Aviation Investigation Final Report

Location:	Monroe, North Carolina	**Accident Number:**	ERA18LA172
Date & Time:	June 19, 2018, 13:50 Local	**Registration:**	N201FD
Aircraft:	Mooney M20J	**Aircraft Damage:**	Substantial
Defining Event:	Loss of engine power (total)	**Injuries:**	2 None
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

According to the pilot, the purpose of the flight was to conduct instrument approaches; a pilot-rated passenger was on board. The pilot had completed the instrument landing system instrument approach procedure to near decision altitude in visual conditions and initiated the missed approach with a climbing right turn. He indicated that when the airplane was about 600 ft above ground level, "the engine suddenly started to falter." The pilot initiated a course reversal to conduct a forced landing on the opposite runway, but the airplane stalled just above the runway and landed hard about 45° off the runway heading. The landing gear separated, the fuselage was substantially damaged, and the airplane slid into the grass infield where it came to rest.

Examination of engine and GPS track data revealed the airplane had entered a full-power climb near the approach end of the 7,001-ft runway when fuel flow and engine rpm rapidly decreased. The climb was arrested, and instead of continuing straight ahead, the airplane entered a descending right turn. About 30 seconds into the descent, the last GPS position was recorded about 3,200 ft down the runway, 1,100 ft right of centerline, at an altitude of 1,023 ft.

An engine start attempted at the airport shortly after the accident was unsuccessful; however, after the airplane was recovered to a recovery facility, the engine was successfully started and run on the airframe using the airplane's own fuel system. The reason for the loss of engine power could not be determined.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be:

A loss of engine power for reasons that could not be determined based on the available information.

Findings

Not determined	(general) - Unknown/Not determined

Factual Information

History of Flight

Initial climb	Loss of engine power (total) (Defining event)
Emergency descent	Aerodynamic stall/spin
Landing-flare/touchdown	Hard landing

On June 19, 2018, at 1350 eastern daylight time, a Mooney M20J, N201FD, was substantially damaged during a forced landing following a missed approach to runway 5 at Charlotte-Monroe Executive Airport (EQY), Monroe, North Carolina. The private pilot was not injured, and the pilot-rated passenger sustained minor injuries. Visual meteorological conditions prevailed and no flight plan was filed for the personal flight which departed Jim Hamilton L. B. Owens Airport (CUB), Columbia, South Carolina about 1245, and was conducted under the provisions of 14 *Code of Federal Regulations* Part 91.

In a written statement, the pilot said the purpose of the flight was to practice instrument approaches at three different airports, and then return to CUB; his home airport. The pilot-rated passenger, who was not instrument rated, accompanied him as a "safety pilot."

According to the pilot, he had completed the ILS RWY 5 instrument approach procedure at EQY (682 feet elevation) to near decision altitude and initiated the missed approach with a climbing right turn, when about 600 feet above ground level (agl), "the engine suddenly started to falter."

The pilot visually checked the mixture, throttle, propeller, and fuel pump settings and turned left for a forced landing on runway 23. The pilot maneuvered the airplane over trees and buildings on the airport perimeter towards the runway "just above" stall speed. As the airplane neared the landing surface heading about 270 degrees and about 8 feet agl, the airplane stalled, landed hard on the paved surface, and continued into the grass between the runway and parallel taxiway.

In a telephone interview, the pilot-rated passenger provided an account consistent with the pilot's. Prior to the approach, he said the pilot consulted his approach checklist. At the end of the approach segment, he estimated the airplane was 200 feet above the runway, but not less than 100 feet.

The pilot applied full power, and initiated a climbing right turn about 45-degress off the runway heading. The airplane climbed at 85-90 knots at 1,000 ft per minute for about 10 seconds when the "engine went to idle." The pilot declared an emergency over the radio and pushed the throttle and mixture controls full forward, "even though they were already there." "We had just enough energy – altitude and airspeed – to nearly complete a 180 degree turn in the opposite direction from the point where we lost power which would have required about 600 to 800 feet AGL. I did not look at the altimeter."

"The airplane stalled about 6-8 feet above the ground and hit the edge of the runway at about a 45-degree angle, wings level, and skidded into the grass with pieces of the airplane and landing gear passing us as we slid."

The pilot-rated passenger believed the airplane was over the runway when the missed approach was initiated and stated that because they had completed a 45-degree right turn and were about 10 seconds into the climb, there was "no way" the airplane could have landed on the remaining runway. The runway was behind them, and they were headed away from it. He added that the few seconds of the climb were what allowed the pilot just enough altitude to reverse course, clear obstacles, and land in the direction of the opposite runway.

A JPI Engine Data Monitor was recovered from the airplane and downloaded. The unit recorded engine parameters at 6 second intervals, and GPS position and altitude parameters at varying intervals, typically 18 to 24 seconds. Some airplane positions referenced in this report were estimated by interpolation of GPS groundspeed and elapsed time.

GPS track data recovered from the engine monitor depicted a track consistent with the approach described by the pilot. According to that data, the airplane was at 965 ft, about 0.8 miles prior to the threshold of the 7,001-ft runway, aligned with the runway centerline, when a full-power climb along the right side of the runway was initiated.

About 25 seconds later, over the paved surface about 0.2 miles prior to the displaced threshold at an altitude of 1370 ft, the fuel flow and engine RPM decreased rapidly (16 GPH to 6 GPH, 2,600 RPM to 2,000 RPM). The airplane's climb was arrested and approximately abeam the displaced threshold, the airplane entered a descending right turn. About30 seconds into the descent, the last GPS position was recorded about 3,200 feet down the runway, 1,100 feet right of centerline, at an altitude of 1,023 ft. The recorded data ended about 36 seconds later and did not depict the course reversal likely due to the GPS data update rate.

According to the ILS or LOC RWY 5 approach at EQY, the published missed approach procedure was, "Climb to 1500 then climbing right turn to 3000 on heading 200°…"

The pilot held a private pilot certificate with ratings for airplane single-engine land and instrument airplane. His most recent Federal Aviation Administration (FAA) 3rd class medical was issued March 20, 2017. The pilot reported 772 total hours of flight experience, of which 137 were in the accident airplane make and model.

The airplane's most recent annual inspection was completed April 4, 2018 at 5,391 total aircraft hours. According to the Owner's Manual, the published stall speed for the airplane with flaps retracted was 63 knots. The best glide airspeed at 2,500 pounds was 88 knots.

At 1353, the weather recorded at EQY included scattered clouds at 7,000 feet and variable winds at 4 knots. The temperature was 36°C, and the dew point was 19°C. The altimeter setting was 29.96 inches of mercury.

Examination of photographs revealed substantial damage to the wings and fuselage.

Following the accident, and under the supervision of an FAA aviation safety inspector, electrical power was applied, and an engine start was attempted at EQY. The engine rotated when the starter was actuated, but the start attempt was unsuccessful. While troubleshooting, compression was confirmed on each cylinder using the thumb method, fuel delivery was confirmed, and spark was confirmed at the top spark plugs for cylinders 1 and 3, and the bottom spark plugs for cylinders 2 and 4. Subsequent start

attempts were also unsuccessful. The engine exam was suspended, and the airplane was scheduled for recovery from the site and further examination.

An NTSB investigator examined the airplane and attempted an engine start on the airframe utilizing the airplane's own battery and fuel system. Both wing tanks were "full" of fuel, and the electric fuel boost pump was used to prime the engine. An engine start was attempted using a "flooded engine procedure" as described by a Lycoming representative. With the mixture off, and the throttle full forward, "the engine turned over 7-10 times before it started. Mixture was then placed in full forward position and the engine was run at idle for several minutes to warm up. The engine RPM was then increased to about 2000 RPM and [the engine] ran well." The engine was stopped and restarted several times using the same procedure. The engine ran smoothly and continuously each time without interruption.

Pilot Information

Certificate:	Private	**Age:**	67,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	3-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	March 20, 2017
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	June 4, 2017
Flight Time:	772 hours (Total, all aircraft), 137 hours (Total, this make and model), 661 hours (Pilot In Command, all aircraft), 7 hours (Last 90 days, all aircraft), 2 hours (Last 30 days, all aircraft), 1 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Mooney	**Registration:**	N201FD
Model/Series:	M20J NO SERIES	**Aircraft Category:**	Airplane
Year of Manufacture:	1977	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	24-0168
Landing Gear Type:	Retractable - Tricycle	**Seats:**	4
Date/Type of Last Inspection:	April 4, 2018 Annual	**Certified Max Gross Wt.:**	2899 lbs
Time Since Last Inspection:	6 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	5391 Hrs at time of accident	**Engine Manufacturer:**	LYCOMING
ELT:	Installed	**Engine Model/Series:**	IO360 SER
Registered Owner:		**Rated Power:**	200 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	KEQY,679 ft msl	**Distance from Accident Site:**	0 Nautical Miles
Observation Time:	17:53 Local	**Direction from Accident Site:**	123°
Lowest Cloud Condition:	Scattered / 7000 ft AGL	**Visibility**	10 miles
Lowest Ceiling:		**Visibility (RVR):**	
Wind Speed/Gusts:	/	**Turbulence Type Forecast/Actual:**	/
Wind Direction:		**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.95 inches Hg	**Temperature/Dew Point:**	36°C / 19°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	COLUMBIA, SC (CUB)	**Type of Flight Plan Filed:**	None
Destination:	Monroe, NC (EQY)	**Type of Clearance:**	VFR flight following
Departure Time:	12:45 Local	**Type of Airspace:**	Class G

Airport Information

Airport:	CHARLOTTE-MONROE EXECUTIVE EQY	**Runway Surface Type:**	Asphalt
Airport Elevation:	682 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	23	**IFR Approach:**	ILS
Runway Length/Width:	7001 ft / 100 ft	**VFR Approach/Landing:**	Forced landing

Wreckage and Impact Information

Crew Injuries:	1 None	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 None	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 None	**Latitude, Longitude:**	35.017501,-80.621948

Administrative Information

Investigator In Charge (IIC):	Rayner, Brian
Additional Participating Persons:	Mark Reynolds; FAA/FSDO; Charlotte, NC
Original Publish Date:	June 3, 2020
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=97543