Aviation Investigation Final Report

Location:	Palo Alto, California	**Accident Number:**	WPR18FA251
Date & Time:	September 4, 2018, 11:00 Local	**Registration:**	N701JM
Aircraft:	Mooney M20J	**Aircraft Damage:**	Substantial
Defining Event:	Aerodynamic stall/spin	**Injuries:**	1 Fatal, 1 Serious, 1 Minor
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot was flying two passengers on an Angel Flight. When the airplane was about 10 miles north of the destination, the pilot contacted the air traffic control tower (ATCT). He was given instructions to fly to a charted VFR checkpoint, but then reported that he was not familiar with it and asked for directions from the controller. The pilot navigated to that checkpoint after several communications, and was then instructed to overfly a second checkpoint, about 2.5 miles north of the runway, as his left base leg for the arrival. The pilot was unable to locate the airport and requested ATCT assistance to advise him when to turn final, which the controller did. The pilot saw the airport and continued the approach.

Witnesses observed the airplane touch down about mid-field and began to porpoise, alternately bouncing between the main and nose landing gear. After 3 to 4 oscillations, the pilot initiated a go-around and reported to the controller of the go-around. In response, the controller instructed the pilot to make a left closed traffic and asked if he needed assistance, to which the pilot replied “negative, I just came in too fast." The airplane climbed a few hundred feet and was then observed to enter a very steep left bank. The nose pitched sharply down, and the airplane descended rapidly to the ground. Examinations of the airplane and engine did not reveal any evidence of any pre-impact mechanical deficiencies or failures. Physical examination of the engine and propeller, combined with review of recorded engine operating parameter data, indicated that the engine operated normally, and was producing power at impact.

The pilot’s logbook indicated that he had flown into that airport at least 32 times before, and therefore he should have been familiar with both the physical location of the airport and the names and locations of the local navigation fixes. Even if he had never been into that airport before, proper preflight planning dictates that he should have become familiar with those aspects.

Data downloaded from the onboard GPS device revealed the airplane was about 10 to 15 knots above the manufacturer's approach speed (75 knots for the calculated landing weight) during final approach.

The data also indicated that for most of the final approach, the airplane remained below the runway's 4° PAPI approach slope path

The pitch trim was found slightly airplane nose down from the normal takeoff setting, but the flaps were found fully retracted. The manufacturer's go-around procedures called for full power, liftoff, and retraction of the flaps from the landing position (full down) to the takeoff position (approximately half) once the climb was established. Then, in sequence, this was to be followed by re-trimming in pitch, acceleration to 76 knots, landing gear retraction, flap retraction to the full-up position, and acceleration to 86 knots. Witnesses reported that the landing gear was retracted very soon after liftoff, making it likely that the pilot did not comply with the manufacturer's retraction sequence.

The flaps-retracted 0° bank stall speed for the calculated airplane weight was about 58 knots, and the stall speed for 30° bank was about 63 knots. Takeoff flaps reduce these speeds by about 2 knots. Both the short amount of time between liftoff and the stall, and the stall itself, indicate that the pilot had fully retracted the flaps prior to achieving the prescribed speed of 86 knots. Based on the available information, speed mismanagement by the pilot, and a reduced stall margin due to the pilot prematurely retracting the flaps, caused the airplane to stall during the early portion of its go-around climb out at an altitude too low for recovery.

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 aircraft control during a go-around due to his premature flap retraction, which resulted in an aerodynamic stall and subsequent loss of control.

Findings

Personnel issues	Use of equip/system - Pilot
Aircraft	Airspeed - Not attained/maintained
Aircraft	Angle of attack - Capability exceeded
Personnel issues	Incorrect action sequence - Pilot
Personnel issues	Incorrect action performance - Pilot
Aircraft	TE flap control system - Incorrect use/operation

Factual Information

History of Flight

Landing-flare/touchdown	Abnormal runway contact
Landing-aborted after touchdown	Abnormal runway contact
Initial climb	Aerodynamic stall/spin (Defining event)

On September 4, 2018, about 1100 Pacific daylight time, a Mooney M20J airplane, N701JM, was substantially damaged when it was involved in an accident in Palo Alto, California. The pilot was fatally injured. One passenger received serious injuries, and the other passenger received minor injuries. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

The pilot and airplane were based at Placerville Airport (PVF), Placerville, CA. The purpose of the flight was to perform an Angel Flight and fly a patient from the Redding Municipal Airport (RDD), Redding, California to the Palo Alto Airport (PAO). On the day of the accident, the airplane arrived at RDD about 0900 to pick up the patient and her mother. Surveillance camera imagery at RDD indicated that the two passengers boarded, and that the airplane departed the RDD ramp about 0924.

About 7 minutes before landing at PAO, the pilot contacted the PAO air traffic control tower. The controller instructed the pilot to enter a left base for runway 13. About 10 seconds later, the controller instructed the pilot to "fly to KGO," a charted visual flight rules (VFR) checkpoint and waypoint, and then enter the left base. The pilot responded that he was unfamiliar with KGO. The controller guided the pilot to KGO, and then instructed the pilot to fly to a second charted VFR checkpoint. About 3 minutes later, the pilot reported that he was having difficulty locating the airport; the controller advised him to turn to a heading that would nearly place the airplane on the final approach course. The pilot turned, sighted the airport, and advised the controller. About 1 minute and 10 seconds later, the pilot radioed "I'm gonna have to abort this and go around." The controller instructed the pilot to make "left closed traffic," and asked if the pilot needed any assistance, to which the pilot replied, "negative I just came in too fast." That was the last communication from the pilot, and the accident occurred about 20 seconds later.

GPS data revealed that as the airplane became established on the final approach course, it was at a GPS altitude of about 550 ft, with groundspeed ranging between 81 and 84 knots. As the airplane traveled inbound on final approach, the groundspeed first increased to about 86 knots, and then steadily decreased to about 73 knots.

Runway 13 was equipped with a precision approach path indicator (PAPI) which provides visual approach slope guidance for pilots. The PAPI approach path slope was 4°, and the PAPI slope intercepted the runway about 400 ft beyond the threshold. For most of the approach, the airplane was below the 4° PAPI approach path.

Both passengers were seated in the rear, and they wore headsets so that they could hear and speak to one another, as well as the pilot. The mother reported that they "came in for a very rocky landing…[and]... we bounced on the airstrip and then took off again." She heard the pilot tell ATC that he had to do a go around, and that he just came in too fast."

A flight instructor and student both reported that they were near midfield on the parallel taxiway (taxiway Z), taxiing toward the runway 13 threshold. The instructor and student watched the accident airplane touch down then begin to "porpoise," oscillating in pitch and alternately bouncing between the main landing gear and the nose landing gear. They observed 3 to 4 oscillations before they saw the airplane lift off and the landing gear retract. At that point, the instructor stopped watching the airplane, but his student continued to watch it. Very shortly thereafter, the student called the instructor's attention back to the airplane. The instructor saw it enter a very steep left bank (70° to 80°) at an altitude of about 150 to 200 ft and watched the nose pitch sharply down (about 60°), and then descend very rapidly to the ground as it essentially reversed course during the event. Other eyewitnesses reported very similar observations.

Review of the engine data revealed that all parameter values remained within their normal operating ranges for the duration of the flight and were consistent with normal engine operation. The data was consistent with witness statements describing the approach and attempted go-around.

The airplane impacted vegetation and a fence before striking the mud and water of the tidal flat. The two passengers, who were both seated in the rear seats, were able to exit via the single cabin door, which was located on the right side of the airplane. The daughter received minor injuries and her mother was seriously injured.

Pilot Information

Certificate:	Private	**Age:**	66,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:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	BasicMed	**Last FAA Medical Exam:**	May 5, 2017
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	1265 hours (Total, all aircraft), 38 hours (Total, this make and model), 3 hours (Last 24 hours, all aircraft)		

The pilot's logbook indicated that his experience in the accident airplane consisted of about 16 hours of dual instruction and about 22 hours of pilot-in-command time. There were no entries indicating that the pilot practiced takeoffs and landings in this airplane without an instructor. There were no entries

indicating that the pilot practiced go-around or balked landings in this airplane, either solo or with an instructor.

The logbook indicated that the pilot had made 18 trips to PAO in a Cirrus SR22 and 10 trips in a Piper PA-28-236. The accident flight was the pilot's fourth flight to PAO in the accident airplane. These four flights were his most recent ones to PAO, and all four were VFR.

Aircraft and Owner/Operator Information

Aircraft Make:	Mooney	**Registration:**	N701JM
Model/Series:	M20J No Series	**Aircraft Category:**	Airplane
Year of Manufacture:	1992	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	24-3281
Landing Gear Type:	Retractable - Tricycle	**Seats:**	4
Date/Type of Last Inspection:	April 24, 2018 Annual	**Certified Max Gross Wt.:**	2900 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	1063 Hrs as of last inspection	**Engine Manufacturer:**	Lycoming
ELT:	Installed	**Engine Model/Series:**	IO-360-B1E
Registered Owner:		**Rated Power:**	180 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

Federal Aviation Administration (FAA) records indicated that in 2013, a Garmin GTN750 GPS-capable nav/comm device was installed in the airplane. This device included a 7 inch full-color moving map display, which was installed in the approximate lateral center of the instrument panel, just to the right of the pilot's side instrument panel.

The airplane's weight and balance values at the time of the accident were calculated using known and estimated weights. The airplane’s weight was between 2,621 lbs and 2,693 lbs, which was within the certificated weight. The center of gravity was within the envelope for the landing and go-around, although it was close to the aft limit.

The pilot's operating handbook (POH) specified the electrically controlled and operated trailing edge flaps were to be set at 15° for takeoffs and full down (about 33°) for landings.
The POH specified an approach speed of 74 knots for an operating weight of 2,600 lbs.

The POH landing distance chart was used to determine the approximate expected landing distances based on a weight of 2,650 lbs and a 30-ft obstacle. For the zero-wind condition, the total estimated landing distance was about 1,630 ft, including a ground roll of about 1,000 ft. For a 4-kt headwind

condition, the total estimated landing distance was about 1,520 ft, including a ground roll of about 900 ft.

The POH cited the zero-bank, landing gear and flaps retracted stall speeds of 59 knots and 57 knots for weights of 2,740 lbs and 2,500 lbs, respectively. These speeds decrease by about 2 knots for the gear-down, flaps 15° configuration.

The airplane's POH go-around (balked landing) procedures called for full power, liftoff at 65 knots, and retraction of flaps to the takeoff setting once the climb was established. In sequence, this was to be followed by re-trimming in pitch, acceleration to 76 knots, landing gear retraction, flap retraction to the full-up position, and acceleration to 86 knots.

The go-around section contains a "Caution" stating "To minimize control wheel forces during a go-around, timely nose-down trimming is recommended to counteract nose-up pitching moment as power is increased and/or flap retraction."

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	PAO,7 ft msl	**Distance from Accident Site:**	0 Nautical Miles
Observation Time:	11:08 Local	**Direction from Accident Site:**	
Lowest Cloud Condition:	Scattered / 1300 ft AGL	**Visibility**	7 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	7 knots /	**Turbulence Type Forecast/Actual:**	None / None
Wind Direction:	90°	**Turbulence Severity Forecast/Actual:**	N/A / N/A
Altimeter Setting:	29.92 inches Hg	**Temperature/Dew Point:**	19°C / 15°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Redding, CA (RDD)	**Type of Flight Plan Filed:**	None
Destination:	Palo Alto, CA (PAO)	**Type of Clearance:**	None
Departure Time:	09:30 Local	**Type of Airspace:**	Class D

Airport Information

Airport:	Palo Alto PAO	**Runway Surface Type:**	Asphalt
Airport Elevation:	7 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	13	**IFR Approach:**	None
Runway Length/Width:	2443 ft / 70 ft	**VFR Approach/Landing:**	Traffic pattern

Runway 13 was designated as having left traffic, with a traffic pattern altitude of 800 ft msl.

In response to an email from a pilot based at PAO that suggested poor runway conditions at the airport, an FAA inspector flew to the airport and reported that the runway was “fairly bumpy,” but he "didn't note it as anything unmanageable," and that it "had at least some minor" effect on the airplane's "stability and [the pilot's] go-around decision."

About 3 months before the accident, the airport was inspected by the Division of Aeronautics of the California Department of Transportation (Caltrans). Caltrans did not cite any observations, concerns, or corrective actions regarding runway surface conditions.

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 Serious, 1 Minor	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Fatal, 1 Serious, 1 Minor	**Latitude, Longitude:**	37.458332,-122.108886(est)

The airplane came to rest about 600 ft beyond the runway 31 threshold and about 600 ft left (northeast) of the extended runway centerline. Ground scars, oriented about 017° magnetic, included a broken fence, gouges between the fence and the shoreline, and slices/gouges in the tidal flat mud. The 6-ft high fence was located about 50 ft prior to the shoreline. The ground scars were discontinuous between the fence and shoreline.

The airplane remained upright, in about 1 ft of tidal salt water about 30 ft from shore. The engine and propeller were partially separated from the fuselage and were submerged in the mud. A detailed engine examination did not reveal any pre-impact anomalies or damage. The 2-blade propeller remained attached to the engine, and both blades exhibited moderate deformation, consistent with engine power at the time of impact. Neither blade tip exhibited any damage indicative of a runway strike. Witness reports suggested the possibility of propeller strikes on the runway, but two separate runway walkdowns did not reveal any propeller strike scars.

The forward fuselage/cockpit was moderately crushed and deformed, while the aft cabin/seating area retained its normal occupiable volume. The instrument panel was severely disrupted, and the cockpit was partially crushed. The ignition key remained in place, and the switch was set to the “BOTH” position. The two master switches were set to the “ON” position. An iPad mount was found attached to the pilot's yoke, and remnants of an iPad were found in the cockpit. This setup is typically used to present a moving map display and other information to pilots for navigation purposes.

Both wings were substantially damaged, and the outboard section of the left wing was fracture-separated at about the two-thirds span location. The landing gear, flaps, and speedbrakes were found in their

respective retracted positions.

The fuel selector valve cockpit handle was found set to the right tank. The valve handle was unable to be rotated. Both fuel tank caps were present and securely attached. The left fuel tank was intact and contained about 16 gallons of fuel. The right tank was found devoid of fuel; the tank drain was impact-damaged and leaked when tested with water.

The aft fuselage was slightly crumpled. The empennage was primarily intact, except that the left elevator was partially torn from its hinges. The pitch trim mechanism was a pivoting empennage that consisted of an attach hinge assembly and an electrically controlled and actuated jackscrew, with manual backup. The jackscrew and cockpit trim position indicator were found slightly airplane nose down from the normal takeoff setting.

All airplane components were accounted for on scene. No evidence consistent with in-flight fire or in-flight structural failure was observed.

Stall Warning System

The airplane was equipped with a stall warning system (SWS). Due to damage, neither the system operability nor its accuracy could be determined.

Medical and Pathological Information

The Santa Clara County (California) Office of the Medical Examiner-Coroner autopsy report indicated that the pilot’s cause of death was "multiple injuries."

The FAA Bioaeronautical Research Sciences Laboratory conducted forensic toxicology examinations on specimens from the pilot and reported that no carbon monoxide or ethanol were detected. The only screened drug that was detected was Tamsulosin, a prescription medication used to treat the symptoms of an enlarged prostate. According to the FAA, Tamsulosin is a medication that is generally acceptable for airmen, except for pilots "exposed to aerobatic flight or sustained acceleration."

Organizational and Management Information

Angel Flight West

Angel Flight West (AFW) is a regional division of Angel Flight. According to its website, Angel Flight West is "a nonprofit, volunteer-driven organization that arranges free, non-emergency air travel for children and adults with serious medical conditions and other compelling needs. "

In response to several questions from the NTSB, the AFW executive director stated that AFW provides both donated general aviation flights and commercial flights to its passengers.
Regarding pilots' qualifications, AFW conducts initial checks during the pilot orientation process, but then the pilots "self affirm" flight experience currency, insurance, and other qualifications prior to each mission. They do not conduct pilot flight checks; instead, AFW relies on "the expertise of the FAA" and pilots' insurance companies to ensure that pilots are appropriately qualified. AFW did not require pilots to provide any records of qualification changes or updates subsequent to their initial orientation-required information. The accident pilot satisfactorily completed the AFW orientation process and qualifications checks.

Subsequent to this accident, AFW "enhanced" its safety management system to "create a culture of self-reporting [and] safety learning." AFW also added a paid safety officer position tasked with managing the safety management system program.

Administrative Information

Investigator In Charge (IIC):	Huhn, Michael		
Additional Participating Persons:	Dennis Pearson; FAA ; San Jose, CA Robert Collier; Mooney Aircraft; Kerrville, TX Mark Platt; Lycoming Engines; Williamsport, PA Andrew Swanson; City of Palo Alto; Palo Alto, CA		
Original Publish Date:	December 3, 2020	**Investigation Class:**	2
Note:	The NTSB traveled to the scene of this accident.		
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=98235		

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The Independent Safety Board Act, as codified at 49 U.S.C. Section 1154(b), precludes the admission into evidence or use of any part of an NTSB report related to an incident or accident in a civil action for damages resulting from a matter mentioned in the report. A factual report that may be admissible under 49 U.S.C. § 1154(b) is available here.