Aviation Investigation Final Report

Location:	Starke, Florida	**Accident Number:**	ERA18FA030
Date & Time:	November 23, 2017, 15:15 Local	**Registration:**	N6894N
Aircraft:	Mooney M20C	**Aircraft Damage:**	Destroyed
Defining Event:	Loss of control in flight	**Injuries:**	1 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

A friend of the private pilot accompanied him on the flight leg before the accident flight; she stated that, while approaching to land, the weather became "very turbulent" and that, after they landed, it was "very windy and raining very hard." The pilot stated that he needed to continue his flight in order to attend a family event, and the passenger suggested that he wait for the weather to improve. During this time, the pilot requested fuel for his airplane from line personnel at the airport's fixed base operator (FBO), who asked if the pilot could wait to receive fuel due to the adverse weather. The pilot stated that he needed fuel "now" and requested that the line personnel wipe his fuel caps with a towel and use an umbrella to prevent rainwater from entering the fuel tanks. After waiting about 45 minutes for the weather to improve, the pilot stated to FBO personnel that he was "heading out"; when asked if he had found a break in the weather, the pilot said he was "gonna go for it." Based on the pilot's comments to his passenger and FBO personnel, he was likely experiencing self-induced pressure to complete the flight despite the poor weather conditions in order to attend the family event.

The pilot subsequently departed on the 65-mile instrument flight rules (IFR) flight. While en route, the controller told the pilot that the airplane's target was "all over the place" and asked if he needed assistance. The pilot indicated that this was due to the wind conditions and declined to change cruise altitudes. The controller then cleared the pilot for the instrument approach at the destination; while the pilot was conducting the approach, the radar controller advised the local controller that the airplane was "going back and forth" through the approach course. Shortly thereafter, the pilot executed a missed approach and asked to try the approach again. The controller provided headings and altitudes to the pilot, then asked if he would like to try an approach at a nearby airport that was reporting better weather conditions. The pilot accepted and the controller provided a heading and altitude toward that airport. The pilot acknowledged the heading but did not acknowledge the altitude assignment; there were no further communications from the pilot and radar contact was lost shortly thereafter.

Review of weather radar information showed light to moderate intensity echoes over the route of flight and the accident site consistent with rain showers, and soundings depicted a high probability of moderate or greater low-level turbulence in the area. Conditions about the time of the accident at a

nearby airport included 1-1/4 mile visibility in heavy rain and a broken cloud ceiling at 100 ft above ground level. Although the pilot contacted flight service to file his IFR flight plan, he did not request a weather briefing at that time, and what, if any, weather information he obtained before the flight could not be determined.

Examination of the airplane, engine, and propeller components did not reveal any anomalies that would have precluded normal operation. Review of the pilot's logbook revealed that he did not meet recency requirements to act as pilot-in-command in instrument meteorological conditions (IMC). In addition, his communications with air traffic control and the airplane's flight path during the approach is consistent with a lack of proficiency while operating in IMC. The reduced visibility conditions present at the time of the accident were conducive to the development of spatial disorientation, and the damage to the airplane indicated a high-energy impact consistent with the known effects of spatial disorientation. It is likely that the pilot experienced spatial disorientation while maneuvering after a missed approach, which resulted in a loss of control.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's loss of control due to spatial disorientation while maneuvering in instrument meteorological conditions. Contributing was the pilot's lack of instrument currency and his self-induced pressure to complete the flight.

Findings

Personnel issues	Aircraft control - Pilot
Personnel issues	Spatial disorientation - Pilot
Environmental issues	Rain - Effect on operation
Environmental issues	Clouds - Effect on operation
Environmental issues	(general) - Effect on operation
Aircraft	(general) - Not attained/maintained
Personnel issues	Recent experience - Pilot
Personnel issues	Motivation/respond to pressure - Pilot

Factual Information

History of Flight

Maneuvering	Loss of control in flight (Defining event)
Uncontrolled descent	Collision with terr/obj (non-CFIT)

On November 23, 2017, about 1515 eastern standard time, a Mooney M20, N6894N, was destroyed when it impacted terrain near Starke, Florida. The private pilot was fatally injured. The airplane was privately owned and operated as a Title 14 Code of Federal Regulations (CFR) Part 91 personal flight. Instrument meteorological conditions prevailed at the time and an instrument flight rules (IFR) flight plan was filed for the flight, which originated about 1419 from Ocala International Airport-Jim Taylor Field (OCF), Ocala, Florida, with a destination of Cecil Airport (VQQ), Jacksonville, Florida.

A friend of the pilot reported that she flew to OCF as a passenger with the accident pilot in the accident airplane earlier on the day of the accident. She said that the flight was uneventful until they approached OCF, when the weather became "very turbulent." The pilot mentioned to her that he was trying to maintain altitude as he was preparing for landing. She said that, after they landed, it was "very windy and raining very hard." They went inside the fixed-base-operator (FBO), where the pilot mentioned that he had to get to VQQ for his daughter's birthday and Thanksgiving. She told him that he should "wait it out," and he agreed.

FBO personnel reported that, as the pilot waited for the weather to improve, he asked them to top off the airplane's fuel tanks. They advised the pilot that the weather was very bad and that he should wait for the fuel. The pilot said that he needed the fuel "now" because he was trying to get to his daughter's house for Thanksgiving and requested that the line personnel wipe his fuel caps with a towel and use an umbrella to prevent rainwater from entering the fuel tanks. After about 45 minutes, the pilot said that he was "heading out"; when asked if he found a break in the weather, the pilot laughed and said he was "gonna go for it."

Review of air traffic control radar and voice communication information from the Federal Aviation Administration (FAA) Jacksonville Air Route Traffic Control Center (JAX ARTCC) revealed that, as the pilot departed OCF he was advised to "climb and maintain three thousand." The JAX ARTCC approach controller identified the pilot's airplane, instructed him to proceed direct to VQQ, advise when he had the ATIS, and expect the "ILS to RWY36R." The controller then cleared the airplane direct to "NOLFO" the initial approach fix for the runway 36R instrument landing system (ILS) approach. The pilot asked the controller to spell out the intersection which the controller did, and the controller subsequently informed the pilot "your uh target's going all over the place you having issues." The pilot attributed the airplane's motion as described by the controller as due to wind and further indicated that he was not having any issues.

The JAX ARTCC approach controller asked the pilot if he wanted to try a different altitude, but the pilot declined and responded "…i'm okay."

The airplane was cleared for the ILS approach to runway 36R at 1455:47 and the pilot was instructed to maintain 3,000 ft until reaching NOLFO; however, the pilot read back 2,000 ft and was corrected by the approach controller. At 1459:26, the pilot was instructed to contact the VQQ air traffic control tower (ATCT), which the pilot did not acknowledge until the instruction was repeated by the controller.

At 1501:19, the JAX ARTCC approach controller provided a low altitude alert to the VQQ tower controller. The approach controller noted that the airplane was "going back and forth on the localizer" and asked the VQQ ATCT controller if he was able to see the airplane. The VQQ ATCT controller said he could not see the airplane due to the low ceilings. About 2002, the VQQ tower controller advised the JAX ARTCC controller that the pilot was coming back to JAX ARTCC approach, and the pilot was subsequently provided radar vectors for a second ILS to runway 36R.

While JAX ARTCC approach controller was providing the pilot radar vectors, he noted that the airplane was triggering low altitude alarms. At 1511:02, when the pilot was asked if he was able to climb and turn, the pilot indicated that he could but needed to go out for a long approach. At 1513:02, the controller asked the pilot if he would like to land at Jacksonville International Airport (JAX), Jacksonville, Florida, which was reporting higher ceilings and better visibility. The pilot elected fly to JAX and was provided initial and repeated vectors. The pilot initially acknowledged the heading but did not acknowledge the altitude assignment. Shortly thereafter, at 1515, radar contact with the airplane was lost.

An alert notice (ALNOT) was subsequently issued and the airplane was located at 1600 in a field about 18 nautical miles south-southwest of VQQ.

Pilot Information

Certificate:	Private	**Age:**	73,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	Unknown
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	July 11, 2016
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	March 29, 2016
Flight Time:	(Estimated) 3146 hours (Total, all aircraft), 400 hours (Total, this make and model), 4 hours (Last 90 days, all aircraft)		

The pilot, age 73, held a private pilot certificate with ratings for airplane single-engine land and instrument airplane. He also held an FAA third-class medical certificate, issued July 11, 2016. A review of the pilot's logbook revealed 3,146 total hours of flight experience; the most recent entry was dated September 8, 2017. The pilot had accumulated 400 flight hours in the accident airplane make and model, and 4 hours within the previous 90 days. The pilot recorded a total of 527 actual instrument hours; since January 1, 2016, he had flown 18 actual instrument flight hours, 8 of which were in 2017. A review of the pilot's logbook revealed that he did not meet

FAA recency requirements to act as pilot in command under IFR or weather conditions less than the minimums prescribed for visual flight rules.

Aircraft and Owner/Operator Information

Aircraft Make:	Mooney	**Registration:**	N6894N
Model/Series:	M20C NO SERIES	**Aircraft Category:**	Airplane
Year of Manufacture:	1968	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	680164
Landing Gear Type:	Retractable - Tricycle	**Seats:**	4
Date/Type of Last Inspection:	August 1, 2017 Annual	**Certified Max Gross Wt.:**	2575 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:		**Engine Manufacturer:**	LYCOMING
ELT:	C91 installed, not activated	**Engine Model/Series:**	O-360-A1D
Registered Owner:	On file	**Rated Power:**	180 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

The single-engine airplane was manufactured in 1968 and was powered by a Lycoming O-360-A1D engine rated at 180 horsepower, equipped with a Hartzell three-bladed, controllable-pitch propeller. The most recent annual inspection was completed on August 1, 2017, at a tachometer time of 2,895.49 hours. At the time of the accident, the tachometer reading was 2,911.22 hours. The Hobbs meter was destroyed during the accident, and the current airframe total times could not be determined. A review of the maintenance logbooks revealed that the last altimeter/pitot-static system and transponder test was performed on June 15, 2015.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument (IMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	VQQ,79 ft msl	**Distance from Accident Site:**	17 Nautical Miles
Observation Time:	15:11 Local	**Direction from Accident Site:**	197°
Lowest Cloud Condition:	Unknown	**Visibility**	2 miles
Lowest Ceiling:	Overcast / 900 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	12 knots /	**Turbulence Type Forecast/Actual:**	/ None
Wind Direction:	30°	**Turbulence Severity Forecast/Actual:**	/ N/A
Altimeter Setting:	29.87 inches Hg	**Temperature/Dew Point:**	17°C / 17°C
Precipitation and Obscuration:	N/A - None - Mist		
Departure Point:	OCALA, FL (OCF)	**Type of Flight Plan Filed:**	IFR
Destination:	JACKSONVILLE, FL (VQQ)	**Type of Clearance:**	IFR
Departure Time:	15:00 Local	**Type of Airspace:**	Class E

VQQ was located about 18 miles north-northeast of the accident site at an elevation of 80 ft. The recorded VQQ special weather observation at 1511 included wind from 030° at 12 knots, 2 miles visibility in mist, overcast ceiling at 900 ft above ground level (agl), temperature and dew point 17°C, and altimeter setting of 29.87 inches of mercury (inHg).

The closest weather reporting location was Keystone Airpark (42J) Keystone Heights, Florida, located about 8 miles south-southwest of the accident site. The 1515 recorded observation at 42J included wind from 040° at 8 knots, 10 miles visibility or more, broken ceiling at 800 ft agl, overcast ceiling at 1,100 ft agl, temperature and dew point 18°C, and altimeter setting of 29.85 inHg.

Weather Surveillance Radar

The National Weather Service KJAX WSR-88D detected a large area of light to moderate intensity echoes along the airplane's flight track and in the vicinity of the accident site, and indicated that the accident flight was in clouds and precipitation when the flight deviated west and then back to the south. The 1513 base reflectively image showed that the airplane's flight track operated through echoes of 30 to 40 dBZ, moderate intensity echoes and in an area of 15 to 20 dBZ echoes at the time of the accident (See figure 1).

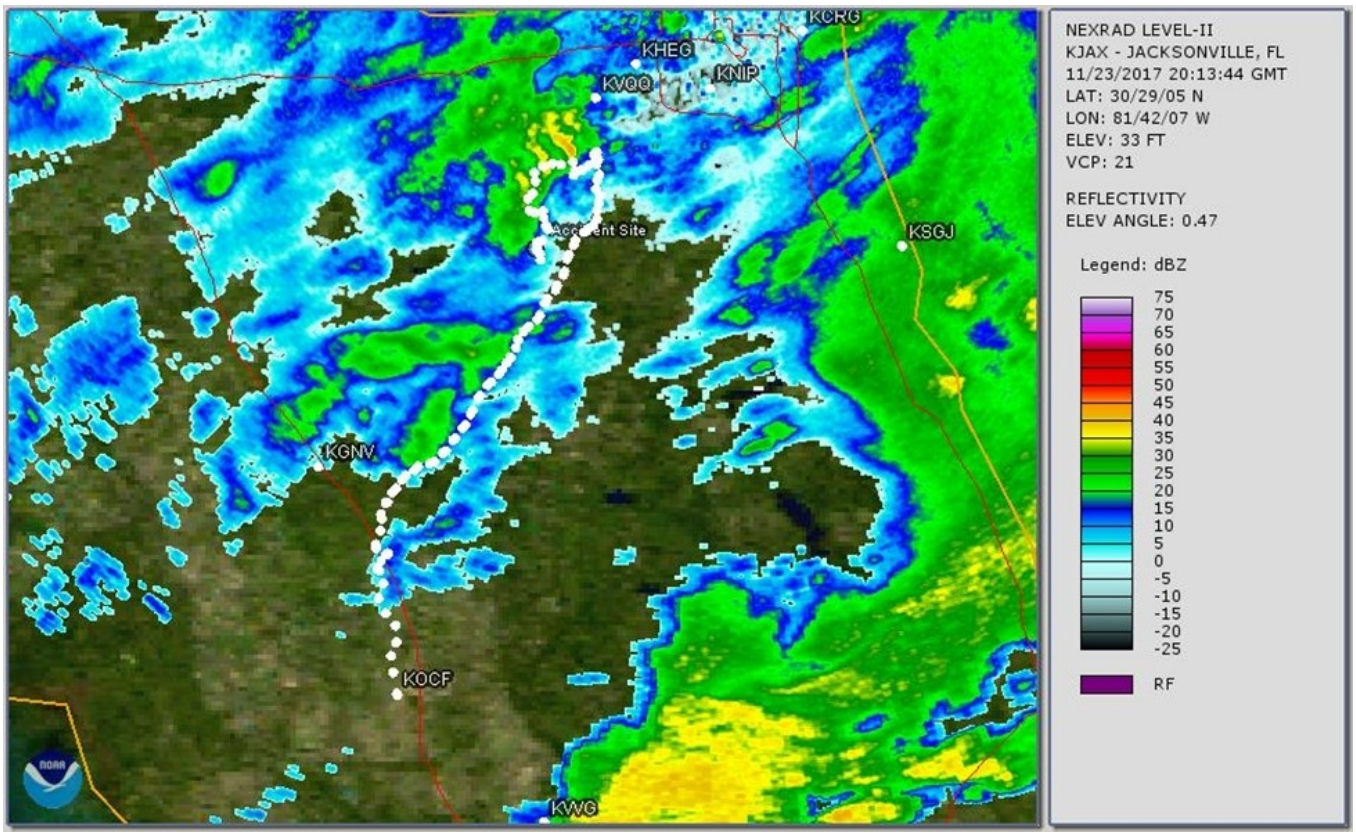

Figure 1. KJAX WSR-88D 0.5° base reflectivity image for 1513 with airplane's flight track of overlaid

Preflight Weather Briefing

The pilot filed IFR flight plans at 0858 and at 1405 with Leidos Flight Service; however, the pilot did not request any weather briefings. There was no record of contact with any other Direct User Access Terminal Service (DUATS) providers or with ForeFlight; therefore, what weather products or advisories the pilot may have familiarized himself with before the flight could not be determined.

Airport Information

Airport:	CECIL VQQ	**Runway Surface Type:**	
Airport Elevation:	79 ft msl	**Runway Surface Condition:**	Unknown
Runway Used:		**IFR Approach:**	ILS
Runway Length/Width:		**VFR Approach/Landing:**	None

VQQ was a publicly-owned airport, located in Jacksonville, Florida. It was classified by the FAA as a towered controlled, public use airport. The airport elevation was 79.1 feet above mean sea level and there were four runways oriented in a 18L/36R,18R/36L, 09R/27L or 09L/27R configuration.

Runway 18L/36R was asphalt and concrete. It was grooved and in good condition. The total length was

12,503 ft long and 200 ft wide. It was marked with precision markings in fair condition.

Runway 36R was equipped with a 3.00° glide path angle indicator, high intensity runway edge lights, Medium-intensity Approach Lighting System with runway alignment indicator lights, and runway end identifier lights. A postaccident check of the runway 36R localizer, glideslope, and distance measuring equipment (DME) by FAA specialists found all the readings were within tolerances.

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Fatal	**Latitude, Longitude:**	29.951944,-81.979446

The wreckage came to rest on a 314° heading about 18 miles from VQQ on the training base of Camp Blanding Military Reservation, Florida. The fuselage was broken into two parts; the cockpit and empennage separated aft of the rear seat at the wing spars. All flight control surfaces were located at the accident site along the debris path.

All flight controls were destroyed and their respective control tubes were impact damaged. Continuity of the flight control tubes could not be established, but the tubes from the yoke mounts to the wing roots were present. Engine and propeller controls were impact damaged and did not reveal useful information. The fuel selector was noted in the left wing tank position and 10 gallons of liquid consistent with aviation fuel was drained from the left wing tank. Flight control tubes in the left wing were attached to the left aileron and the aileron remained attached to the wing surface. The flap remained attached to the wing and the flap control tubes were damaged. The position of the flaps at the time of impact could not be established. The right wing was fragmented along the debris path; its associated flight controls were accounted for and impact damaged.

The empennage was buckled; both horizontal stabilizers and elevators remained attached. The elevator control tubes remained attached to the elevators but were broken within the fuselage. The vertical stabilizer was separated and located along the debris path. The rudder was separated from the vertical stabilizer and located along the debris path. The rudder and elevator control tubes were located within the empennage and buckled but could not be manipulated due to impact damage.

The engine was impact-damaged. The engine was partially dissembled for examination and the engine accessories were removed. Rotation of the crankshaft produced thumb compression and valve train movement on all four cylinders. The spark plugs were removed and were gray. The oil sump screen was removed and was free of debris. Both magnetos were impact-damaged. The ignition leads were broken and separated from the spark plugs. The magneto drive gear was rotated on both magnetos and produced spark on all ignition leads. The vacuum pump was disassembled and all internal vanes were intact. The internal drive coupling was intact and not damaged. The carburetor was separated from the engine and

impact damaged. The carburetor was disassembled and the bowl was free of debris. Examination of the fuel screen revealed insignificant amounts of debris. The throttle and mixture cable were separated from the carburetor and impact damaged.

All three propeller blades were damaged and remained attached to the hub; the hub remained attached to the crankshaft. One blade was bent aft and had chordwise scoring, one blade remained relatively straight with scoring, and one blade exhibited "S" bending and scoring along its span.

No anomalies of the airframe and engine were noted that would have precluded normal operation.

Medical and Pathological Information

The Office of the Medical Examiner, Jacksonville, Florida, performed an autopsy on the pilot. The cause of death was noted as multiple blunt force trauma.

Toxicology testing performed by the FAA's Bioaeronautical Sciences Research Laboratory was negative for carbon monoxide, cyanide, basic, acidic, and neutral drugs with the exception of:

Salicylates (i.e. aspirin) which was detected in urine was previously reported by the airman.

Additional Information

According to the FAA's General Aviation Joint Steering Committee, a pilot's sight, supported by other senses, allows a pilot to maintain orientation while flying. However, when visibility is restricted (i.e., no visual reference to the horizon or surface detected), the body's supporting senses can conflict with what is seen. When this spatial disorientation occurs, sensory conflicts and optical illusions often make it difficult for a pilot to tell which way is up.

The FAA Airplane Flying Handbook (FAA-H-8083-3) describes some hazards associated with flying when visual references, such as the ground or horizon, are obscured. The handbook states:

The vestibular sense (motion sensing by the inner ear) in particular tends to confuse the pilot. Because of inertia, the sensory areas of the inner ear cannot detect slight changes in the attitude of the airplane, nor can they accurately sense attitude changes that occur at a uniform rate over a period of time. On the other hand, false sensations are often generated; leading the pilot to believe the attitude of the airplane has changed when in fact, it has not. These false sensations result in the pilot experiencing spatial disorientation.

FAA AC-00-6B, Aviation Weather, describes thunderstorms and the turbulence that is associated with

them. The AC stated, in part:

Turbulence is present in all thunderstorms. Severe or extreme turbulence is common. Gust loads can be severe enough to stall an aircraft at maneuvering speed or to cause structural damage at cruising speed. The strongest turbulence occurs with shear between updrafts and downdrafts. Outside the cumulonimbus cloud, turbulence has been encountered several thousand feet above, and 20 miles laterally from, a severe storm.

The Turbulence Reporting Criteria Table in the FAA Aeronautical Information Manual provides the following definitions:

Severe: Turbulence that causes large, abrupt changes in altitude and/or attitude. It usually causes large variations in indicated airspeed. Aircraft may be momentarily out of control.
Extreme: Turbulence in which the aircraft is violently tossed about and is practically impossible to control. It may cause structural damage.

FAA Advisory Circular AC 60-22, Aeronautical Decision Making, stated, "Pilots, particularly those with considerable experience, as a rule always try to complete a flight as planned, please passengers, meet schedules, and generally demonstrate that they have 'the right stuff.'" One of the common behavioral traps identified was "Get-there-itis." The text stated, "Common among pilots, [get-there-itis] clouds the vision and impairs judgment by causing a fixation on the original goal or destination combined with a total disregard for any alternative course of action."

Administrative Information

Investigator In Charge (IIC):	Alleyne, Eric
Additional Participating Persons:	Robert Lasky; FAA/FSDO; Orlando, FL Mike Childers; Lycoming; Williamsport, PA Robert Collier; Mooney; Kerrville, TX
Original Publish Date:	April 20, 2020
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=96363