Aviation Investigation Final Report

Location:	Tallahassee, Florida	**Accident Number:**	ERA20LA290
Date & Time:	August 19, 2020, 12:15 Local	**Registration:**	N4089R
Aircraft:	Piper PA32	**Aircraft Damage:**	Substantial
Defining Event:	Loss of engine power (partial)	**Injuries:**	1 Minor, 2 None
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot performed a preflight inspection of the airplane with no anomalies noted; during the engine run-up, the engine backfired. The pilot continued the run-up procedures and did not have any other issues with the engine. After rotation, the pilot noticed that the tachometer did not indicate full engine rpm, and also noted that the engine was not producing power. Since the airspeed was slow, he attempted to decrease the pitch of the airplane; however, the airplane was already in an aerodynamic stall, which resulted in impact with the runway. The airplane departed the right side of the runway and impacted the visual approach light system lights, resulting in substantial damage to the right wing.

A postaccident examination and test run of the engine revealed no evidence of preimpact mechanical malfunctions or failures that would have precluded normal operation. A review of data extracted from the airplane's engine data monitor data revealed that the number 3 cylinder began performing erratically beginning around 7 minutes after the recording began, likely as the airplane was being taxied, and continued through the run-up described by the pilot. This erratic behavior initially appeared as rapid increases and decreases in exhaust gas temperature (EGT) that differed dramatically from the behavior of the other 5 cylinders. Then, about 3 minutes after the erratic EGT temperatures began, the number 3 cylinder head temperature (CHT) began steadily decreasing, while the remaining 5 cylinders continued their gradual increase. The takeoff likely began about 11 minutes and 30 seconds after the data recording began, as the engine rpm increased to about 2,400 (which was less than the maximum 2,700 rpm that was observed during the three previous takeoffs that were recorded).

Given this information, the most likely explanation for the observed EGT and CHT behaviors was that the number 3 cylinder fuel injector was being intermittently blocked. As the fuel mixture leaned due to the blockage, it produced the spikes observed in EGT, and the blockage eventually progressed to a point where the cylinder was no longer producing power, resulting

in the observed gradual CHT cooling. Postaccident examination of the number 3 cylinder fuel injector showed that it was absent of debris and deposits; therefore, the nature and origin of the blockage could not be definitively determined.

Probable Cause and Findings

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

A partial loss of engine power on takeoff due to an intermittently blocked fuel injector on the number 3 cylinder.

Findings

Aircraft	Fuel injector nozzle - Damaged/degraded

Factual Information

History of Flight

Takeoff-rejected takeoff	Loss of engine power (partial) (Defining event)
Landing	Hard landing
Landing-landing roll	Collision during takeoff/land

On August 19, 2020, about 1215 eastern daylight time, a Piper PA-32-300, N4089R, was substantially damaged when it was involved in an accident at Tallahassee International Airport (TLH), Tallahassee, Florida. The pilot incurred minor injuries and the two passengers were not injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

According to the pilot, he performed a preflight inspection of the airplane with no anomalies noted and loaded the airplane for the flight. He knew that the airplane had about 60 gallons of fuel on board, since he flew a trip the previous week and used the fuel out of the left main tank. He performed the accident flight with the right main fuel tank selected. The engine started up, ran without issue, until the engine run-up when it "backfired." The pilot continued to perform the engine run-up by checking the magnetos and letting the engine continue to run, and no other issues were noted.

The pilot taxied onto the runway and slowly increased engine power. After rotation, the pilot noticed that the tachometer did not indicate full engine rpm, and also noted that the engine was not producing power. Since the airspeed was slow and close to the stall speed, the pilot attempted to descend in order to increase the airspeed; however, the airplane was "already stalling." It "pancaked" onto the runway and veered off the right side striking the visual approach lighting system with the right wing. During the accident sequence, the right wing incurred substantial damage.

After the accident, the pilot provided a weight and balance calculation for the flight, which revealed that the airplane was within load limits for the flight.

An engine examination was performed by an NTSB investigator after the accident. The top spark plugs were removed from the engine and no anomalies were observed with their electrodes. The crankshaft was rotated by hand and valvetrain continuity was confirmed to the rear accessory section. Additionally, thumb compression was confirmed on all cylinders. The number 3 cylinder fuel injector was examined and found to be absent of debris or deposits. Fuel was plumbed from an external fuel tank into the engine. The engine started immediately, accelerated smoothly, and ran continuously without interruption.

The airplane was equipped with a JPI EDM-700 engine data monitor. Examination of data from the unit revealed that the recording associated with the accident flight began around

1207. The exhaust gas temperatures (EGT) for all six cylinders followed rough relative patterns of increase and decrease until about 1214:30, when the number 3 cylinder EGT began intermittently rapidly increasing and decreasing until just before 1217. Also during this time the cylinder head temperatures (CHT) for all six cylinders gradually rose at a relatively uniform rate until from the start of the data until about 1217, when the number 3 CHT began a steady decrease while the remaining 5 cylinders continued their gradual increase in temperature. About 1218, the engine rpm increased gradually over about 30 seconds to about 2,300, then reached a maximum of about 2,400 rpm shortly after 1219. The rpm then rapidly decreased around 1930. Review of 3 previous flights revealed that the engine rpm maximum recorded was about 2,700 rpm, compared to 2,400 achieved during the accident flight.

Pilot Information

Certificate:	Private	**Age:**	40,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	Unknown
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 3 Without waivers/limitations	**Last FAA Medical Exam:**	April 14, 2020
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	October 21, 2019
Flight Time:	922 hours (Total, all aircraft), 862 hours (Total, this make and model), 920 hours (Pilot In Command, all aircraft), 43 hours (Last 90 days, all aircraft), 6 hours (Last 30 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	**Registration:**	N4089R
Model/Series:	PA32 300	**Aircraft Category:**	Airplane
Year of Manufacture:	1967	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	32-40408
Landing Gear Type:	Tricycle	**Seats:**	6
Date/Type of Last Inspection:	December 2, 2019 Annual	**Certified Max Gross Wt.:**	3400 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	5441 Hrs as of last inspection	**Engine Manufacturer:**	Lycoming
ELT:	C91 installed, not activated	**Engine Model/Series:**	IO-540-K1A5
Registered Owner:	On file	**Rated Power:**	300 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:	TLH,68 ft msl	**Distance from Accident Site:**	1 Nautical Miles
Observation Time:	11:53 Local	**Direction from Accident Site:**	164°
Lowest Cloud Condition:	Few / 5000 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	Broken / 20000 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	/	**Turbulence Type Forecast/Actual:**	/
Wind Direction:		**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.9 inches Hg	**Temperature/Dew Point:**	28°C / 24°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Tallahassee, FL (TLH)	**Type of Flight Plan Filed:**	IFR
Destination:	Fort Pierce, FL (FPR)	**Type of Clearance:**	IFR
Departure Time:	12:15 Local	**Type of Airspace:**	Class C

Airport Information

Airport:	Tallahassee Intl TLH	**Runway Surface Type:**	Asphalt
Airport Elevation:	83 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	36	**IFR Approach:**	None
Runway Length/Width:	7000 ft / 150 ft	**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	1 Minor	**Aircraft Damage:**	Substantial
Passenger Injuries:	2 None	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Minor, 2 None	**Latitude, Longitude:**	30.409444,-84.358329(est)

Administrative Information

Investigator In Charge (IIC):	Kemner, Heidi
Additional Participating Persons:	Gregory Joy; FAA/FSDO; Tampa, FL Mike Childers; Lycoming Engines; Atlanta, GA
Original Publish Date:	September 7, 2022
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=101827