



Aviation Investigation Final Report

Location:	Bluffton, South Carolina	Accident Number:	MIA01FA071
Date & Time:	February 4, 2001, 13:18 Local	Registration:	N88FJ
Aircraft:	Mooney M20R	Aircraft Damage:	Destroyed
Defining Event:		Injuries:	2 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The instrument-rated pilot obtained a weather brief which indicated instrument meteorological flight conditions, with cloud bases near 600 feet, and tops above 10,000 feet. Flight visibility was 0 miles in the clouds, and near 4 miles in mist below the lowest cloud base. An AIRMET for IFR conditions had been in effect for the area of the accident site. The pilot departed Savannah, Georgia during daylight hours, and about 8 minutes into the flight after he had acknowledged an Air Traffic Controller's instruction to fly heading of 080 degrees, and to maintain an altitude of 3,000 feet, the airplane was observed to turn to the left, followed by in a descending turn to the right. The airplane was last observed at 1318:38, at an altitude of 1,700 feet. It collided with high voltage utility wires, and impacted the ground spreading burning debris over a large area. A witness who was outside her house on her porch said she saw the accident airplane in a descent with one wing low as if in a turn, and it disappeared behind trees, exploding on impact. She stated that the engine sounded as if it was operating normally prior to the impact. Postcrash examination of the aircraft did not reveal any evidence of any preaccident failure or malfunction to the airframe, the flight controls, or the engine.

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 due to spatial disorientation.

Findings

Occurrence #1: LOSS OF CONTROL - IN FLIGHT

Phase of Operation: CRUISE - NORMAL

Findings

1. WEATHER CONDITION - LOW CEILING
2. (C) AIRCRAFT CONTROL - NOT MAINTAINED - PILOT IN COMMAND
3. (C) SPATIAL DISORIENTATION - PILOT IN COMMAND

Occurrence #2: IN FLIGHT COLLISION WITH OBJECT

Phase of Operation: DESCENT - UNCONTROLLED

Findings

4. OBJECT - WIRE, TRANSMISSION

Factual Information

HISTORY OF FLIGHT

On February 4, 2001, about 1318 eastern standard time, a Mooney M-20R, N88FJ, registered to FHJ Aviation Inc., and operated by a private individual, as a Title 14 CFR Part 91 personal flight, crashed in Bluffton, South Carolina. Instrument meteorological conditions prevailed, and an instrument flight rules flight plan was filed. The private-rated pilot and one passenger received fatal injuries, and the aircraft was destroyed. The flight originated from Savannah, Georgia, the same day, about 1309.

Several witnesses on highway SC170 at the time of the accident, reported not seeing the initial impact, but said that as they were in their motor vehicles on the highway, they saw a wall of fire extending about 40 feet in the air, along with scattered and burning debris. They further stated that they heard a corresponding "swooshing" sound, as a fireball of burning debris crossed the four-lane highway. One witness said that upon seeing the debris he stopped his vehicle, somehow concluding that it could only have been an aircraft that had crashed, and he went in to the wooded areas to see if he could offer any assistance. A witness who was inside his house at the time of the accident said that he heard the aircraft pass overhead, and the engine sounded as if it was operating normally, and another witness stated that she was outside the house on the porch, and she heard, as well as saw the accident aircraft, at a very low altitude prior to its impact. She said that as the aircraft was descending, one wing was low as if it was in a turn, just prior to it impacting, and bursting into flames. She said the aircraft went behind the trees, and she did not see the actual impact, but she heard it, and observed the resulting fire and rising black smoke. She also stated that the engine sounded as if it was operating normally prior to the impact.

Information obtained from the FAA showed that the pilot of N88FJ had been in radio communications contact with the Savannah North Radar Controller, and had received a clearance to turn the aircraft to a heading of 080 degrees, and to climb to and maintain 3,000 feet. At 1312, the pilot verified his altitude to be 3,000 feet, and at 1313, the radar controller coordinated with Marine Beaufort Approach Control, the next air traffic control facility along the accident aircraft's intended route of flight, to affect a radio communications handoff, as the flight progressed. At 1316:19, the pilot checked into Beaufort's airspace stating, "And Beaufort Mooney eight eight fox juliet three thousand." At 1316:22, the Marine Beaufort Approach controller responded, "Mooney eight eight foxtrot juliet Beaufort Approach Beaufort altimeter three zero one eight." At 1316:26, the pilot responded, "three zero one eight fox juliet." At 1318:18, the pilot stated, "And Beaufort Mooney eight eight foxtrot juliet", to which the Marine Beaufort controller responded two times, requesting that the pilot "...say intentions", but a reply was never received. Subsequent attempts by both Marine Beaufort Approach and Savannah North Radar controllers to reestablish communications with the pilot of N88FJ also

yielded negative results.

According to the Marine Beaufort Approach controller, radar data showed that at 1316:20, the accident airplane was on a heading of 070, at an altitude of 2,900 feet, and had a ground speed of 190 knots. At 1317:00, the heading was 070 degrees, the altitude 3,000 feet, and the ground speed 190 knots. At 1317:19, the heading was 070, the altitude 3,100 feet, the ground speed 190 knots. At 1317:30, the heading was 070, the altitude 3,000 feet, and the ground speed 190 knots. At 1317:41, the heading was 010, the altitude 2,900 feet, and the ground speed 190 knots. At 1317:45, the heading was 020, the altitude 2,800 feet, and the ground speed 190 knots. At 1317:51, the heading was 030, the altitude 2,600 feet, and the ground speed 190 knots. At 1317:57, the heading was 050, the altitude 2,300 feet, and the ground speed 180 knots. At 1318:00, the heading was 090, the altitude 2,300 feet, and the ground speed 180 knots. At 1318:07, the heading was 160, the altitude 2,400 feet, and the ground speed 160 knots. At 1318:12, the heading was 180, the altitude 2,400 feet, and the ground speed 150 knots. At 1318:18, when the pilot communicated to air traffic control, the airplane was on a heading of 190 degrees, at an altitude of 2,400 feet, and had a ground speed of 180 knots. At 1318:25, when the controller repeated the request that the pilot "say intentions", the accident airplane was on a heading of 230, at an altitude of 2,400 feet, and a ground speed of 170 knots. FAA Savannah North radar data also showed N88FJ in a descending right turn, with the last radar indication occurring at 1318:36, at an altitude of 1,700 feet. There were no further communications or radar contact with N88FJ.

N88FJ collided with high voltage utility wires, and impacted the ground in the vicinity of the intersection of highways US278 and SC170, spreading burning debris over a large area.

PERSONNEL INFORMATION

FAA records indicate that the pilot, age 54, held an FAA private pilot certificate, with an airplane single engine land rating, which had been issued on November 4, 1996. On January 15, 2000, the pilot added an airplane instrument rating. Logbooks were not obtained by the NTSB, but the pilot's application for the instrument rating, dated January 15, 2000, showed that at the time of his application for the rating, he reported having had a total of 366 flight hours, of which about 303 flight hours were in similar aircraft to the accident airplane. He also reported having had 97 hours of instrument flight experience at the time of his application for the instrument rating. The pilot's last application for an FAA third class medical certificate, issued on September 25, 2000, showed that at the time of the application he reported having 425 flight hours, of which 65 flight hours were flown in the past six months. The medical certificate had the limitation that he must have available his spectacles for near vision, and that his certificate was valid only for 12 months following the month he had been examined. The pilot attended Flight Safety International's Mooney initial flight training course, from September 9, to September 11, 1999.

AIRCRAFT INFORMATION

N88FJ, serial number 29-0192, a Mooney M-20R four-place airplane, had been manufactured and was declared airworthy on August 13, 1999. It was delivered IFR equipped and certificated, and with the accident having occurred within the 24 calendar month limitation, is considered to have had a current pitot static, altimeter, and transponder systems check. The aircraft logbooks were not obtained by the NTSB, but according to information supplied by the Henry Weber Aircraft Distributors Inc., Lilitz, Pennsylvania, where the aircraft had been first delivered to its owner upon its purchase, and also where it had been primarily serviced, the accident aircraft had accumulated about 221.6 hours. It had once been recalled to the Mooney factory in Kerrville, Texas, due to the need for its compliance with a rivet Service Bulletin, Mooney Service Bulletin No. M20-273. During the period it was at Mooney's repair facility, it had been given an annual inspection, and was returned to service on October 25, 2000. According to personnel at Henry Weber Aircraft Distributors, the aircraft had last been serviced by them on January 30, 2001, when they examined it for a reportedly rough running engine. A representative of Henry Weber's stated that they did not find any problems with the aircraft when they examined it, and at the time of its examination, its Hobbs meter read 250.9 hours.

N88FJ was equipped with a Teledyne Continental Motors IO-550G, 280 horsepower fuel injected engine, whose serial number was 679412. The aircraft was also equipped with a 3-bladed propeller, manufactured by McCauley Propeller Systems.

METEOROLOGICAL INFORMATION

The Savannah International Airport, 1253, surface weather observation, was winds from 360 degrees at 8 knots, visibility 10 statute miles, ceiling 700 feet overcast, temperature 48 degrees F, dew point temperature 45 degrees F, altimeter setting 30.20 inches Hg. The Savannah International Airport was located about 18 nautical miles, southwest of the accident site, at an elevation of 50 feet.

The Beaufort Marine Corps Air Station, 1322, surface weather observation, was winds from 360 degrees at 7 knots, visibility 4 statute miles, mist, ceilings 600 feet broken, 1,000 feet broken, 2,000, feet overcast, temperature 46 degrees F, dew point temperature 45 degrees F, altimeter setting 30.17 inches Hg.

The NTSB conducted a detailed weather analysis of weather along the accident aircraft's pertinent route of flight, and the NTSB Weather Group Chairman's report is an attachment to this report.

WRECKAGE AND IMPACT INFORMATION

The accident occurred in the Okatie Commerce Center, a business park near McGarvey's Corner, about 5 miles northwest of Hilton Head, near the town of Bluffton, in Beaufort County, South Carolina. The accident aircraft, N88FJ, initially collided with 230,000 and 115,000 Kilovolt (phase to phase) power lines, suspended about 70 feet in the air on utility poles, and which comprised a portion of the main power grid, supplying electrical power to Hilton Head,

South Carolina. The collision severed the power lines, and interrupted electrical power to communities downstream.

Examination of the impact area revealed evidence that upon colliding with the power lines the aircraft exploded and spread debris along a direction of about 110 degrees magnetic. From the point of initial impact, the main aircraft wreckage next impacted the ground a short distance away, creating a small crater, and continuing on, spreading debris across the manicured entrance to the Okatie business park, a four-lane divided highway (SC170), and the grassy and wooded areas opposite the point of initial impact, for a total distance of about 150 yards. The larger portions of the aircraft remaining among the scattered and burned debris, consisted of a 4-foot section of the left wing, a portion of the empennage, and the engine block.

All pieces of the accident aircraft showed heavy fire and/or overstress damage consistent with a high energy, high velocity impact. There was heavy fragmentation as well as a large and widely scattered debris field. In addition to the onscene examination, the debris was transported to a central point, where a detailed postaccident examination and reconstruction was performed.

Postcrash examination of the aircraft did not reveal any evidence of any preaccident failure or malfunction to the airframe, the flight controls, or the engine. The detailed examination of the aircraft wreckage revealed that all components of the aircraft which were necessary to sustain flight had been located in the vicinity of the debris field. Extensive impact and fire damage precluded verification of flight control continuity, and all control surfaces exhibited extensive damage consistent with overstress. The flap actuator measured about 2.5 inches from the edge of the flap housing to the screw, consistent with the flaps having been in the retracted position, the landing gear actuator measured about 3.75 inches from the edge of the bolt to the housing, consistent with the gear having been retracted. The elevator trim measured about 1 inch from the housing to the bolt, consistent with a nose-up condition.

The engine was found isolated in the grass, about 100 yards from the initial impact point, with all propeller blades separated at the hub, consistent with overstress from a high energy impact. The engine was free of any cowling, support brackets or fixtures, and was not affixed to the airframe. Associated accessories, to include the starter, alternator, fuel manifold, exhausts, intake, pipes, propeller governor, magnetos, oil cooler, vacuum pump, and fuel control unit, and oil pan had all separated from the engine, with all separation points exhibiting signatures consistent with overstress. The ignition harness had torn loose, and had been shredded due to impact and fire damage. The No. 6 spark plugs as well as both magnetos had also separated from the engine, and their separation points were also consistent with overstress.

The spark plugs were examined, and they displayed coloration and signatures consistent with normal operation, except for the No. 4 spark plugs which had some deposits. Both magnetos were tested, and produced a spark at their terminals. The crankshaft was bent, precluding the engine from being rotated, and a compression check was not obtained. The cylinders as well

as the pistons were removed and examined, and the examination revealed signatures and deposits consistent with normal operation. The crankcase had been intact, and it was opened and the examination revealed the presence of oil, and no unusual signatures or damage, other than impact related damage to the cam drive gear.

The fuel manifold valve with its fuel screen and diaphragm were clean and intact. Fuel injector nozzles, fuel lines, and the throttle body all exhibited impact damage. The fuel control unit had broken off, and was missing. Examination of the engine driven vacuum pump showed that the pump had incurred impact damage to the corner of the case, but when the opened its drive coupling, housing, vanes and rotor were all intact, and showed no evidence of any preaccident anomalies. When power was applied to the standby vacuum pump the motor did not operate.

The lubrication system with its oil pump, oil sump, oil pickup screen, oil filter and oil cooler showed signs of impact damage, but was otherwise intact, and exhibited signs of the presence of clean oil and good lubrication.

A representative of McCauley Propeller Systems, Vandalia, Ohio, under the supervision of an FAA inspector, conducted a detailed examination of the propeller blades and recovered pieces of the propeller hub for the NTSB. The examination revealed that the propeller was being rotated with power at impact, and that the propeller damage was a result of the impact and there were no indications of any type of propeller failure prior to the impact. The McCauley Propeller Systems report is included as an attachment to this report.

The impact and fire left only remnants of the KEA 130A Encoding Altimeter, and the KI 525A Pictorial Navigation available for examination. Although they were severely damaged, they were both sent to the manufacturer, Honeywell Aerospace Electronic Systems, Olathe, Kansas, for examination. Both the KEA 130A Encoding Altimeter, and the KI 525A Pictorial Navigation Indicator were examined for the NTSB by a Honeywell Aerospace Electronic Systems technician, under the supervision of an FAA Avionics Inspector. Both instruments were found to be too badly damaged due to impact forces, and no information was recovered. The Honeywell report is included as an attachment to the NTSB report.

MEDICAL AND PATHOLOGICAL INFORMATION

Curt Copeland, Beaufort County Coroner, Beaufort, South Carolina, was responsible for the postmortem examination of the pilot, and the autopsy was performed by Drs. Debra Curry, M.D., Kim A. Collins, M.D., and David Hurray, M.D., at Charleston Memorial Hospital, Charleston, South Carolina. According to Mr. Copeland, the cause of death is attributed to total body blunt force trauma. No findings, which could be considered causal to the accident, were reported.

The FAA Toxicology Laboratory, Oklahoma City, Oklahoma conducted toxicological studies on specimens obtained from the pilot. Tests were conducted for volatiles and drugs, and the results were negative.

ADDITIONAL INFORMATION

On February 7, 2001, the NTSB released the wreckage of N88FJ to Mr. Ralf Shey, owner/operator of the Shey Corporation, Hilton Head, South Carolina. The NTSB retained the propeller blades and the recovered portions of the propeller hub, as well as the HSI and altimeter for further evaluation. All retained parts were returned to Mr. Edmond Pottle, Aerospace Technical Specialist, Ace USA Insurance.

Pilot Information

Certificate:	Private	Age:	54,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:	September 25, 2000
Occupational Pilot:	No	Last Flight Review or Equivalent:	January 1, 2000
Flight Time:	500 hours (Total, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Mooney	Registration:	N88FJ
Model/Series:	M20R	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	
Airworthiness Certificate:	Normal	Serial Number:	29-0192
Landing Gear Type:	Retractable - Tricycle	Seats:	4
Date/Type of Last Inspection:	October 25, 2000 Annual	Certified Max Gross Wt.:	3368 lbs
Time Since Last Inspection:		Engines:	1 Reciprocating
Airframe Total Time:		Engine Manufacturer:	Teledyne Continental
ELT:	Installed, not activated	Engine Model/Series:	IO-550-G
Registered Owner:	FHJ Aviation	Rated Power:	280 Horsepower
Operator:		Operating Certificate(s) Held:	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument (IMC)	Condition of Light:	Day
Observation Facility, Elevation:	SAV,50 ft msl	Distance from Accident Site:	18 Nautical Miles
Observation Time:	12:53 Local	Direction from Accident Site:	232°
Lowest Cloud Condition:	Clear	Visibility	7 miles
Lowest Ceiling:	Overcast / 700 ft AGL	Visibility (RVR):	
Wind Speed/Gusts:	8 knots / None	Turbulence Type Forecast/Actual:	/
Wind Direction:	360°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	30.2 inches Hg	Temperature/Dew Point:	9°C / 7°C
Precipitation and Obscuration:	Light - None - Drizzle		
Departure Point:	Savannah, GA (SAV)	Type of Flight Plan Filed:	IFR
Destination:	Lumberton, NJ (N14)	Type of Clearance:	IFR
Departure Time:	13:09 Local	Type of Airspace:	Class E

Wreckage and Impact Information

Crew Injuries:	1 Fatal	Aircraft Damage:	Destroyed
Passenger Injuries:	1 Fatal	Aircraft Fire:	
Ground Injuries:	N/A	Aircraft Explosion:	
Total Injuries:	2 Fatal	Latitude, Longitude:	32.296665,-80.936668

Administrative Information

Investigator In Charge (IIC): Lovell, John

Additional Participating Persons: John V Bures; Teledyne Continental Motors; New Bern, NC
Laurin J Kaasa; FAA South Carolina FSDO; West Columbia, SC

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Investigation Class: [Class](#)

Note:

Investigation Docket: <https://data.nts.gov/Docket?ProjectID=51427>

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](#).