equipped with a double latch and is located at the right front seat of the airplane. No additional emergency exits were designated for this airplane. Additionally, search and rescue personnel stated that the underwater visibility was limited due to the brackish water conditions.

ADDITIONAL INFORMATION

The airplane and all components were released to the owner's representative.

Pilot Information

Certificate:	Commercial	**Age:**	25, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	Seatbelt
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 2 Valid Medical--no waivers/lim.	**Last FAA Medical Exam:**	05/23/1997
Occupational Pilot:		**Last Flight Review or Equivalent:**	
Flight Time:	300 hours (Total, all aircraft), 5 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	**Registration:**	N21LL
Model/Series:	PA-28-235 PA-28-235	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	No
Airworthiness Certificate:	Normal	**Serial Number:**	28-11235
Landing Gear Type:	Tricycle	**Seats:**	4
Date/Type of Last Inspection:	03/04/1998, 100 Hour	**Certified Max Gross Wt.:**	2900 lbs
Time Since Last Inspection:	31 Hours	**Engines:**	1 Reciprocating
Airframe Total Time:	3503 Hours	**Engine Manufacturer:**	Lycoming
ELT:	Installed, not activated	**Engine Model/Series:**	O-540-B4B5
Registered Owner:	ALTAIR AVIATION INC.	**Rated Power:**	235 hp
Operator:	NORTH AMERICAN FLIGHT ACADEMY	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument Conditions	**Condition of Light:**	Night/Dark
Observation Facility, Elevation:	NEW, 9 ft msl	**Distance from Accident Site:**	13 Nautical Miles
Observation Time:	0951 CST	**Direction from Accident Site:**	180°
Lowest Cloud Condition:	Clear / 0 ft agl	**Visibility**	3 Miles
Lowest Ceiling:	Broken / 600 ft agl	**Visibility (RVR):**	0 ft
Wind Speed/Gusts:	8 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	160°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29 inches Hg	**Temperature/Dew Point:**	23°C / 22°C
Precipitation and Obscuration:			
Departure Point:	DENTON, TX (DTO)	**Type of Flight Plan Filed:**	IFR
Destination:	LAKEFRONT, LA (NEW)	**Type of Clearance:**	IFR
Departure Time:	1855 CDT	**Type of Airspace:**	Class B

Airport Information

Airport:	LAKEFRONT AIRPORT (NEW)	**Runway Surface Type:**	Asphalt
Airport Elevation:	9 ft	**Runway Surface Condition:**	
Runway Used:	18R	**IFR Approach:**	ILS
Runway Length/Width:	6879 ft / 150 ft	**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:	2 Fatal, 1 Minor	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	3 Fatal, 1 Minor	**Latitude, Longitude:**	

Administrative Information

Investigator In Charge (IIC):	TIMOTHY A BORSON	**Report Date:**	09/28/1999
Additional Participating Persons:	JAVIER RODRIGUEZ; BATON ROUGE, LA		
Publish Date:			
Investigation Docket:	NTSB accident and incident dockets serve as permanent archival information for the NTSB's investigations. Dockets released prior to June 1, 2009 are publicly available from the NTSB's Record Management Division at pubinq@ntsb.gov, or at 800-877-6799. Dockets released after this date are available at http://dms.ntsb.gov/pubdms/.		

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The Independent Safety Board Act, as codified at 49 U.S.C. Section 1154(b), precludes the admission into evidence or use of any part of an NTSB report related to an incident or accident in a civil action for damages resulting from a matter mentioned in the report. A factual report that may be admissible under 49 U.S.C. § 1154(b) is available here.