Aviation Investigation Final Report

Location:	San Juan, Puerto Rico	**Accident Number:**	ERA20LA202
Date & Time:	June 2, 2020, 13:33 Local	**Registration:**	N14181
Aircraft:	Piper PA23	**Aircraft Damage:**	Substantial
Defining Event:	Loss of engine power (partial)	**Injuries:**	2 Fatal, 1 Serious
Flight Conducted Under:	Part 91: General aviation - Flight test		

Analysis

The pilot-rated passenger reported that before takeoff, the pilot performed an engine run-up with no discrepancies noted. During takeoff, when full power was applied, the airplane yawed abruptly to the left and the left engine was not producing full power. The pilot elected to continue the takeoff and immediately applied right rudder, right aileron and back pressure, similar to a crosswind soft field takeoff. The airplane climbed about 100 ft-per-minute at an indicated airspeed below the published single engine rate of climb airspeed. When the pilot reached to retract the hydraulically controlled landing gear, it failed to retract. The airplane then rolled left and impacted the water adjacent to the airport in an inverted nose-low attitude.

The pilot-rated passenger, who was also a mechanic, stated that during a previous takeoff attempt, the pilot aborted the takeoff when the airplane yawed left after takeoff power was applied. While taxiing off the runway, the left engine quit. The pilot restarted the engine and taxied to the ramp. Following a visual inspection that revealed the left strut extension was more than the right, the pilot decided to attempt the takeoff again; it was during this subsequent takeoff that the accident occurred.

Postaccident examination of the flight controls, right engine and its systems, and the left engine powertrain, fuel supply, and ignition systems revealed no evidence of preimpact failure or malfunction. A missing nylon throttle stop of the left servo fuel injector (fuel servo) was the likely reason why the left engine quit at idle, and internal contamination of it resulted in a decreased fuel flow of about 31% of the minimum required value at full throttle and full rich mixture. Once the contamination was removed the left fuel servo flowed within limits at full throttle and full rich mixture; the contaminant was not analyzed.

Probable Cause and Findings

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

The pilot's intentional operation of the airplane with known deficiencies of the left engine and subsequent in-flight loss of control after takeoff. Contributing to the loss of engine power was internal contamination of the left servo fuel injector. Contributing to the loss of control was the pilot's intentional operation below the single engine rate of climb airspeed, and his failure to feather the left propeller.

Findings

Aircraft	Fuel control/carburetor - Damaged/degraded
Personnel issues	Decision making/judgment - Pilot
Aircraft	Engine out control - Not attained/maintained
Personnel issues	Use of equip/system - Pilot
Aircraft	Airspeed - Not attained/maintained
Aircraft	Main landing gear - Incorrect use/operation
Aircraft	Propeller feather/reversing - Not used/operated

Factual Information

History of Flight

Takeoff	Loss of engine power (partial) (Defining event)
Initial climb	Miscellaneous/other
Initial climb	Loss of control in flight
Uncontrolled descent	Collision with terr/obj (non-CFIT)

On June 2, 2020, about 1333 Atlantic standard time, a Piper PA-23-250, N14181, was substantially damaged when it was involved in an accident during takeoff from Fernando Luis Ribas Dominicci Airport (TJIG), San Juan, Puerto Rico. The airline transport pilot and one passenger were fatally injured and a pilot-rated passenger was seriously injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 post-maintenance flight test.

The pilot-rated passenger, who occupied the right front seat and also held a mechanic certificate with airframe and powerplant ratings, reported the pilot taxied to runway 9 where an engine run-up was performed and that no discrepancies were noted. The airplane was cleared for takeoff, the pilot applied takeoff power, and the airplane immediately yawed to the left as if the left engine was not producing power. The pilot aborted the takeoff and was able to control the airplane, which, according to the pilot-rated passenger, was “almost sideways.”

The pilot-rated passenger later reported that he attributed the yaw to a loss of power from the left engine but at the time asked the pilot what would have caused the yaw, and the pilot responded that the left landing gear strut had less nitrogen than the right strut. However, according to a partial transcript of the pilot’s communications with air traffic control, he replied “…I think it’s a low tire” when asked if he needed any assistance. The pilot-rated passenger reported that the left engine quit while at idle power as they exited the runway. The pilot was able to restart it with some difficulty then taxied to the ramp.

While at the ramp, the pilot directed the pilot-rated passenger to inspect the landing gear. He informed the pilot that the left strut had more extension than the right, which was opposite the pilot’s expectation. The pilot directed the passenger to get back in the airplane and performed an engine run-up, which included a check of the magnetos and cycling the propellers. The pilot-rated passenger did not detect any discrepancies though he did state that he was wearing a noise-cancelling headset.

The pilot then contacted the air traffic control tower and requested taxi clearance to runway 09. After taxiing to the runway, the airplane was cleared for takeoff. The pilot-rated passenger stated that the airplane again immediately yawed to the left when the pilot applied full power for takeoff. The pilot immediately applied “right rudder, yoke to the right and back pressure like in a crosswind soft field takeoff.” During takeoff, the pilot was "fighting" the

airplane as it drifted left of the runway centerline with the left engine not producing full power. The pilot-rated passenger reported the pilot raised the landing gear selector to retract the landing gear but did not recall seeing a green light. The pilot-rated passenger noticed that the airplane was not climbing normally; he estimated the climb rate at 100 feet-per-minute.

Security video from a nearby marina captured the final portion of the flight and depicted the airplane during the upwind leg flying in a near wings-level, slight nose-up attitude. As the flight continued, one of the landing gear was visible. The video depicted the airplane rolling left into an inverted and nose-low attitude. It remained in that position until impacting the water. No parts were seen separating from the airplane.

After impact, the passenger was knocked unconscious then regained consciousness. He initially had difficulty opening the door but was able to exit the airplane after it was fully submerged.

An in-flight video taken by the middle row passenger's portable electronic device (PED) was provided to the National Transportation Safety Board (NTSB) for review and analysis. A view of the full instrument panel was captured at 03 seconds and frame 21 at which time the airplane was noted to be in a climb pitch attitude, both of the pilot's hands were on the control yoke, and he was inputting a right roll command. The left throttle, propeller, and mixture controls appeared to be in the full forward position. During that same time and frame, the airspeed indicator appeared to be between 90 and 100 mph. The JPI engine monitor depicted the fuel flow for the left and right engines near zero and top of the indicator bar, respectively. The fuel pressure for the left engine was lower than the fuel pressure for the right engine, and the rpm for the left engine was between 1,000 and 1,500, while the rpm for the right engine was near the top of the green arc.

Pilot Information

Certificate:	Airline transport; Commercial	**Age:**	51,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	3-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 1 With waivers/limitations	**Last FAA Medical Exam:**	March 5, 2020
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	October 22, 2019
Flight Time:	(Estimated) 9504 hours (Total, all aircraft)		

Pilot-rated passenger Information

Certificate:	Private	**Age:**	32,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Right
Other Aircraft Rating(s):	None	**Restraint Used:**	3-point
Instrument Rating(s):	None	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 3 Waiver time limited special	**Last FAA Medical Exam:**	June 5, 2014
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	(Estimated) 85 hours (Total, all aircraft)		

The pilot also held an mechanic certificate with airframe and powerplant ratings issued September 18, 2008.

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	**Registration:**	N14181
Model/Series:	PA23 250	**Aircraft Category:**	Airplane
Year of Manufacture:	1971	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	27-4746
Landing Gear Type:	Retractable - Tricycle	**Seats:**	6
Date/Type of Last Inspection:	August 23, 2019 Annual	**Certified Max Gross Wt.:**	5200 lbs
Time Since Last Inspection:		**Engines:**	2 Reciprocating
Airframe Total Time:	6094.9 Hrs as of last inspection	**Engine Manufacturer:**	Lycoming
ELT:	C126 installed	**Engine Model/Series:**	IO-540-C4B5
Registered Owner:	Blue Waters Air Charters Llc	**Rated Power:**	250 Horsepower
Operator:	ISLA NENA AIR SERVICE INC	**Operating Certificate(s) Held:**	On-demand air taxi (135)
Operator Does Business As:		**Operator Designator Code:**	2ISA

The landing gear and flaps were hydraulically controlled by an engine-driven hydraulic pump installed on the left engine. According to the Federal Aviation Administration (FAA)-approved

Airplane Flight Manual, in the event of failure of the left engine, the landing gear and flaps should be retracted by utilizing the emergency hydraulic hand pump. The Pilot's Operating Manual (POM) specified about 50 strokes of the hand pump were required to retract the landing gear.

The published minimum controllable single-engine airspeed and best single engine rate of climb airspeed were 80 and 102 mph, respectively.

The airplane was equipped with a Garmin GTN 650, a Garmin GPSMay 696 and a JPI EDM 960 engine monitor. The devices were submitted to the NTSB Vehicle Recorder Division for read-out. The GTN 650 had no data recording capability and the last recorded flight in the Garmin GPSMap 696 was April 4, 2019.

The JPI engine monitor recorded two sessions on the accident date; the last being associated with the accident flight. The data from the engine monitor indicated that for the accident flight, the left and right engine rpm values were between 1,000 and 1,300, and 600 to 800 rpm, respectively; thus, no data were recorded during takeoff for the accident flight. A review of prior flights revealed the recorded engine rpm for both engines were about 2,300. The last recorded fuel level in the left outboard fuel tank was 9.9 gallons.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	TJIG,10 ft msl	**Distance from Accident Site:**	0.4 Nautical Miles
Observation Time:	13:33 Local	**Direction from Accident Site:**	250°
Lowest Cloud Condition:	Scattered / 4000 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	Broken / 10000 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	13 knots /	**Turbulence Type Forecast/Actual:**	Unknown / Unknown
Wind Direction:	80°	**Turbulence Severity Forecast/Actual:**	N/A / N/A
Altimeter Setting:	30 inches Hg	**Temperature/Dew Point:**	30°C / 24°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	San Juan, PR (TJIG)	**Type of Flight Plan Filed:**	Unknown
Destination:	San Juan, PR (TJIG)	**Type of Clearance:**	None
Departure Time:	13:32 Local	**Type of Airspace:**	

Airport Information

Airport:	Fernando Luis Ribas Dominicci SIG	**Runway Surface Type:**	Asphalt
Airport Elevation:	9 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	09	**IFR Approach:**	None
Runway Length/Width:	5539 ft / 100 ft	**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 Fatal, 1 Serious	**Aircraft Fire:**	None
Ground Injuries:		**Aircraft Explosion:**	None
Total Injuries:	2 Fatal, 1 Serious	**Latitude, Longitude:**	18.458889,-66.091941(est)

The wreckage was recovered the following day. As part of the recovery the fuel tanks were drained; the FAA was not present when the tanks were drained. Examination of the wreckage by a representative of the airframe manufacture with oversight from the FAA revealed extensive impact damage to the airframe and wings; the left wing was separated at the wing root. All landing gears were extended.

A postaccident examination of the flight controls revealed no evidence of preimpact failure or malfunction. The hydraulic flap actuating cylinder piston was extended about 7 inches which corresponded to flaps retracted. The rudder trim jackscrew was extended aft from the drum about 5/8 inch or about 5 threads, which corresponded to a neutral to slight aircraft nose right trim setting. The stabilator jackscrew was extended above the drum about 1/2 inch or about 10 threads, which corresponded to a full aircraft nose up trim setting.

A postaccident examination of the left-wing fuel supply system to include the fuel selector, supply hoses, fuel strainer bowl, fuel tank, and electric fuel pump did not reveal any preimpact failures or malfunctions which would have precluded normal operation.

Examination of the left engine propeller and mixture controls revealed that except for cuts at the left-wing root consistent with recovery, control cable continuity was confirmed from the cockpit to their respective attach points in the engine compartment. Throttle control cable continuity was confirmed from the cockpit to the left-wing root area where cut for recovery, then from there to the ball screw which was fractured; the ball screw connected the throttle cable to the fuel servo throttle arm. Examination of the fractured ball screw by the NTSB Materials Laboratory revealed the fracture features were consistent with fracture from overstress in bending.

During manual rotation of the left propeller, crankshaft, camshaft, and valve train continuity were confirmed to the valves and to the accessory section. Thumb section and compression were felt at each of the top spark plug openings of each cylinder. The magnetos appeared secure on their mounts and undamaged. The magnetos were mechanically rotated and both produced spark at all towers of the distributor cap. Examination of the engine-driven fuel pump revealed during hand actuation, the pump could be heard making noises consistent with actuating. Disassembly examination of the pump revealed the diaphragm appeared to be flexible and no debris was observed within the pump. Examination of the servo fuel injector (fuel servo), the manifold valve, and the fuel injectors revealed the servo inlet screen was free from blockage, the diaphragm of the manifold valve was flexible and intact and three of the injectors appeared free of blockage while three appeared to have some blockage. The fuel supply hoses in the engine compartment contained small quantities of liquid that was consistent with 100 low lead (100LL), with no water detected in any sample. Examination of the propeller governor revealed the screen was clean, the shaft rotated normally and pumped oil. The fuel supply hoses, fuel servo, manifold valve, and fuel injectors were retained for further examination.

Examination of the engine controls of the right engine revealed throttle, propeller, and mixture control cable continuity was confirmed from the cockpit to their respective attach points in the engine compartment. A postaccident examination of the engine did not reveal any preimpact failure or malfunction that would have prevented normal operation of the right engine.

Both propellers remained attached to each engine crankshaft flange and both propeller blades of each propeller remained secured in each propeller hub assembly. There was no evidence of failure or malfunction of either propeller; the left propeller blades were at or near the low pitch position.

Tests and Research

Examination of the fuel supply hoses revealed no internal obstructions or leaks.

Examination of the left fuel servo at a FAA certified repair station revealed the nylon throttle stop was missing, which allowed the throttle plate to fully close rather than have a 0.006-inch gap. While setting the gap to 0.006 inch between the throttle plate and bore, a gap greater than 0.006 inch was noted at the throttle stop. During initial operational testing, material consistent with sand flowed from the unit. At a test point that required the throttle to be wide open and the mixture control full rich (consistent with takeoff), the unit flowed about 69% of the minimum specified or required value. Subsequent partial disassembly revealed contamination between the mixture and idle valves. Following removal of the contamination, the unit was

operationally tested at the same test point and flowed within specification. No attempt was made to identify the contamination. Operational testing of the fuel injector nozzles revealed slight out of tolerance conditions, while operational testing of the manifold valve could not be performed.

Additional Information

According to fueling records, the airplane was fueled with 47.5 gallons of 100LL aviation fuel about 2 hours prior to the accident. According to the fueler, the pilot was present during fueling and both inboard fuel tanks were topped off. After fueling the pilot was observed checking the fuel in the area of each engine nacelle. Another airplane that was fueled from the same fuel truck about 22 minutes earlier flew on multiple flights with no reported fuel related discrepancies.

Administrative Information

Investigator In Charge (IIC):	Monville, Timothy
Additional Participating Persons:	Jorge L Echegoyen; FAA/FSDO; San Juan, PR Jonathon Hirsch; Piper Aircraft, Inc.; Vero Beach, FL Jeremy D. Katt; Parker Aerospace; Irvine, CA
Original Publish Date:	June 28, 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=101363