Aviation Investigation Final Report

Location:	Houston, Missouri	**Accident Number:**	CEN19LA229
Date & Time:	July 21, 2019, 09:20 Local	**Registration:**	N1831
Aircraft:	Cessna 305A	**Aircraft Damage:**	Substantial
Defining Event:	Fuel related	**Injuries:**	1 None
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The private pilot was practicing full-stop takeoffs and landings in the airport traffic pattern. During the fourth takeoff, about 500 to 600 ft above the ground, the airplane's engine experienced a total loss of power. The pilot performed a forced landing and the airplane impacted trees and terrain, resulting in substantial damage to the left wing and fuselage.

Postaccident examination, which included three engine test runs, failed to duplicate the power loss. Examination of the carburetor revealed no mechanical anomalies that would have precluded normal operation. Atmospheric conditions about the time of the accident were conducive to the development of serious carburetor icing at glide power. Given the absence of mechanical anomalies, it is likely that the loss of engine power was the result of carburetor ice accumulation while the engine was being operated at reduced power settings during the previous landings and ground operations.

Probable Cause and Findings

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

A total loss of engine power during initial climb due to carburetor icing, which resulted in a forced landing and impact with trees and terrain.

Findings

Personnel issues	Identification/recognition - Pilot
Environmental issues	Conducive to carburetor icing - Effect on operation

Factual Information

History of Flight

Takeoff	Fuel related (Defining event)
Landing	Collision with terr/obj (non-CFIT)

On July 21, 2019, at 0920 central daylight time, a Cessna 305A airplane, N1831, experienced a total loss of engine power during a departure climb from the Houston Memorial Airport (M48), Houston, Missouri. The pilot subsequently performed a forced landing to a field, during which the airplane impacted trees and terrain. The private pilot was uninjured and the airplane sustained substantial damage. The airplane was registered to and operated by the pilot under Title 14 Code of Federal Regulations Part 91 as a local personal flight that was not operating on a flight plan. Day visual meteorological conditions prevailed at time of the accident.

A National Transportation Safety Board (NTSB) Accident/Incident Report Form 6120.1 was not received from the pilot.

According to a Federal Aviation Administration (FAA) aviation safety inspector from the Saint Louis Flight Standards District Office, the pilot was practicing takeoffs and landings to a full stop on runway 34 at M48. During climbout on the fourth takeoff, about 500 – 600 ft above ground level and as he retracted the wing flaps, a complete loss of engine power occurred. The pilot verified the fuel selector was ON and applied carburetor heat with the throttle at a full power setting. The pilot moved the cockpit throttle control back and forth, but there was no effect on engine power. During the forced landing attempt, the pilot kept the wings level and aerodynamically stalled the airplane at treetop height to cushion the landing. The airplane sustained substantial damage to the left wing and fuselage.

The airplane fuel system and the carburetor were modified through FAA supplemental type certificates SA281SW (installation of gravity flow fuel system, carburetor heater system, and fuel selector valve) and SE264SW (removal of the carburetor and installation of a Marvel-Schebler MA-4-5 carburetor) on July 18, 2019, at a tachometer time of 503.7 hours.

Post-accident examination of the airplane revealed the tachometer at the accident site indicated 508.4 hours. The left fuel tank contained about 3 gallons of 100 low lead aviation fuel and was broken open due to impact forces. The right fuel tank contained about 10 gallons of 100 low lead aviation fuel. Both wing root fuel gauges had red ranges below approximately ¼ tank with the following marking: "NO TAKEOFF." The useable fuel capacity of the airplane, as placarded on the fuel selector valve, was 36 gallons. A fuel sample taken from the airplane center belly drain valve revealed no fuel contamination.

The cockpit throttle, mixture, and carburetor heat controls were at approximate mid-range of travel position. The magneto switch was in the BOTH position. The fuel selector was in the OFF position. The wing flaps were extended to about half their travel. One propeller blade was straight, and the other propeller blade was bent rearwards about 30°, about 12 inches inboard from the propeller tip.

A post-accident engine run of the engine was performed using an external fuel supply plumbed through the right wing root. The engine started normally on the first attempt. While the engine warmed, engine oil pressure increased to the normal operating range. At an engine speed of about 1,000 rpm, magneto selections of LEFT and RIGHT produced corresponding reductions of engine speed of about 100 rpm. Carburetor heat was selected two times and, on both occasions, produced engine speed reductions of about 75 rpm. The cockpit throttle control was advanced using a maximum setting of 1,500 rpm due to propeller damage and associated engine vibration during the engine run. The cockpit fuel selector was positioned to OFF and the engine sputtered and stopped operating in about 30-45 seconds.

The engine was started a second time, the primer was actuated, and there was no effect on engine operation. The cockpit mixture control was retarded to IDLE-CUTOFF, and the engine sputtered and began to cease operating, but regained operation when the mixture control was advanced from the IDLE-CUTOFF position. A second magneto check was performed resulting in reductions of engine speed of about 100 rpm. The mixture control was moved to IDLE-CUTOFF, and the engine was allowed to cease operation.

The engine was started a third time, and engine power was increased to about 1,500 rpm. The electric fuel pump was turned ON and allowed to operate for several minutes, during which there was no effect on engine operation. The engine sputtered and ceased operation after exhausting the external fuel supply used for the engine run.

Air was blown through all the fuel lines not used for the engine run and through the vent lines. There was no foreign blockage of air through those lines.

After the engine run, the carburetor was removed for examination that was conducted under the supervision of the NTSB Investigator-in-Charge. The carburetor body had the following inscription: "Facet". The carburetor body had a red data plate with the following inscriptions: Model - "MA-4-5," Part Number – "10-3859-1," Serial Number – "4015585," and "FF V".

All external and internal components were attached and secure. The installed float was non-metallic and blue in color. There was no fluid within the float. The float setting/gap was confirmed to be 13/64 inch, which was in accordance with the carburetor manufacturer's specifications. The float moved without binding and/or sticking. The throttle valve moved without binding/sticking. The fuel inlet screen did not contain debris. The carburetor bowl did not contain debris. The carburetor nozzle assembly was unobstructed and had the following inscription: "737," which was the part number for the nozzle assembly based upon the 1959 design drawing for the carburetor. The current nozzle part number was 47-735 and according to repair shop personnel, both part numbers were applicable. The carburetor pump discharge valve did not have a spring installed with the valve (spring loaded valve) in accordance with Volare Carburetors, LLC. Service Bulletin SB-8 Rev B. There were no mechanical anomalies that precluded normal operation of the carburetor.

Recorded ambient temperature and dewpoint temperature about the time of the accident was conducive to serious carburetor icing at glide power.

Pilot Information

Certificate:	Private	**Age:**	70,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	Unknown
Instrument Rating(s):	None	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Unknown Unknown	**Last FAA Medical Exam:**	September 1, 1990
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	March 31, 2019
Flight Time:	17 hours (Total, this make and model)		

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	**Registration:**	N1831
Model/Series:	305A	**Aircraft Category:**	Airplane
Year of Manufacture:	1951	**Amateur Built:**	
Airworthiness Certificate:	Normal; Utility	**Serial Number:**	22393
Landing Gear Type:	Tailwheel	**Seats:**	2
Date/Type of Last Inspection:	October 11, 2018 Annual	**Certified Max Gross Wt.:**	2430 lbs
Time Since Last Inspection:	10 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	8297 Hrs at time of accident	**Engine Manufacturer:**	Continental
ELT:	Installed	**Engine Model/Series:**	O-470-11
Registered Owner:	Pilot	**Rated Power:**	213 Horsepower
Operator:	Pilot	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	TBN	**Distance from Accident Site:**	24 Nautical Miles
Observation Time:	08:56 Local	**Direction from Accident Site:**	360°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	6 knots /	**Turbulence Type Forecast/Actual:**	None / None
Wind Direction:	290°	**Turbulence Severity Forecast/Actual:**	N/A / N/A
Altimeter Setting:	29.98 inches Hg	**Temperature/Dew Point:**	26°C / 21°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Houston, MO (M48)	**Type of Flight Plan Filed:**	None
Destination:	Houston, MO (M48)	**Type of Clearance:**	None
Departure Time:		**Type of Airspace:**	Class E

Airport Information

Airport:	Houston Memorial Airport M48	**Runway Surface Type:**	Concrete
Airport Elevation:	1195 ft msl	**Runway Surface Condition:**	Vegetation
Runway Used:	34	**IFR Approach:**	None
Runway Length/Width:	3500 ft / 60 ft	**VFR Approach/Landing:**	Forced landing

Wreckage and Impact Information

Crew Injuries:	1 None	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 None	**Latitude, Longitude:**	37.333332,-91.966667(est)

Administrative Information

Investigator In Charge (IIC):	Gallo, Mitchell
Additional Participating Persons:	Travis Schwien; Federal Aviation Administration; STL FSDO; St. Ann, MO Christopher Lang; Continental Motors; Mobile, AL
Original Publish Date:	February 2, 2021
Last Revision Date:	
Investigation Class:	Class 3
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=99894