



Aviation Investigation Final Report

Location:	Scottsdale, Arizona	Accident Number:	WPR12FA297
Date & Time:	July 9, 2012, 09:37 Local	Registration:	N137MP
Aircraft:	Mooney M20L	Aircraft Damage:	Substantial
Defining Event:	Loss of control in flight	Injuries:	1 Serious, 1 Minor
Flight Conducted Under:	Part 91: General aviation - Instructional		

Analysis

The flight instructor stated that the pilot receiving instruction was practicing touch-and-go landings. On the fifth landing, the pilot flared too high, and the airplane dropped to the runway, landed hard, and bounced into the air. The flight instructor directed the pilot to “go around,” and the pilot applied power and fully retracted the flaps, which is contrary to the procedure in the pilot’s operating handbook to retract the flaps only to the 10-degree position. Both pilots stated that the engine did not respond. A video recording showed that the airplane’s altitude was about 30 feet above the ground when it rolled left to a bank angle of about 90 degrees. The left wing tip impacted the runway, and the airplane cartwheeled and came to rest upright about 200 feet left of the runway centerline.

Postaccident examination of the engine revealed that two O-ring seals were installed on each of the engine’s six fuel injector nozzles, whereas the engine’s maintenance manual called for the installation of only one O-ring seal on each nozzle. However, flow testing showed that placing two O-rings on the nozzles had no effect on the operation of the fuel system. No other anomalies were found, and the examination and testing indicated that the engine was capable of operating normally and producing its rated horsepower. Further, the damage to the propeller blades was consistent with the engine operating at a mid-range to high power setting at impact. The airplane’s left roll to a steep bank angle is consistent with the engine developing power as the airplane enters an aerodynamic stall, which resulted in a torque roll to the left.

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 airplane control during an aborted landing, and the flight instructor's delayed remedial action. Contributing to the accident were the pilot's improper landing flare, which resulted in a bounced landing, and his premature flap retraction while performing a go-around maneuver.

Findings

Personnel issues	Delayed action - Instructor/check pilot
Personnel issues	Aircraft control - Pilot
Aircraft	Landing flare - Not attained/maintained
Aircraft	Trailing edge flaps - Incorrect use/operation
Personnel issues	Incorrect action performance - Pilot

Factual Information

History of Flight

Landing-flare/touchdown	Hard landing
Landing-flare/touchdown	Loss of control in flight (Defining event)
Landing-flare/touchdown	Runway excursion

HISTORY OF FLIGHT

On July 9, 2012, at 0937 mountain standard time, a Mooney M20L, N137MP, was substantially damaged when it experienced a hard landing followed by a loss of control at Scottsdale Airport, Scottsdale, Arizona. The flight instructor was seriously injured, and the pilot receiving instruction received minor injuries. The airplane was being operated by the private pilot/owner under the provisions of 14 Code of Federal Regulations Part 91. A flight plan had not been filed for the local instructional flight, which had originated about 35 minutes before the accident. Visual meteorological conditions prevailed at the time of the accident.

The pilot/owner had purchased the airplane in Florida a few days before the accident. He and the flight instructor flew the airplane back to the Phoenix area together, arriving about 2 to 3 days before the accident. The purpose of the flight was to get more flight experience in his recently acquired airplane. The flight instructor reported that the pilot was practicing touch-and-go landings on runway 21. On the fifth landing, the pilot flared too high, and the airplane dropped to the runway and landed hard. The airplane bounced back into the air, and the flight instructor directed the pilot to "go around." The pilot pushed the power lever to the full open position and then moved his right hand to the flap handle. The pilot reported that he moved the flaps to the up position. Both the pilot and the flight instructor reported that the engine "did not respond."

The flight instructor stated that, in order to prevent the airplane from stalling, he pushed the nose of the airplane down and attempted to level the wings. He said that his actions "resulted in the airplane impacting the ground in a fairly level attitude, which minimized the severity of the impact." He reported that, after it impacted terrain, the airplane veered off the left side of the runway. The flight instructor said that he inspected the wreckage after the accident and found the flaps in the full up position.

Two video cameras documented the accident. One was located at the control tower, and a second one was located approximately 1,700 feet from the threshold of runway 21 and approximately 575 feet to the left of the runway centerline. A study of the videos was performed by the National Transportation Safety Board (NTSB) Vehicle Recorder Division, Washington, D.C., headquarters. The second camera was located much closer to the accident, and its images display the unfolding events more accurately. The video showed that, after the

airplane's hard landing, which was about 500 feet from the runway threshold, it became airborne and reached an altitude of between 24 to 37 feet. The video further showed that the accident airplane entered a left bank with an increasing bank angle that reached approximately 90 degrees. The left wingtip contacted the ground, and the airplane cartwheeled and came to rest upright heading opposite to the direction of landing approximately 1,330 feet from the initial touchdown point.

PERSONNEL INFORMATION

The flight instructor held a commercial pilot certificate with single-engine land airplane, land airplane, and instrument ratings. He held a flight instructor certificate with single-engine land airplane, land airplane, and instrument ratings. He held a second-class medical certificate, which was issued on January 26, 2011. The flight instructor's most recent flight review was on November 4, 2011. He reported that he had 6,397 hours of flight experience and had given 5,066 hours of flight instruction.

The pilot receiving instruction held a private pilot certificate with single-engine land airplane and instrument ratings. He reported that he had approximately 1,400 hours of flight experience with about 400 hours in Mooney aircraft. The accident aircraft records indicate that the pilot had approximately 17 hours of flight experience in it since he purchased it a week before the accident. His most recent third-class medical certificate was issued on May 1, 2012.

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 IO-550-N reciprocating, direct drive, air-cooled, fuel injected engine, which had a maximum takeoff rating of 310 horsepower at sea level. It was equipped with a McCauley 3-blade propeller.

The flight instructor reported on the NTSB's Pilot/Operator Accident Report form that the airplane received its last annual inspection on July 2, 2012. The airframe had 1,945 flight hours on it at the time of the last inspection. A new engine was installed in the airplane in 2004; at the time of the accident, the engine had accumulated a total of approximately 123 hours.

The wing flaps on the Mooney M20L are electrically operated and interconnected through push-pull tubes and bellcranks. Nominal travel is 0 to 33 degrees and limit switches prevent travel above or below these limits. The flap position is controlled by a switch located on the lower control console. The electric flap position indicator, which shows full up, takeoff (10 degrees) and full down positions, is located in the center of the instrument panel. The flaps are lowered by holding the spring-loaded switch in the FLAPS DOWN position until the flaps reach the desired angle of deflection. Simply releasing downward pressure on the switch allows it to

return to the OFF position stopping the flaps at any desired intermediate position during extension. When the FLAPS UP position is selected, the flaps will retract to the full up position unless the switch is returned to the neutral position for a desired intermediate setting.

The airplane manufacturer's Pilot Operating Handbook (POH) states:

CAUTION

Pushing the switch to the UP position retracts the flaps completely.

The POH lists the following procedure for GO AROUND/ABORTED LANDING:

1. Power Lever full power
2. Wing Flaps TAKEOFF POSITION (10 degrees)
3. Trim as desired

CAUTION

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

4. Airspeed 75 KIAS
5. Landing Gear UP
6. Wing Flaps UP
7. Airspeed 90 KIAS

METEOROLOGICAL INFORMATION

At 0935, the reported weather conditions at the Scottsdale Airport(SDL); elevation 1,510 feet), were: wind 160 degrees at 4 knots; visibility 10 statute miles; cloud condition, clear; temperature 100 degrees Fahrenheit; dew point 54 degrees Fahrenheit; altimeter setting 29.92 inches mercury. The density altitude was calculated to be 4,594 feet.

WRECKAGE AND IMPACT INFORMATION

The airplane came to rest about 1,830 feet from the threshold of runway 21 and 200 feet left of the runway centerline. It was located near the junction of taxiways B12 and B. It was longitudinally aligned on a magnetic heading of about 020 degrees. The main landing gear had collapsed and the nose wheel landing gear had separated from the fuselage; the airplane was resting on its belly. Both wings were bent up about 30 degrees from about 2/3 of the distance from the wing root to the tip. The outer 4 feet of the left wing had separated from the airplane and was found about 50 feet away.

The engine had broken free from its mounts, but was in place and attached by wires, cables, and hoses. The propeller blades were deeply scored, their leading edges were gouged, and the blades were S-bent; two of the blade tips had separated from their blades.

The airplane was equipped with a Supplemental Type Certificate modification that added additional main landing gear doors. Low Profile Inner Gear Doors, made of fiberglass, were attached to the main landing gear wheels. They covered the brake calipers and were closer to the ground than the outer (factory) main landing gear doors. The lower forward corners of these doors were found to be ground down. Two parallel marks were found by an FAA inspector about 500 feet from the runway threshold. Small flecks of paint, which matched the color of the landing gear doors, were found in the vicinity of the two runway marks. The distance between the two marks matched the distance between the two landing gear doors.

TESTS AND RESEARCH

Photographs of the propeller blades were reviewed by the propeller manufacturer's representative. The representative stated that the damage to the blades was consistent with the engine operating "in the mid-range to high power" at the time of impact.

On July 12, 2012, a team of investigators convened to examine the engine. The team consisted of an NTSB investigator, a Federal Aviation Administration (FAA) inspector and an engine manufacturer's representative. The spark plugs exhibited normal electrode wear, and each magneto produced good spark when the propeller/crankshaft was rotated. All six cylinders were borescoped, and none of the cylinders, pistons, valves, or bottom spark plugs displayed any signs of operational distress. Thumb compression and suction were obtained on all six cylinders through manual rotation of the propeller, confirming crankshaft and camshaft continuity. The inspection of the engine did not reveal any anomalies that would have prevented normal operation and production of rated horsepower.

On August 16, 2012, the engine was further examined by an NTSB investigator. Five of the six fuel injectors were removed, and it was noted that there were two O-ring seals installed on the nozzle of each fuel injector. On August 17, 2012, the sixth fuel injector was removed by salvage yard personnel, and two O-ring seals were also found installed on the nozzle of this injector. According to the engine manufacturer's representative, only one O-ring was to be installed on the fuel nozzles of this engine. The NTSB's investigator-in-charge requested that the engine manufacturer perform a flow test to determine if the installation of two O-rings per nozzle rather than the specified one O-ring per nozzle would have an effect on the operation of the fuel system. The testing indicated that placing two O-rings on the nozzles did not result in a significant difference in fuel flow during bench testing.

Flight instructor Information

Certificate:	Commercial; Flight instructor	Age:	64, 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 multi-engine; Airplane single-engine; Instrument airplane	Toxicology Performed:	No
Medical Certification:	Class 2 With waivers/limitations	Last FAA Medical Exam:	January 26, 2011
Occupational Pilot:	UNK	Last Flight Review or Equivalent:	November 4, 2011
Flight Time:	6397 hours (Total, all aircraft), 187 hours (Total, this make and model), 47 hours (Last 90 days, all aircraft), 1 hours (Last 24 hours, all aircraft)		

Student pilot Information

Certificate:	Private	Age:	59, Male
Airplane Rating(s):	Single-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:	No
Medical Certification:	Class 3 With waivers/limitations	Last FAA Medical Exam:	May 1, 2012
Occupational Pilot:	UNK	Last Flight Review or Equivalent:	
Flight Time:	1400 hours (Total, all aircraft), 400 hours (Total, this make and model), 25 hours (Last 30 days, all aircraft), 1 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Mooney	Registration:	N137MP
Model/Series:	M20L	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	
Airworthiness Certificate:	Normal	Serial Number:	26-0017
Landing Gear Type:		Seats:	4
Date/Type of Last Inspection:		Certified Max Gross Wt.:	
Time Since Last Inspection:		Engines:	1 Reciprocating
Airframe Total Time:		Engine Manufacturer:	Continental
ELT:		Engine Model/Series:	IO-550
Registered Owner:	Stephen Faliks	Rated Power:	285 Horsepower
Operator:	Stephen Faliks	Operating Certificate(s) Held:	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	Condition of Light:	Day
Observation Facility, Elevation:	SDL,1510 ft msl	Distance from Accident Site:	
Observation Time:	09:35 Local	Direction from Accident Site:	
Lowest Cloud Condition:	Clear	Visibility	10 miles
Lowest Ceiling:	None	Visibility (RVR):	
Wind Speed/Gusts:	4 knots /	Turbulence Type Forecast/Actual:	/
Wind Direction:	160°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	29.92 inches Hg	Temperature/Dew Point:	38°C / 12°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Scottsdale, AZ (SDL)	Type of Flight Plan Filed:	Unknown
Destination:	Scottsdale, AZ (SDL)	Type of Clearance:	None
Departure Time:	09:00 Local	Type of Airspace:	

Airport Information

Airport:	Scottsdale Airport SDL	Runway Surface Type:	Asphalt
Airport Elevation:	1510 ft msl	Runway Surface Condition:	Dry
Runway Used:	21	IFR Approach:	None
Runway Length/Width:	8249 ft / 100 ft	VFR Approach/Landing:	Touch and go

Wreckage and Impact Information

Crew Injuries:	1 Serious, 1 Minor	Aircraft Damage:	Substantial
Passenger Injuries:		Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	1 Serious, 1 Minor	Latitude, Longitude:	33.625556,-111.907218

Administrative Information

Investigator In Charge (IIC):	Struhsaker, James
Additional Participating Persons:	Craig Roberts; FAA FSDO; Scottsdale, AZ Nicole L Charnon; Continental Motors, Inc.; Mobile, AL
Original Publish Date:	February 14, 2013
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=84230

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The NTSB does not assign fault or blame for an accident or incident; rather, as specified by NTSB regulation, “accident/incident investigations are fact-finding proceedings with no formal issues and no adverse parties ... and are not conducted for the purpose of determining the rights or liabilities of any person” (Title 49 *Code of Federal Regulations* section 831.4). Assignment of fault or legal liability is not relevant to the NTSB’s statutory mission to improve transportation safety by investigating accidents and incidents and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report (Title 49 *United States Code* section 1154(b)). A factual report that may be admissible under 49 *United States Code* section 1154(b) is available [here](#).