Aviation Investigation Final Report

Location:	San Diego, California	**Accident Number:**	WPR14FA320
Date & Time:	July 30, 2014, 17:35 Local	**Registration:**	N147MP
Aircraft:	Mooney M20L - NO SERIES	**Aircraft Damage:**	Substantial
Defining Event:	Loss of control in flight	**Injuries:**	1 Fatal, 1 Serious
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot stated that after the airplane bounced on landing, she aborted the landing by adding full power and confirmed that the flaps were in the takeoff position. She further stated that when she realized that the airplane was not climbing normally and that the engine did not seem to be providing full power, she prepared for an emergency landing to a parking lot between two large retail buildings. The airplane impacted a rooftop air conditioning unit on one of the buildings, collided with the roof's perimeter cinderblock barrier, and then fell to the ground.

A witness, who was a pilot, reported that he observed the airplane flying low over the runway in a nose-high attitude, and, when it crossed the departure end of the runway, it was only about 25 ft above the runway approach lighting. The witness stated that he observed the airplane continue to fly low in a nose-high attitude, and he did not think it was going to clear the trees in its flight path. He further stated that just before reaching the trees, the airplane's nose pitched up abruptly into a very nose-high attitude, and the airplane climbed about 100 to 200 ft, cleared the trees, but then stopped climbing. According to the witness, "it looked like it stalled, followed by the left wing dipping." The witness added that the airplane then descended in a nose-high, left-wing-low attitude and went out of sight behind a building.

Postaccident examination of the airframe and engine revealed no evidence of mechanical malfunctions or failures that would have precluded normal operation. The landing gear was found extended, which would have resulted in reduced climb performance. The airplane's pilot operating handbook states that the landing gear is to be retracted during a go-around procedure. The airplane's initial nose-high attitude (before the abrupt pitch-up) also likely reduced climb performance. It is likely that the pilot recognized that the airplane was entering an aerodynamic stall during the steep climb over the trees, lowered the nose, gained airspeed, and averted a spin. However, at this point, there was insufficient altitude to fully recover from the stall and stop the airplane's descent before it impacted the building.

Probable Cause and Findings

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

The pilot's failure to achieve climb performance and maintain sufficient airspeed during a go-around, which led to the airplane exceeding its critical angle of attack and experiencing an aerodynamic stall. Contributing to the accident was the pilot's failure to retract the landing gear in accordance with the go-around checklist.

Findings

Personnel issues	Aircraft control - Pilot
Aircraft	Airspeed - Not attained/maintained
Aircraft	Angle of attack - Capability exceeded
Personnel issues	Forgotten action/omission - Pilot
Personnel issues	Use of checklist - Pilot
Environmental issues	Residence/building - Contributed to outcome

Factual Information

History of Flight

Landing-aborted after touchdown	Attempted remediation/recovery
Initial climb	Loss of control in flight (Defining event)
Approach-VFR go-around	Aerodynamic stall/spin
Approach-VFR go-around	Off-field or emergency landing
Emergency descent	Collision with terr/obj (non-CFIT)

HISTORY OF FLIGHT

On July 30, 2014, about 1735 Pacific daylight time, N147MP, a Mooney M20L, was substantially damaged following an aborted landing at Montgomery Field (MYF), San Diego, California. The private pilot sustained serious injuries, and the sole passenger received fatal injuries. Visual meteorological conditions prevailed at the time of the accident, and no flight plan was filed. The personal cross-country flight, which was being operated in accordance with 14 Code of Federal Regulations Part 91, departed the San Bernardino International Airport (SBD) about 1630, with MYF as its destination.

In a statement provided to the National Transportation Safety Board (NTSB) investigator-in-charge (IIC), the pilot reported that she departed SBD with one passenger en route to MYF, and was using visual flight rules Flight Following. The pilot further reported that about 1735 while landing at MYF, the airplane bounced, at which time she attempted to go around for another landing by adding full power, verifying rotation speed, and noting that the flaps were in the takeoff position. The pilot stated that soon after lifting off she realized that the airplane was not climbing as it normally should, and that the engine didn't seem to be making full power. The pilot reported her situation to the MYF control tower, after which she prepared for an emergency landing by verifying that she had full throttle in, and adequate airspeed. At this time, she turned in the direction of her "bailout" emergency landing site, a shopping complex parking lot. However, the airplane impacted the top of an industrial warehouse building before falling to the ground and coming to rest in a delivery area on the west side of the building.

In a statement provided to the NTSB IIC, a witness, who was also a pilot, reported that he was parked at the intersection of taxiway Golf and taxiway Kilo, when he noticed the accident airplane taking off over the end of Runway 28L. The witness stated the he noticed that it was very low, and that it continued to fly low in a nose-up attitude. The witness further stated that when it crossed over the runway approach lighting, it cleared the lights by a little more than 25 ft, when normally at this point the airplane would have already climbed to at least 500 ft. The witness added that the airplane continued its climb out over Highway 163 in a nose-high attitude, but was not climbing effectively, and that he didn't think it was going to clear the trees in its flight path, which were about 50 to 60 ft high. The witness reported that just prior to reaching the trees, the airplane's nose pitched up abruptly into a very nose-high attitude, increasing the angle of attack from what he would have estimated to have been between 15 to 20

degrees, or something closer to 30 degrees. The airplane quickly climbed up about 100 to 200 feet and cleared the trees, but then stopped climbing, at which point it looked like it had stalled, followed by the left wing dipping. The airplane then began a descent rate of about 200 to 300 ft per minute, while it maintained a nose-high, left-wing-low attitude, and then began to fall towards the southwest. The witness lost sight of the airplane when it went behind a building; a few seconds later he saw smoke rising from behind the building.

Other witnesses observed the airplane take off, make a sharp left turn, and then clip the top of a building before it "flipped down."

A survey of the accident site by the NTSB IIC and representatives from the Federal Aviation Administration (FAA) on the day following the accident, revealed that the airplane initially impacted a rooftop air-conditioning unit situated atop a retail building, about 28 feet above ground level with its right wing tip. It then proceeded across the rooftop on a measured magnetic heading of 200 degrees for about 40 ft, and then impacted the cinder block perimeter barrier with the forward undercarriage structure. Blue paint transfer signatures were observed on the top portion of the cinder block structure, which were consistent with the paint scheme on the lower forward section of the airplane. Additionally, the airplane's right main landing gear impacted the roof's perimeter barrier; the gear separated, and came to rest in a fenced in area about 25 feet of where the main wreckage came to rest in the delivery parking area on the southwest side of the building. Subsequent to the right main landing gear being separated, the airplane's right wing impacted a 40-foot tall light standard, also located on the southwest side of the building. The airplane then fell to the pavement, and rotated about 150 degrees to the right prior to coming to rest upright on a heading of about 350 degrees. A subsequent fire ensued. All components necessary for flight were accounted for at the accident site.

The wreckage was recovered to a secured storage facility for further examination.

PERSONNEL INFORMATION

The pilot, age 52, possessed a private pilot certificate with an airplane single-engine land rating. She reported a total time of 219 hours, with 164 hours in make and model. She also reported that she had completed her most recent flight review on July 24, 2013. Her most recent third-class medical certificate was issued on November 15, 2012, with the limitation, "Must wear corrective lenses for near and distant vision."

AIRCRAFT INFORMATION

The airplane was a single-engine, propeller-driven, four seat airplane, with dual flight controls, which was manufactured by Mooney Aviation Company in 1988. Its maximum takeoff gross weight was 2,900 pounds. It was powered by a Continental Motors (CMI) IO-550-N-16 reciprocating, direct drive, air-cooled, fuel injected engine, which had a maximum takeoff rating of 280 horsepower at sea level. It was equipped with a McCauley three-blade propeller.

A review of maintenance records revealed that the airplane's most recent annual inspection was conducted on June 18, 2014, at a total airframe time of 2,555.9 hours, and time on the engine since new was 967.3 hours. Additionally, a top overhaul of the engine was performed on October 9, 2013, at a tachometer time of 2,470.3 hours.

METEOROLOGICAL INFORMATION

At 1653, the MYF Automated Surface Observing System (ASOS), reported wind 270 degrees at 7 knots, visibility 10 miles, sky clear, temperature 29 degrees C, dew point 16 degrees C, and an altimeter setting of 29.92 inches of mercury.

At 1753, the MYF ASOS reported wind 280 degrees at 6 knots, visibility 10 miles, sky clear, temperature 28 degrees C, dew point 15 degrees C, and an altimeter setting of 29.91 inches of mercury.

WRECKAGE AND IMPACT INFORMATION

The wreckage was located in the truck delivery parking area between two retail buildings about 2,250 feet from the departure end of Runway 28L at MYF on a magnetic heading of 265 degrees. The airplane came to rest upright on a northerly heading, with significant impact damage to the right wing, as a result of colliding with a light standard. Fire damage and sooting was confined to the right cabin and cockpit area and the right wing.

The cabin and cockpit sections, although impact damaged, were primarily intact; the right side sustained thermal damage and light sooting. The throttle was observed retarded and the mixture was full rich. A survey of the cockpit instrumentation revealed the Horizontal Situation Indicator read 195 degrees, the Vertical Speed Indicator read plus 120 feet, the altimeter read 220 feet, the right and left fuel indicators read 33 gallons and undetermined respectively, the landing gear handle was positioned in the GEAR DOWN position, the flap switch was in the neutral position, the elevator trim was selected ON, High Boost and Boost Pump switches were off, both left and right control columns were remained connected, and all circuit breakers not tied off were in place. The airplane's Vision Microsystems VM1000 Display Assembly, serial number 94600, was removed from the airplane, and shipped to the NTSB Vehicle Recorder division for examination and testing.

The right wing remained attached to the airplane's fuselage at the wing root attach points. The wing was destroyed as a result of severe impact forces with the light standard, as well as thermal activity. The right aileron remained attached to the trailing edge of the wing at each of the three attach points, with fire and impact damage observed. Control continuity from the aileron to the cabin flight control area was confirmed during the postaccident investigation. The right flap, which was observed partially extended, was destroyed by fire and impact damage, with remnants of the component having remained partially attached to the trailing edge of the wing. The right fuel tank was destroyed. The fuel tank's filler cap was observed tightly in place and not compromised.

The airplane's left wing remained attached to the airplane's fuselage at the wing root attach points. The wing had sustained a longitudinal tear from the leading edge of the wing aft to the inboard area of the aileron. Additionally, the upper surface of the wing just forward of the extreme inboard area of the left flap was deformed upward over an area of 18 inches in width and 30 inches in length. The left aileron remained attached to the wing's trailing edge at all attach points, and had sustained only minor damage. Control continuity was confirmed from the aileron to the cockpit control area during the postaccident investigation. The left flap was observed partially extended and attached at all attach points to the trailing edge of its respective wing, and had sustained only minor damage. The left fuel tank was not beached, and the fuel filler cap was found tightly in place and not compromised.

The empennage, with the exception of the outboard one-third of the right horizontal stabilizer and right elevator and the inboard top section of the rudder, was observed to have sustained only minor damage. The referenced horizontal stabilizer was impact damaged, and moderate sooting was observed. Sooting was also observed on both the upper and lower surfaces of the right elevator. The forward top piece of the rudder, which overlays the top of the vertical stabilizer had failed down and aft to the left, and remained partially attached to the top of the rudder. Both horizontal stabilizers and vertical stabilizer remained attached to the fuselage, and were not compromised. The elevator remained attached to the vertical stabilizer at all attach points, and both elevators remained attached to the trailing edge of their respective horizontal stabilizer at all attach points, with the exception of the right outboard elevators attach point.

During the postaccident examination of the airplane, control continuity was observed from the elevator and rudder forward to the cockpit control area.

The airplane's left main landing gear was separated, and came to rest about 8 ft aft of the main wreckage. The right main landing gear had separated from the airplane after impact with the roof top perimeter barrier, and came to rest in an enclosure at ground level, about 25 feet east of the main wreckage. The nose landing gear was observed to have separated due to impact forces, and was located wedged in a fence about 20 ft east of the main wreckage.

The engine remained intact, but had separated from the firewall and upper engine mounts, and came to rest upright and canted downward about 30 degrees relative to the forward fuselage area. The engine sustained minimal impact damage, and no thermal damage was observed. The engine was subsequently sent to CMI for further examination.

The propeller remained attached to the engine crankshaft at the propeller flange. Each of the three propeller blades remained attached to the propeller at their respective hubs. Blades #1 and #2 sustained minimal damage with slight bending, while blade #3 was significantly damaged with forward bending observed. The propeller was shipped to McCauley Propellers for further examination.

TESTS AND RESEARCH

Vision Microsystems VM-1000 Engine Monitoring System

The airplane's Vision Microsystems VM-1000 engine monitoring system was recovered from the airplane by the NTSB IIC and shipped to the NTSB's Vehicle Recorder division in Washington, D.C. for examination. The Vehicle Recorder Specialist reported the following:

An exterior examination revealed that the display unit had sustained damage from impact forces, and the data processing unit had sustained minimal damage. An internal inspection revealed that the damage did not compromise the internal memory device. A new display module was obtained, and interfaced with the data processing unit. Data, which was stored within the data processing unit, was read out from the display screen upon power-up. The table that summarizes the observed minimum and maximum values as recorded can be found in the NTSB Vehicle Record Specialist's Factual Report, which is appended to the docket for this report.

Engine Examination/Engine Test Run

The airplane's engine was shipped to the facilities of Continental Motors, Inc., Mobile, Alabama, for examination and an engine test run. On December 2, 2014, under the supervision of the NTSB IIC, the engine examination and test run was performed at CMI's facility, with the following results reported by a CMI Air Safety Investigator:

Prior to the engine run, the propeller governor was removed and disassembled for a visual inspection. The flyweights, spring, pump gears, valve, and associated components displayed normal operating signatures. The engine was not disassembled prior to the engine run.

The crankshaft end-play measured 0.007", the crankshaft flange run-out was 0.003" the deflection was 0.002".

It was noted during the oil sump removal that there was several large pieces of orange material consistent with the alternator drive coupling; it was noted that the installed alternator drive coupling was intact with no missing portions.

The #2 intake push rod was removed, and visually inspected for possible damage resulting from the impact damage to the push rod housing; there was no damage noted. The push rod was installed in a serviceable push rod housing.

The engine was then prepared for operation by installing the appropriate thermocouples, pressure lines, and test pads for monitoring purposes.

The engine was then moved to CMI test cell number 43, and mounted for operation.

The engine was fitted with a test club propeller for the IO-550-N engine model.

The engine experienced a normal start on the first attempt without hesitation or stumbling in observed rpm. The engine rpm was advanced in steps for warm-up in preparation for full power operation, and held at each position for 5 minutes to stabilize. The engine throttle was then advanced to 1,200, 1,600, and 2,450 rpm, and then to the full open position. The engine throttle was then rapidly advanced from idle to full throttle six times, where it performed normally without any hesitation, stumbling, or interruption in power.

It was noted that there was an oil leak in the left rear of the engine; the oil leak was consistent with the impact damage to the oil filter adapter and the oil cooler.

Throughout the test phase, the engine accelerated normally without any hesitation, stumbling, or interruption in power, and demonstrated the ability to produce rated horsepower. (Refer to the CMI Engine Operational Test Report, which is appended to the docket for this report.)

Propeller Examination

The airplane's propeller was shipped to the facilities of McCauley Propeller Systems, Wichita, Kansas, for a teardown inspection. On December 4, 2014, the propeller was inspected by a McCauley engineer, who reported the following:

• The propeller had damage as a result of impact. There were no indications of any type of propeller failure or malfunction prior to impact.

• The propeller had indications of some mid-level amount of rotational energy absorption (above windmilling and below full power) during the impact sequence. Exact engine power level was not determined,

• The propeller had no impact signature markings or component positions indicating angle disagreement between blades at impact. All three propeller blades had indications of operating in the normal angle range at impact (16 to 40 degrees reference angle measured at the 30" blade spanwise station). Exact blade angles at impact were not determined. This approximate blade angle was consistent with a propeller being operated at the concluded power level.

The engineer also reported the following observations:

• The propeller had sudden-failure type damage that is typically associated with impact forces, and gross part deflections. The investigation found no evidence of any type of fatigue failure.

• The propeller blade butts had marks from contact with adjacent pitch change hardware during the accident sequence. The position of these marks indicates that all three blades were in the normal operating angle range at impact.

• All three actuating links were failed. The failure was tension overload type failure related to gross deflection of the blades and the pitch change mechanism during the impact sequence.

• All three actuating pins left similar indentations in the blade butts. The depth and direction of material displacement of the indentations corresponded to impact loading from gross deflection of the pitch change piston during the impact sequence.

• The propeller blade bending, twisting, and overall propeller assembly damage was typical of that associated with some mid-level (above windmilling and less than full power) rotational energy absorption at impact.

ADDITIONAL INFORMATION

According to the Mooney M20L Pilot's Operating Handbook, Section IV, Normal Procedures, issued 2-88, Rev. A, 8-18-88, page 4-15, the following procedures are outlined for a GO AROUND (BALKED LANDING):

Powerlever.....2343 RPM
(VERIFY FUEL ENRICH ANNUNCIATOR is ILLUMINATED)

Wing flaps..... TAKEOFF POSITION (10 degrees)
(After POSITIVE climb established)

Trim.....AS DESIRED

CAUTION

To minimize control wheel forces during maneuvering, timely nose-up trimming is recommended to counteract the nose down pitching moment as power is reduced and/or the flaps are extended

Airspeed.....75 KIAS

Landing Gear.....UP

Wing Flaps.....UP

Airspeed.....90 KIAS

Pilot Information

Certificate:	Private	**Age:**	52
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	3-point
Instrument Rating(s):	None	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	November 15, 2012
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	July 24, 2013
Flight Time:	219 hours (Total, all aircraft), 164 hours (Total, this make and model), 162 hours (Pilot In Command, all aircraft), 14 hours (Last 90 days, all aircraft), 8 hours (Last 30 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Mooney	**Registration:**	N147MP
Model/Series:	M20L - NO SERIES	**Aircraft Category:**	Airplane
Year of Manufacture:	1988	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	26-0027
Landing Gear Type:	Retractable - Tricycle	**Seats:**	4
Date/Type of Last Inspection:	June 18, 2014 Annual	**Certified Max Gross Wt.:**	2900 lbs
Time Since Last Inspection:	33 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	2555.9 Hrs at time of accident	**Engine Manufacturer:**	Continental
ELT:	C91A installed, not activated	**Engine Model/Series:**	IO-550
Registered Owner:	On file	**Rated Power:**	280 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:	MYF,427 ft msl	**Distance from Accident Site:**	68 Nautical Miles
Observation Time:	17:53 Local	**Direction from Accident Site:**	276°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	7 knots /	**Turbulence Type Forecast/Actual:**	/ None
Wind Direction:	270°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.92 inches Hg	**Temperature/Dew Point:**	29°C / 16°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	San Bernardino, CA (SBD)	**Type of Flight Plan Filed:**	None
Destination:	San Diego, CA (MYF)	**Type of Clearance:**	VFR flight following
Departure Time:	16:30 Local	**Type of Airspace:**	Class D

Airport Information

Airport:	Montgomery Field MYF	**Runway Surface Type:**	Asphalt
Airport Elevation:	427 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	28L	**IFR Approach:**	None
Runway Length/Width:	3401 ft / 60 ft	**VFR Approach/Landing:**	Traffic pattern

Wreckage and Impact Information

Crew Injuries:	1 Serious	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 Fatal	**Aircraft Fire:**	On-ground
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Fatal, 1 Serious	**Latitude, Longitude:**	32.816665,-117.152221

Administrative Information

Investigator In Charge (IIC):	Little, Thomas
Additional Participating Persons:	Scott Worthington; Federal Aviation Administration; San Diego, CA Kurt A Gibson; Continental Motors, Inc. ; Mobile, AL Robert Collier; Mooney International; Kerrville, TX Dan Ball; McCauley Propeller Systems; Wichita, KS
Original Publish Date:	October 21, 2015
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=89768