Aviation Investigation Final Report

Location:	NORTON, Virginia	**Accident Number:**	NYC00FA118
Date & Time:	April 21, 2000, 11:45 Local	**Registration:**	N5632H
Aircraft:	Mooney M20J	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	5 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

Prior to departure the pilot received a weather briefing, which included flight advisories for icing along his intended route of flight. The airplane was in cruise flight at 9,000 feet when the pilot reported he was 'riding in the tops of the clouds.' The pilot requested and was cleared to climb to 11,000 feet. The airplane leveled off at 9,400 feet; then began another climb, and reached a maximum altitude of 9,700 feet. Shortly thereafter, the airplane entered a steep vertical descent, and radar contact was lost. The airplane came to rest at an elevation of about 3,600 feet, in uneven, wooded terrain. Examination of the wreckage did not reveal any evidence of a mechanical failure of the airframe or engine. Satellite data obtained for the flight indicated the potential for icing in the area of the airplane's last radar return. The airplane was not approved for flight into known icing conditions. An airplane weight and balance calculation revealed that the airplane's weight was about 2,945 pounds, and the center of gravity (CG) was about 142.88 inches, at the time of the accident. According to the pilot operating handbook, the maximum certificated gross weight for the airplane was 2,740 pounds. Additionally, the CG range at the maximum certificated gross weight was about 128 to 138 inches.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's improper weather evaluation, which resulted in a loss of aircraft control. Factors in this accident were icing conditions, and aircraft loading which exceed the airplane's weight and balance limitations.

Findings

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

Findings
1. (F) WEATHER CONDITION - ICING CONDITIONS
2. (C) WEATHER EVALUATION - IMPROPER - PILOT IN COMMAND

Occurrence #2: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: DESCENT - UNCONTROLLED

Findings
3. (F) AIRCRAFT WEIGHT AND BALANCE - EXCEEDED - PILOT IN COMMAND
4. TERRAIN CONDITION - MOUNTAINOUS/HILLY
5. (C) AIRCRAFT CONTROL - NOT MAINTAINED

Factual Information

HISTORY OF FLIGHT

On April 21, 2000, about 1145 Eastern Daylight Time, a Mooney M20J, N5632H, was destroyed when it impacted terrain in Norton, Virginia. The certificated private pilot and four passengers were fatally injured. Instrument meteorological conditions prevailed and an instrument flight rules (IFR) flight plan had been filed for the flight that departed the Nashville International Airport (BNA), Nashville, Tennessee, destined for the Roanoke Regional/Woodrum Field Airport, Roanoke, Virginia. The personal flight was conducted under 14 CFR Part 91.

About 0915, the pilot received an in-person weather briefing at the BNA Flight Service Station (FSS), and filed an IFR flight plan.

The airplane departed BNA from Runway 2C, at 1023.

According to communication transcripts received from the Federal Aviation Administration (FAA), at 1138:43, the airplane was in cruise flight at 9,000 feet, in contact with the Indianapolis Air Route Traffic Control Center (ARTCC), when the pilot reported he was "riding in the tops of the clouds," and requested a climb to 11,000 feet. At 1140:01, the airplane was cleared to climb to 10,000 feet, and about 1 minute later, the airplane was cleared to 11,000 feet. At 1141:37, the pilot was instructed to contact the Atlanta ARTCC. At 1141:50, the pilot contacted Atlanta ARTCC, and stated he was at an altitude of 9,000 feet. When asked to verify he was climbing to 11,000 feet, the pilot responded "roger." There were no further communications from the pilot.

Review of radar data obtained from the FAA for the accident flight revealed the airplane "leveled off" at 9,400 feet at 1140:27. The airplane then began another climb at 1141:19, and reached a maximum altitude of 9,700 feet, before it descended back down to 9,400 feet at 1142:07. At 1142:16, the airplane entered a steep vertical descent, and radar contact with the airplane was lost at 1142:30, at an altitude of 7,700 feet.

The airplane was located by the Civil Air Patrol on April 22, about 1245, on private property, near Jefferson National Forest.

The accident occurred during the hours of daylight approximately 36 degrees, 53 minutes north latitude, and 82 degrees, 38 minutes west longitude.

PERSONNEL INFORMATION

The pilot held a private pilot certificate with a single engine land airplane and an instrument

rating. Examination of the pilot's logbook revealed he had accumulated about 1,815 hours of total flight experience, of which, about 1,030 hours were in the accident airplane. Additionally, the pilot had logged about 57 hours of "simulated" instrument flight experience, and 276 flight hours of "actual" instrument flight experience. The pilot's most recent flight in the accident airplane was on April 12, 2000.

The pilot's most recent FAA third class medical certificate was issued on July 26, 1999.

AIRCRAFT INFORMATION

Review of the airplane's maintenance records revealed it's most recent annual inspection was performed on September 30, 1999, at a tachometer time of 4164.3 hours. Review of the airplane's usage logbook revealed it had been operated for about 47 hours since the inspection.

The airplane's most recent pitot-static system check was performed on October 27, 1998

METEOROLOGICAL INFORMATION

In a written statement, the FSS specialist who provided the pilot with a weather briefing stated:

"...I advised the pilot of flight advisories for moderate rime or mixed icing between 3,000 and 20,000 for the Tennessee portion of the flight and between 4,000 and 20,000 for the Virginia portion [of the flight]. Also, moderate turbulence below 10,000 over Tennessee and mountain obscuration. I provided the pilot with the current conditions over the route, followed by a forecast for the route and final destination...."

A review of FAA records revealed that at 1044, the pilot provided a Pilot Weather Report (PIREP) to the BNA automated FSS. The pilot stated the airplane was located 40 miles east of BNA, heading 079 degrees and the ride was smooth. Additionally, he reported the cloud tops were 8,700 feet msl, and there had been "negative icing."

Geostationary Operational Environmental Satellite (GOES) images taken at 1132 and 1145, showed clouds along the accident airplane's route of flight from BNA to the location of the last radar return. Additionally, GOES data obtained for the flight indicated the potential for icing in the area of the airplane's last radar return.

Airman's Meteorological Information (AIRMET) Zulu, which was issued at 0945, and valid until 1600, called for occasional moderate rime/mixed icing in clouds and in precipitation between 5,000 feet and 11,000 feet. The route between BNA and the location of the last radar return of the accident airplane was included in the area encompassed by the AIRMET.

Additionally, at 1157:34, a Cessna 340, N124DR, located about 50 nautical miles northwest of the accident site reported to the Atlanta ARTCC that it experienced icing conditions while

descending between 10,800 feet, and 8,500 feet.

The weather reported at an airport with an elevation of about 2,685 feet, about 8 miles northeast of the accident site, at 1153 was: Winds 240 at 6 knots; Visibility 10 statue miles; Ceiling 1,700 feet broken; Temperature 46 degrees F; Dewpoint 39 degrees F; Altimeter 29.72 in/hg.

WRECKAGE AND IMPACT INFORMATION

Examination of the accident site revealed that the airplane came to rest at an elevation of about 3,600 feet, in uneven, wooded terrain, surrounded by trees, which were about 75 feet tall. Two trees, about 21 feet north-northeast of the main wreckage, were found broken at their respective 35 and 25-foot heights. Shattered fragments of the trees were strewn around the accident site area. In addition, portions of the trees, which were approximately 10 inches in diameter, and larger, were found freshly cut with black paint transfer visible on the cut surface. This included a 50-inch long portion of a tree about 35 feet west-northwest of the main wreckage, partially imbedded in the ground, which had both ends cut cleanly at a 45-degree angle. There was no noticeable damage to any other trees in the accident site area.

Examination of the wreckage revealed that all major components of the airplane were accounted for at the accident site. The cabin and cockpit areas were destroyed during the impact. Both wings were separated from their attach points. The right wing was fragmented and located in the area of the main wreckage. The left wing was located at base of the two damaged trees. The empennage was partially crushed and distorted.

The airplane's flight controls were actuated by "push/pull," or torque tubes. Due to the fragmented nature of the wreckage, flight control continuity could not be verified; however, it was noted that the push/pull tubes to the rudder and elevator control surfaces remained intact at their respective attach points.

The engine was partially imbedded in the ground, near the main wreckage, in an 8-foot round, 30-inch deep crater. The propeller hub was partially attached to the crankshaft; however, one propeller blade was separated from the hub. The separated propeller blade contained "S" bending, and the outboard third of the blade was bent forward about 45-degrees. Examination of the propeller blade that remained attached to the hub revealed that the white paint on the leading edge of propeller blade tip was displaced in an aft, chord wise direction.

Due to the position of the engine and damage to the propeller hub, the engine could not be rotated more than about 180 degrees. Crankshaft and camshaft continuity was confirmed to their respective gears in the accessory section. The top row of spark plugs were removed. Their electrodes were intact and light gray in color. A borescope was used to view the condition of the pistons and cylinder valves, which were not damaged.

The dual magneto and vacuum pump were separated from the accessory section and

sustained impact damage. The magneto housing was fractured and the magneto did not produce spark when rotated. Examination of the vacuum pump revealed damage to the carbon vanes; however, the shear shaft was found intact.

MEDICAL AND PATHOLOGICAL INFORMATION

An autopsy was performed on the pilot, on April 24, 2000, by the Virginia State Medical Examiners Office, Roanoke, Virginia.

Toxicological testing was conducted by the FAA Toxicology Accident Research Laboratory, Oklahoma City, Oklahoma.

TESTS AND RESEARCH

The airplane's attitude indicator and directional gyroscope were forwarded to the Safety Board's Materials Laboratory for examination. According to the metallurgist's factual report, the attitude indicator sustained significant impact damage. Internal examination of the attitude indicator gyro rotor and housing revealed circumferential scoring damage. Examination of the directional gyro rotor and housing revealed the unit was intact and that the rotor easily rotated about the pivot points. There was no evidence of physical damage to the interior surface of the housing or to the rotor.

ADDITIONAL INFORMATION

Airplane Flight Manual

The airplane's pilot operating handbook, "Section II - Limitations, Kinds of Operation Limits," stated:

"Do not operate in known icing conditions."

Re-Fueling

Fueling records revealed the airplane was "topped off" after the last flight prior to the accident, which was on April 12. Additionally, on the flight plan for the accident flight, the pilot indicated 6 hours of fuel-on-board.

Weight and Balance

An estimated airplane weight and balance calculation was performed for the conditions during the accident flight. The weight and balance calculations revealed the airplane's takeoff weight was about 3,035 pounds, and the center of gravity (CG) was about 147.38 inches. At the time of the accident, the airplane's weight was about 2,945 pounds, and the CG was about 142.88 inches.

According to the pilot operating handbook, the maximum certificated gross weight for the airplane was 2,740 pounds. Additionally, the CG range at the maximum certificated gross weight was about 128 to 138 inches.

Wreckage Release

The airplane wreckage was released on April 27, 2000, to a representative of the owners insurance company.

Pilot Information

Certificate:	Private	**Age:**	65,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:**	July 26, 1999
Occupational Pilot:	UNK	**Last Flight Review or Equivalent:**	
Flight Time:	1815 hours (Total, all aircraft), 1030 hours (Total, this make and model), 1685 hours (Pilot In Command, all aircraft), 11 hours (Last 90 days, all aircraft), 3 hours (Last 30 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Mooney	**Registration:**	N5632H
Model/Series:	M20J M20J	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	24-1368
Landing Gear Type:	Retractable - Tricycle	**Seats:**	4
Date/Type of Last Inspection:	September 30, 1999 Annual	**Certified Max Gross Wt.:**	2740 lbs
Time Since Last Inspection:	47 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	4310 Hrs	**Engine Manufacturer:**	Lycoming
ELT:	Installed, not activated	**Engine Model/Series:**	IO-360
Registered Owner:	IRA B. WALDEN	**Rated Power:**	200 Horsepower
Operator:		**Operating Certificate(s) Held:**	None
Operator Does Business As:		**Operator Designator Code:**	

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument (IMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	LNP ,2685 ft msl	**Distance from Accident Site:**	8 Nautical Miles
Observation Time:	11:53 Local	**Direction from Accident Site:**	45°
Lowest Cloud Condition:	Unknown	**Visibility**	10 miles
Lowest Ceiling:	Overcast / 1700 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	6 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	240°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29 inches Hg	**Temperature/Dew Point:**	8°C / 4°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	NASHVILLE , TN (BNA)	**Type of Flight Plan Filed:**	IFR
Destination:	ROANOKE , VA (ROA)	**Type of Clearance:**	IFR
Departure Time:	10:23 Local	**Type of Airspace:**	Class E

Airport Information

Airport:		**Runway Surface Type:**	
Airport Elevation:		**Runway Surface Condition:**	
Runway Used:	0	**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	None

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:**	36.930934,-82.619125(est)

Administrative Information

Investigator In Charge (IIC):	Schiada, Luke
Additional Participating Persons:	PAUL REYNOLDS; CHARLESTON , WV EDWARD G ROGALSKI; BELLEVIEW , FL
Original Publish Date:	May 9, 2001
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=49015