National Transportation Safety Board
Aviation Accident Final Report

Location:	Skiatook, OK	**Accident Number:**	GAA17CA472
Date & Time:	08/02/2017, 1630 CDT	**Registration:**	N95442
Aircraft:	MOONEY AIRCRAFT CORP. M20	**Aircraft Damage:**	Substantial
Defining Event:	Fuel starvation	**Injuries:**	1 None
Flight Conducted Under:	Part 91: General Aviation - Personal		

Analysis

The pilot reported in a written statement that the airplane had just been released from a repair shop after the engine exhaust system had been rebuilt. He added that the engine was tested before being released from the repair shop, and no mechanical anomalies were noted.

According to the pilot, while completing the preflight run-up, the engine quit running when it was at 1,800 rpm. He got out of the airplane and did a walk-around and noticed nothing abnormal. He then attempted multiple engine starts, and "the engine would try to start but would not keep running." Subsequently, he was able to get the engine started. The pilot reported that he conducted a preflight but did not visually check or measure the fuel in either tank during the preflight, but before flight, he believed the left fuel tank was empty. He then took off and circled the airport in a right traffic pattern, flew down the runway at 2,000 ft mean sea level, then proceeded on-course to his destination.

The pilot further reported that, when he departed, the left tank low fuel light was on, the right fuel tank light was off, and the fuel level in the right tank was between 1/8 and 1/4 full. The fuel selector was selected to the right fuel tank. He added that, about 7 nautical miles from the destination airport, the right tank low fuel light illuminated for about 3 to 5 seconds and then extinguished. As he turned the airplane onto final, he added power and "pumped [the] throttle several times with no response from [the] engine." He added that when the engine lost power, he switched the fuel selector from the right tank to the left tank out of habit. The pilot reported that the airplane continued to sink and that he made a slight right turn to avoid power lines and a street with several cars and landed hard in a large yard.

The right wing sustained substantial damage.

A Federal Aviation Administration aviation safety inspector reported that, after the accident, he and the pilot drained the fuel from the airplane. He reported that they sumped about 3.25 to 3.50 gallons of fuel from the right tank and about 1 gallon of fuel from the left tank.

The Airplane Flight Manual (AFM) stated that the airplane had a total unusable fuel volume of 3 gallons and was equipped with left and right fuel low annunciation lights that indicated when 2.5 to 3 gallons of usable fuel remained in the respective tanks. The AFM further stated, "switch to fuller tank."

According to Title 14 *Code of Federal Regulations* Part 91.151 Fuel requirements for flight in VFR [visual flight rules] conditions: (a) No person may begin a flight in an airplane under VFR conditions unless (considering wind and forecast weather conditions) there is enough fuel to fly to the first point of intended landing and, assuming normal cruising speed - (1) During the day, to fly after that for at least 30 minutes.

Estimated fuel requirements for the flight, based on the pilot's statement that the airplane normally burned "28-30 gph [gallons per hour] on takeoff power and 18-19 gph on cruise power" and the reported flight profile, indicated that a minimum of 8.7 gallons were required for the flight. When an additional 30-minute reserve was added, a total of 17.96 gallons were required for the flight. As noted previously, the pilot reported that, before flight, the fuel gauges read 1/8 (4.7 gallons) to 1/4 (9.4 gallons) full on the right fuel tank, and he believed the left fuel tank was empty.

It is likely that the engine was starved of fuel after the pilot completed multiple turns in the traffic pattern with low fuel in the right fuel tank, and that, subsequently, when the pilot switched the fuel selector to the left fuel tank, which contained only about 1 gallon of fuel, fuel starvation occurred.

Probable Cause and Findings

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

The pilot's improper decision to conduct the flight despite the fuel gauges indicating that there was insufficient fuel for the flight, which resulted in the low amount of fuel in the right tank becoming unported during the multiple turns, and his subsequent improper decision to switch to the nearly empty left tank, which led to a loss of engine power due to fuel starvation.

Findings

Aircraft	Fuel - Inadequate inspection (Cause)
	Fuel - Fluid level (Cause)
Personnel issues	Fuel planning - Pilot (Cause)
	Decision making/judgment - Pilot (Cause)

Factual Information

History of Flight

Prior to flight	Aircraft inspection event
Approach-VFR pattern final	Fuel starvation (Defining event) Loss of engine power (total)
Landing	Off-field or emergency landing

Pilot Information

Certificate:	Private	**Age:**	56, Male
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:**	10/05/2016
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	02/23/2017
Flight Time:	(Estimated) 1009 hours (Total, all aircraft), 107 hours (Total, this make and model), 1009 hours (Pilot In Command, all aircraft), 87 hours (Last 90 days, all aircraft), 28 hours (Last 30 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	MOONEY AIRCRAFT CORP.	**Registration:**	N95442
Model/Series:	M20 K	**Aircraft Category:**	Airplane
Year of Manufacture:	1980	**Amateur Built:**	No
Airworthiness Certificate:	Normal	**Serial Number:**	25-0489
Landing Gear Type:	Retractable - Tricycle	**Seats:**	4
Date/Type of Last Inspection:	02/22/2017, Annual	**Certified Max Gross Wt.:**	3200 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	3736.5 Hours at time of accident	**Engine Manufacturer:**	Continental
ELT:	Installed, not activated	**Engine Model/Series:**	TSIO-520-NB
Registered Owner:	On file	**Rated Power:**	305 hp
Operator:	On file	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	**Condition of Light:**	Day
Observation Facility, Elevation:	KTUL, 677 ft msl	**Distance from Accident Site:**	11 Nautical Miles
Observation Time:	2153 UTC	**Direction from Accident Site:**	140°
Lowest Cloud Condition:	Few / 5500 ft agl	**Visibility**	10 Miles
Lowest Ceiling:		**Visibility (RVR):**	
Wind Speed/Gusts:	4 knots /	**Turbulence Type Forecast/Actual:**	/ None
Wind Direction:	90°	**Turbulence Severity Forecast/Actual:**	/ N/A
Altimeter Setting:	30 inches Hg	**Temperature/Dew Point:**	32°C / 16°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	BARTLESVILLE, OK (BVO)	**Type of Flight Plan Filed:**	None
Destination:	Skiatook, OK (2F6)	**Type of Clearance:**	VFR
Departure Time:	1610 CDT	**Type of Airspace:**	Class G

Airport Information

Airport:	SKIATOOK MUNI (2F6)	**Runway Surface Type:**	Asphalt
Airport Elevation:	670 ft	**Runway Surface Condition:**	Dry
Runway Used:	36	**IFR Approach:**	None
Runway Length/Width:	3000 ft / 60 ft	**VFR Approach/Landing:**	Forced Landing; Full Stop; Traffic Pattern

Wreckage and Impact Information

Crew Injuries:	1 None	**Aircraft Damage:**	Substantial
Passenger Injuries:	N/A	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 None	**Latitude, Longitude:**	36.355278, -96.010833 (est)

Administrative Information

Investigator In Charge (IIC):	Adam M Gerhardt	**Report Date:**	03/27/2018
Additional Participating Persons:	Melvin Devore; FAA/ FSDO; Oklahoma City, OK		
Publish Date:	03/27/2018		
Note:	This accident report documents the factual circumstances of this accident as described to the NTSB.		
Investigation Docket:	http://dms.ntsb.gov/pubdms/search/dockList.cfm?mKey=95760		

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