Aviation Investigation Final Report

Location:	Mt. Gilead, Ohio	**Accident Number:**	CHI07FA048
Date & Time:	December 27, 2006, 14:26 Local	**Registration:**	N9596M
Aircraft:	Mooney M-20F	**Aircraft Damage:**	Substantial
Defining Event:		**Injuries:**	2 Fatal
Flight Conducted Under:	Part 91: General aviation - Instructional		

Analysis

The purpose of the flight was for the PIC/aircraft owner to receive familarization training from a certified flight instructor (CFI) in his newly purchased airplane. The PIC was a recently retired airline pilot and had not flown general aviation airplanes for a number of years. Witnesses reported hearing the aircraft engine and seeing the airplane descending straight into the trees. One witness reported the airplane went "straight up or tried to" prior to descending. Another witness reported seeing the airplane "twist" a little prior to it descending. The accident site was in a heavily wooded area which was surrounded by open fields. The airplane impacted the terrain in a nose down attitude and the only trees observed to have been damaged were those immediately surrounding the impact site. The landing gear and flaps were observed in the extended position. Inspection of the airplane and engine failed to reveal any mechanical failure/malfunction which would have precluded normal operation of the airplane. Radar data indicated that during the last 26 minutes of the flight, the airplane had been maneuvering with changes in heading, altitude, and groundspeed indicative of stalls and/or slow flight. The groundspeed, based on the radar data, varied from 164 knots to 39 knots. Just prior to the loss of radar contact, the ground speed based on the radar data was approximately 54 knots. According to the aircraft manufacturer the aircraft stall speeds, at a gross weight of 2,740 pounds, with flaps retracted is 68 miles per hour (mph) or 59 knots. With flaps set at 15 degrees the stall speed is 64 mph or 55 knots, and with flaps fully extended the stall speed is 62 mph or 54 knots. The speeds provided do not take into consideration the position of the landing gear.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: Both the pilot-in-command/aircraft owner and the flight instructor failed to recover from the stall and the flight instructor's inadequate supervision of the flight. Contributing to the accident was the failure to maintain stall speed which resulted in the subsequent stall.

Findings

Occurrence #1: LOSS OF CONTROL - IN FLIGHT
Phase of Operation: MANEUVERING

Findings
1. (F) AIRSPEED(VSO) - NOT MAINTAINED - FLIGHTCREW
2. (F) STALL - ENCOUNTERED
3. (C) REMEDIAL ACTION - INADEQUATE - FLIGHTCREW
4. (C) SUPERVISION - INADEQUATE - COPILOT/SECOND PILOT

Occurrence #2: IN FLIGHT COLLISION WITH OBJECT
Phase of Operation: DESCENT - UNCONTROLLED

Findings
5. OBJECT - TREE(S)

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

Findings
6. TERRAIN CONDITION - GROUND

Factual Information

HISTORY OF FLIGHT

On December 27, 2006, at 1426 eastern standard time, a Mooney M-20F, N9596M, collided with trees and the terrain following a loss of control during a local flight over Mt. Gilead, Ohio. The airline transport rated pilot-in-command (PIC) and the certified flight instructor (CFI) on board were both fatally injured. The airplane was substantially damaged. The 14 Code of Federal Regulation Part 91 training flight was operating in visual meteorological conditions without a flight plan. The flight originated from the Knox County Airport (4I3), Mt. Vernon, Ohio, about 1245.

The PIC purchased the airplane on December 11, 2006, and was in the process of obtaining familiarization training in the airplane for insurance purposes. The accident occurred during his first flight in the airplane. The airport manager at 4I3 reported the CFI arrived at the airport around 1200 where he met the PIC. She reported the airplane departed shortly thereafter.

One witnesses reported seeing and hearing the airplane flying from the east to the west. She stated, "It looked like it went straight up or tried to then I saw it just go straight down." She stated the airplane was low enough for her to be able to read the numbers on it and that the left wing tipped up before the airplane descended.

Several other witnesses reported hearing the airplane prior seeing it. One stated the engine seemed to be working and that it was loud. The witnesses reported seeing the airplane coming "straight down" nose first until it descended into the trees. Another witness reported seeing the airplane "twist" a little prior to it descending.

PERSONNEL INFORMATION

The PIC, age 61, held an airline transport pilot certificate with a airplane multi-engine land and airplane single-engine land ratings. The pilot's logbooks were not provided to the Safety Board during the investigation. The pilot was issued a first-class medical certificate on April 25, 2005. The certificate contained the limitation "Holder shall wear corrective lenses." At the time of the medical examination, the pilot reported having 16,700 hours of flight time, of which 335 hours were flown in the previous 6 months. According to the pilot's family he had recently retired as an airline pilot and he purchased the airplane because he wanted to keep flying.

The CFI, age 67, held a commercial pilot certificate with airplane single-engine land, airplane multi-engine land, and instrument ratings. The airplane multi-engine rating was added to the pilot's certificate on April 15, 2005. He also held a flight instructor certificate with airplane single-engine land and instrument airplane ratings. The flight instructor certificate was issued

on April 26, 2005. The CFI was issued a second-class medical certificate on August 8, 2005. The certificate contained the limitation "Must wear corrective lenses." The pilot's family reported that as of May 2006, he had 5,522 hours of total flight time of which 212 hours were in Mooney M-20 airplanes.

There was no indication that the PIC and CFI had flown with each other prior to the accident flight.

AIRCRAFT INFORMATION

The accident airplane was a Mooney M-20F, serial number 670173. It was a single-engine, low wing, four-place airplane with retractable landing gear. A copy of the Bill of Sale showed the pilot purchased the airplane 16 days prior to the accident. The aircraft logbooks were not located during the investigation. The most recent aircraft total time was listed on a maintenance invoice dated July 15, 2005. This invoice listed a tachometer time of 482.9 hours and an aircraft total time of 4,789.02 hours. At the time of the accident, the tachometer read 520.8 hours.

According to maintenance personnel and maintenance invoices/work orders, the airplane was involved in a sudden propeller stoppage event earlier in 2006. The engine was overhauled, a new propeller was installed, and the airplane received an annual inspection following this event. The airplane had accumulated approximately 17.1 hours since it was returned to service in October 2006.

The airplane was equipped with a 200-horsepower, fuel injected, Lycoming IO-360-A1A engine, serial number L-3617-51A. The engine was overhauled approximately 17.1 hours prior to the accident.

The last fueling record located indicated the airplane was topped off with 13.7 gallons of fuel on November 30, 2006. According to the previous owner and 4I3 airport manager, the airplane was then flown from Chillicothe, Ohio, to 4I3, and was not flown again until the accident flight.

METEOROLOGICAL INFORMATION

The weather conditions recorded at the Marion Municipal Airport (MNN), Marion, Ohio, located approximately 13 miles northwest of the accident site, at 1452 were: Wind from 260 degrees at 8 knots; visibility 10 statute miles; few clouds at 10,000 feet; temperature 4 degrees Celsius; dew point minus 3 degrees Celsius; altimeter 30.07 inches of mercury.

WRECKAGE AND IMPACT INFORMATION

The wreckage was located in a heavily wooded area, which was surrounded by open fields. The nearest road intersection was Township Road 121 and State highway 114. The terrain

elevation at the accident site was 613 feet. The tree heights at the accident site were approximately 80 to 100 foot tall. The only trees observed to have been damaged were those immediately surrounding the impact site.

The airplane contacted the terrain in a nose down attitude. The engine, wings, and empennage remained attached to the fuselage. The lower front section of the fuselage and cockpit contained severe crush damage. The engine bent forward at the engine mounts and pushed back into the instrument panel. Two of the three propeller blades were visible and the third blade was completely buried in the terrain.

Most of the instruments in the instrument panel were destroyed. The attitude indicator was jammed in an approximate 30 degree nose down, 45 degree left bank attitude. The throttle was extended approximately one-half inch. The mixture and propeller controls were full in, and both magnetos were on. The gear handle was in the down position. The position of the flap handle could not be determined due to impact damage.

The left wing was intact with the exception of the wing tip and the aileron, which were separated and found alongside the main wreckage. The leading edge and underside of the wing were compressed for the entire length of the wing. The wing was bowed up in the middle and the skin was split in three areas along rivet lines. The flap remained attached to the wing at the outboard hinges. The inboard one-third portion of the flap was bent upward. The position of the flap hinges indicated the flap was in the extended position. The aileron push tube remained attached to the aileron. The left wing was approximately three-quarters full of fuel.

The inboard section of the right wing was intact. The wingtip was separated just outboard of the aileron attach points. The two inboard flap hinges separated from the wing and the outboard hinges remained attached. The position of the flap hinges indicated the flap was in the extended position. The aileron separated from the wing in two sections. One of the sections of aileron was located in a tree near the main wreckage and the other section was on the ground near the main wreckage. The leading inboard edge of the right wing contained an indentation that was indicative of a tree strike. There was another similar, slightly smaller, indentation further outboard on the wing.

The upper and side surfaces of the empennage were crushed and split just forward of the vertical stabilizer. The aft portion of the empennage, including the vertical and horizontal stabilizers, was bent upward and forward. The elevator and rudder remained attached to the empennage. The foldable scissors trim was intact. All of the push/pull tubes were bent and separated just forward of the empennage.

Both main landing gears were in the extended position.

MEDICAL AND PATHOLOGICAL INFORMATION

Autopsies of both the PIC and the CFI were performed on December 29, 2006, by the Franklin County Coroner's Office, Columbus, Ohio. The final autopsy reports for both pilots listed the cause of death as "Extensive multiple blunt impacts to the head, neck, trunk, and extremities with skeletal, visceral, and vascular injury."

The FAA's Civil Aerospace Medical Institute performed forensic toxicology on specimens from the pilot. All test results for the PIC were negative. The test results for the CFI indicated that Naproxen was detected in the blood.

TESTS AND RESEARCH

The wreckage was moved to a hangar were the engine was torn down and the propeller was inspected. The propeller spinner was crushed into the propeller hub. Rotational twisting and scoring was visible on the spinner. One propeller blade was bent aft approximately 30 degrees near root of the blade. The second propeller blade was twisted to a low pitch setting and was broken loose in the propeller hub. This blade was bent aft approximately 20 degrees and the blade tip was curled. The third propeller blade was twisted to a low pitch setting and was bent aft approximately 50 degrees. This blade was broken loose in the hub and the leading edge of the blade was polished. Chordwise scratches were noted on all of the propeller blades.

All of the engine accessories were broken free from their respective mounts with the exception of the vacuum pump. Both magnetos sustained impact damage. When rotated by hand, the left magneto did not produce a spark and the right magneto produced a spark on two of the terminals. Rotation scoring was observed on the starter gear housing. The fuel flow divider was opened and the diaphragm was intact with fuel present. All of the spark plugs appeared to have been relatively new with normal combustion coloration. The fuel inlet and oil suction screens were free of debris.

The rocker arms, valves, and connecting rods were intact. The camshaft was free to rotate; however, the crankshaft was bound and could not be rotated by hand. All of the cylinders were inspected internally and no defects were noted. The cylinders and the accessory housing were then removed from the engine and the crankcase was parted. The crankshaft was free to move once the case was parted approximately one-quarter of an inch. The number one and two thrust bearing, which was pushed forward by impact forces, was restricting the crankshaft movement. No pre-existing mechanical failure/malfunction of the engine was noted which would have precluded normal engine operation.

ADDITIONAL INFORMATION

A review of the radar data for the last 26 minutes of the flight showed the airplane was maneuvering with changes in heading, altitude, and groundspeed. The airplane's groundspeed varied between approximately 164 knots to 39 knots, and the altitude varied between 2,500 feet above mean sea level (msl) and 4,500 feet msl. The data indicated that at 1400 the airplane was on a northerly heading at an altitude of 4,500 feet msl with an approximate

ground speed of 130 knots. During the next 4 minutes the ground speed decreased to approximately 49 knots and the altitude decreased to 4,200 feet msl. The ground speed then increased to approximately 88 knots and the altitude increased to 4,400 feet msl. During the next 4 minutes the airplane turned to a westerly heading, the groundspeed decreased to approximately 48 knots and the altitude decreased to about 3,500 feet msl. The airplane then began a turn to the east with the groundspeed increasing to approximately 164 knots and the altitude increasing to 4,100 feet msl. While on the easterly heading the groundspeed decreased to about 94 knots then increased to 141 knots at an altitude of about 3,900 feet msl. The airplane then made a right turn back to the west as the groundspeed continued to increase to approximately 151 knots. While on the westerly heading, the groundspeed began to decrease to 85 knots with the altitude remaining at or above 3,900 feet msl. At 1423, the altitude and groundspeed continued to decrease. Just prior to the loss of radar contact, the airplane was at 2,500 feet msl with a ground speed of approximately 57 knots.

According Mooney Aircraft the indicated stall speed of the M-20F, at a gross weight of 2,740 pounds, with flaps retracted is 68 miles per hour (mph), which equates to 59 knots. With flaps set at 15 degrees the stall speed is 64 mph, which equates to 55 knots, and with flaps fully extended the stall speed is 62 mph, which equates to 54 knots. The speeds provided do not take into consideration the position of the landing gear.

Pilot Information

Certificate:	Airline transport; Commercial	**Age:**	61,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 1 With waivers/limitations	**Last FAA Medical Exam:**	April 1, 2005
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	16700 hours (Total, all aircraft)		

Flight instructor Information

Certificate:	Commercial; Flight instructor	**Age:**	67,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Right
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	Airplane single-engine; Instrument airplane	**Toxicology Performed:**	Yes
Medical Certification:	Class 2 With waivers/limitations	**Last FAA Medical Exam:**	August 1, 2005
Occupational Pilot:	UNK	**Last Flight Review or Equivalent:**	April 1, 2005
Flight Time:	5522 hours (Total, all aircraft), 212 hours (Total, this make and model)		

Aircraft and Owner/Operator Information

Aircraft Make:	Mooney	**Registration:**	N9596M
Model/Series:	M-20F	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	670173
Landing Gear Type:	Retractable - Tricycle	**Seats:**	4
Date/Type of Last Inspection:	October 1, 2006 Annual	**Certified Max Gross Wt.:**	2740 lbs
Time Since Last Inspection:	17 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	4827 Hrs at time of accident	**Engine Manufacturer:**	Lycoming
ELT:	Installed, activated, did not aid in locating accident	**Engine Model/Series:**	IO-360-A1A
Registered Owner:	Eric P. Balcom	**Rated Power:**	200 Horsepower
Operator:		**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	MNN,993 ft msl	**Distance from Accident Site:**	13 Nautical Miles
Observation Time:	14:53 Local	**Direction from Accident Site:**	295°
Lowest Cloud Condition:	Few / 10000 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	8 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	260°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.06 inches Hg	**Temperature/Dew Point:**	4°C / -3°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Mt. Vernon, OH (4I3)	**Type of Flight Plan Filed:**	None
Destination:	(4I3)	**Type of Clearance:**	None
Departure Time:	12:45 Local	**Type of Airspace:**	

Wreckage and Impact Information

Crew Injuries:	2 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 Fatal	**Latitude, Longitude:**	40.506389,-84.785835

Administrative Information

Investigator In Charge (IIC):	Sullivan, Pamela
Additional Participating Persons:	Robert Holdridge; FAA; Columbus, OH Maureen Turkovich; FAA; Columbus, OH John Butler; Lycoming; Williamsport, PA
Original Publish Date:	March 31, 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=65078