



AVIATION



HIGHWAY



MARINE



RAILROAD



PIPELINE

Aviation Investigation Final Report

Location:	Rosamond, California	Accident Number:	WPR18LA196
Date & Time:	July 14, 2018, 10:00 Local	Registration:	N43SJ
Aircraft:	Cassutt IIIM	Aircraft Damage:	Substantial
Defining Event:	Loss of engine power (partial)	Injuries:	1 Minor
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot was departing in his experimental, amateur-built airplane configured for aerial racing. He reported that when the airplane entered its initial climb and was about 50 ft above ground level, the engine performance reduced by about 300 rpm. The pilot attempted to continue the takeoff to complete a circuit in the airport traffic pattern. A witness saw the airplane turn left, and the nose immediately dropped and impacted the ground, followed by the right side of the airplane. The airplane sustained substantial damage to the forward fuselage and right wing. It is likely that, while the pilot was maneuvering at low altitude after the partial loss of engine power, he failed to maintain adequate airspeed, which resulted in the airplane exceeding its critical angle of attack and a subsequent accelerated stall.

Postaccident examination of the engine and most of the accessories did not reveal any preimpact mechanical anomalies. However, a teardown of the carburetor showed multiple discrepancies, the most notable of which was a loose primary venturi. This condition is likely to have caused the partial loss of engine power during takeoff due to the delivery of inconsistent vacuum pressure and a disruption in fuel flow. An airworthiness directive (AD) issued 20 years before the accident required that the venturi be inspected at each annual, 100-hour, or conditional inspection. It is unknown if this AD was complied with, as the pilot/owner did not possess any records that showed the carburetor's maintenance history.

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 adequate airspeed during a low-altitude maneuver after a partial loss of engine power, which resulted in exceedance of the airplane's critical angle of attack and a subsequent accelerated stall. Contributing to the accident was a loose primary venturi in the carburetor due to improper maintenance, which resulted in a disruption in fuel flow and the subsequent partial loss of engine power.

Findings

Aircraft	Airspeed - Not attained/maintained
Personnel issues	Aircraft control - Pilot
Aircraft	Angle of attack - Not attained/maintained
Aircraft	Fuel control/carburetor - Not serviced/maintained

Factual Information

History of Flight

Initial climb	Loss of engine power (partial) (Defining event)
Landing	Collision with terr/obj (non-CFIT)

On July 14, 2018, about 1000 Pacific daylight time, an experimental, amateur-built Cassutt airplane, N43SJ, was substantially damaged when it was involved in an accident near Rosamond, California. The pilot sustained minor injuries. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

The flight was departing Rosamond Skypark Airport (L00), Rosamond, California. According to the pilot, who also owned and maintained the airplane, he performed a preflight inspection and then taxied the airplane to runway 26. He performed an engine run-up to a static rpm of 2,450 before starting his ground roll. The pilot reported that he expected to see the engine rpm at about 2,400 during takeoff and between 2,400 and 2,800 during the climb. The pilot reported that after the airplane lifted off the ground and approached about 50 ft above ground level, the engine rpm dropped from 2,400 to about 2,100. He made an unsuccessful attempt to regain the lost power by cycling the fuel/air mixture control. The airplane was just beyond midfield, so the pilot attempted to continue the takeoff and fly the circuit. A witness who was near the departure end of runway 26 at the time of the accident reported that he heard the engine lose power momentarily. He said it appeared the airplane was returning to the runway, as it began a left turn, but the nose immediately dropped and impacted the ground, followed by the right side of the airplane. The airplane sustained substantial damage to the forward fuselage and right wing.

The airplane's most recent experimental, amateur-built certificate was issued on May 9, 2017. The airplane had been configured for aerial racing with a Whirlwind two-bladed propeller and a 9-gallon fuel tank, which the pilot indicated had been filled before the accident flight.

A maintenance entry showed that the airplane's most recent condition inspection was completed on August 27, 2017, at 669 total flight hours. An entry dated September 1, 2017, indicated that the owner had installed different propellers and performed dynamic tests.

An engine examination did not show any preimpact mechanical anomalies. The pilot had modified the fuel system, which was comprised of a finger strainer at the fuel pickup inside the fuel tank. Fuel was then directed along a 3/8-inch hose through a ball valve directly to the carburetor beyond the firewall. Both finger screens (in the fuel tank and carburetor) were clean with no debris noted, and the fuel tank hoses were free of obstructions. Mechanical continuity was established throughout the engine and valvetrain when the engine was rotated by hand at the propeller. Thumb compression and suction were obtained for all four cylinders, with noticeably weaker compression from cylinders 3 and 4. The oil filter did not display any metallic particles, and the oil sump did not contain any metallic particles. Each spark plug produced spark when the magneto was rotated by hand, and no anomalies were noted.

A functional test of the carburetor showed that fuel was pulled through the main nozzle when air pressure was applied to carburetor bowl; however, the pressure was not measured. A subsequent teardown of the carburetor revealed multiple discrepancies, including a loose primary venturi; a missing cotter pin; an idle circuit that was excessively rich, as indicated by black carbon build-up on the idle mixture needle; and a foam float drop that was set too low so that the float pontoons were contacting the bottom of the bowl, as indicated by wear on both the bowl and pontoons. The examination also suggested that Airworthiness Directive (AD) 98-01-05 and Volare Service Bulletin (SB) SB-2, Revision B, had not been accomplished.

AD 98-01-06, which was issued on February 13, 1998, required inspection of the carburetor to determine if the primary venturi was loose or missing and, for this particular model, indicated the following:

To prevent disruption of fuel flow to the engine resulting in failure to attain rated power, power loss in flight, and forced landings...if a two-piece venturi is installed, inspect the carburetor at each annual, 100-hour, or progressive inspection, to determine if the primary venturi is loose or missing. If either of these conditions is found, prior to further flight, repair the carburetor by installing a serviceable two-piece venturi or by installing a one-piece venturi in accordance with Precision Airmotive Service Bulletin No. MSA-2.

Volare Carburetors, the successor to Precision Airmotive, issued SB-2, Revision B, on June 22, 2009, to replace foam and hollow floats with solid, blue epoxy floats. The SB stated that foam floats may deteriorate in certain fuels and that the company has developed new composite floats to be impervious to fuels and fuel additives. According to the SB, owners are encouraged to inspect the carburetor every 30 days until the float is replaced. Additionally, the SB reminds owners that the carburetor must be overhauled or rebuilt every 10 calendar years or at engine overhaul, whichever occurs first.

According to the Marvel-Schebler carburetor technical expert, air moves past the venturi and speeds up due to a pressure difference that creates a vacuum and pulls fuel from the nozzle. A loose primary venturi would shake and move, which can disrupt this vacuum and create an inconsistent pressure delivery and disruption in fuel flow, which can result in a loss of power.

Pilot Information

Certificate:	Private	Age:	56, Male
Airplane Rating(s):	Single-engine land	Seat Occupied:	Single
Other Aircraft Rating(s):	None	Restraint Used:	4-point
Instrument Rating(s):	None	Second Pilot Present:	No
Instructor Rating(s):	None	Toxicology Performed:	No
Medical Certification:	Class 2 With waivers/limitations	Last FAA Medical Exam:	April 4, 2017
Occupational Pilot:	No	Last Flight Review or Equivalent:	July 25, 2016
Flight Time:	22 hours (Total, all aircraft), 15 hours (Total, this make and model)		

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	Registration:	N43SJ
Model/Series:	172M	Aircraft Category:	Airplane
Year of Manufacture:	1973	Amateur Built:	Yes
Airworthiness Certificate:	Experimental (Special)	Serial Number:	1
Landing Gear Type:	Tailwheel	Seats:	1
Date/Type of Last Inspection:	August 27, 2017 Condition	Certified Max Gross Wt.:	925 lbs
Time Since Last Inspection:	15 Hrs	Engines:	1 Reciprocating
Airframe Total Time:	669.5 Hrs as of last inspection	Engine Manufacturer:	Continental
ELT:	Not installed	Engine Model/Series:	O-200
Registered Owner:		Rated Power:	95 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:	MHV,2801 ft msl	Distance from Accident Site:	12 Nautical Miles
Observation Time:	17:00 Local	Direction from Accident Site:	13°
Lowest Cloud Condition:	Clear	Visibility	10 miles
Lowest Ceiling:	None	Visibility (RVR):	
Wind Speed/Gusts:	7 knots /	Turbulence Type Forecast/Actual:	/
Wind Direction:	250°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	30.05 inches Hg	Temperature/Dew Point:	33°C / 11°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Rosamond, CA (L00)	Type of Flight Plan Filed:	None
Destination:	Rosamond, CA (L00)	Type of Clearance:	None
Departure Time:	10:00 Local	Type of Airspace:	Class G

Airport Information

Airport:	Rosamond Skypark L00	Runway Surface Type:	Asphalt
Airport Elevation:	2415 ft msl	Runway Surface Condition:	Dry
Runway Used:	26	IFR Approach:	None
Runway Length/Width:	3600 ft / 50 ft	VFR Approach/Landing:	Full stop;Traffic pattern

Wreckage and Impact Information

Crew Injuries:	1 Minor	Aircraft Damage:	Substantial
Passenger Injuries:		Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	1 Minor	Latitude, Longitude:	34.868888,-118.207221

Administrative Information

Investigator In Charge (IIC):	Stein, Stephen		
Additional Participating Persons:	Rex Hallesy; Federal Aviation Administration; Van Nuys, CA		
Original Publish Date:	July 15, 2021	Investigation Class:	3
Note:	The NTSB did not travel to the scene of this accident.		
Investigation Docket:	https://data.nts.gov/Docket?ProjectID=97762		

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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](#).