Aviation Investigation Final Report

Location:	San Juan, Puerto Rico	**Accident Number:**	ERA17FA195
Date & Time:	June 3, 2017, 14:17 Local	**Registration:**	N21WW
Aircraft:	Piper PA23	**Aircraft Damage:**	Destroyed
Defining Event:	Loss of control in flight	**Injuries:**	1 Fatal, 2 Serious, 1 Minor
Flight Conducted Under:	Part 135: Air taxi & commuter - Non-scheduled		

Analysis

The commercial pilot was conducting an on-demand air taxi flight with three passengers on board the multiengine airplane. The majority of the pilot's multiengine experience was in a larger airplane with more powerful engines. He had about 20 hours of experience in the accident airplane make and model and had completed training in it about 9 days before the accident. The pilot stated that, after receiving clearance for takeoff from air traffic control, he performed the takeoff roll and rotated the airplane at 85 knots. The airplane climbed to about 100 ft above ground level (agl), but then did not continue to climb or accelerate. The airplane then yawed left, and the left engine rpm needle indicated less than the right engine rpm, but it remained in the green arc. Subsequently, the pilot turned the airplane left with the yaw to return to the airport, but the airplane was unable to maintain altitude and subsequently impacted water. The pilot further stated that, other than the rpm difference, there were no other preimpact mechanical malfunctions with the airplane.

The front seat passenger reported that he was not a pilot but that he was familiar with airplanes. He stated that the airplane initially gained some altitude, but that it then yawed left. He then noticed that the pilot did not correct the yaw and let the airplane turn perpendicular to the wind, at which point he mentally questioned the pilot's competency and felt compelled to take the controls, but he did not touch anything. The airplane lost altitude and then flew under a tree line while remaining in a left banking turn. The pilot then moved the yoke abruptly right, and the airplane collided with the water. The front seat passenger added that the sound of the engines did not change during the flight and that he noted no smoke or fuel odor.

Airport surveillance video confirmed that the airplane climbed to about 100 to 150 ft agl, which is out of ground effect, as it passed over the departure end of the runway. The airplane remained in a nose-up attitude as it then began to descend and, begin a shallow left turn; it then impacted the water.

Examination of the airplane did not reveal any preimpact mechanical malfunctions that would have precluded normal operation, and the airplane was about 350 lbs below its maximum gross weight.

Additionally, the airplane was equipped with constant-speed propellers, and a loss of left engine power would have been noticeable on the manifold pressure gauge and not the rpm gauge.

The airplane's airspeed indicator revealed that mph were depicted by the larger numbers on the outer ring and that knots were depicted by the smaller numbers on the inner ring. Given the airspeed indicator's configuration, it is likely that the pilot rotated and then attempted to climb the airplane at 85 mph and not 85 knots, but either airspeed was significantly less than airplane's best rate-of-climb speed of 120 mph (102 knots). It is likely that the airplane climbed at the lower airspeed until out of ground effect, but then could not maintain a climb and began to descend back into ground effect. Further, the airplane was not equipped with counter-rotating engines to offset the left yaw at slower airspeeds, and the airplane began to yaw to the left. Rather than lower the nose, correct for the yaw, and continue straight into a 15-knot headwind to increase airspeed, the pilot allowed the airplane to continue to yaw left and exceeded the airplane's critical angle of attack, which resulted in an aerodynamic stall and subsequent descent into water.

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, properly correct for left yaw, and his exceedance of the airplane's critical angle of attack during initial climb, which resulted in an aerodynamic stall and subsequent uncontrolled descent into water.

Findings

Personnel issues	Aircraft control - Pilot
Aircraft	Airspeed - Not attained/maintained
Aircraft	Angle of attack - Not attained/maintained
Aircraft	Yaw control - Not attained/maintained

Factual Information

History of Flight

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

On June 3, 2017, about 1417 Atlantic standard time, a Piper PA-23-250, N21WW, impacted water and a reef shortly after takeoff from Luis Munoz Marin International Airport (TJSJ), San Juan, Puerto Rico. The commercial pilot sustained minor injuries, two passengers were seriously injured, and one passenger was fatally injured. The airplane was destroyed. The flight was being operated by Air America, Inc., as a Title 14 *Code of Federal Regulations* Part 135 on-demand air taxi flight. Visual meteorological conditions prevailed, and an instrument flight rules flight plan was filed for the planned flight to Benjamin Rivera Noriega Airport (TJCP), Isla de Culebra, Puerto Rico.

According to air traffic control (ATC) information provided by the Federal Aviation Administration (FAA), the flight was cleared for an intersection takeoff on runway 8 from taxiway S5. Runway 8 was 10,400 ft long, and the intersection takeoff at S5 allowed about half of the runway length for takeoff. At 1414:09, the pilot contacted ATC and stated that he was ready for takeoff. The tower controller replied that there was about 30 seconds left of a wake turbulence delay due to an Embraer 190 that had departed about 2 minutes 30 seconds earlier. The pilot waived the delay, and the tower controller cleared the flight for takeoff at 1414:26. At 1416:33, the tower controller instructed the pilot to contact departure control; however, the pilot stated that he was "unable" and was returning to the airport. At 1416:46, the pilot stated, "we are trying hard we lost power on an engine we're trying to go back." The controller asked what engine, and the pilot replied, "we… [lost] an engine." No further communications were received from the pilot.

Review of radar data revealed that, at 1415:52, the airplane was near the departure end of the runway, indicating an altitude of 100 ft. The last radar target was recorded at 1416:16, about 1,000 ft beyond the departure end of the runway, indicating an altitude of 0 feet (about 100 ft agl). Review of airport surveillance video revealed that the airplane had lifted off the runway by about 1415:40 and had climbed to between about 100 and 150 ft agl, out of ground effect, as it passed over the departure end of the runway at 1416:01. The airplane remained in a nose-up attitude and began to descend; it then entered a shallow left turn at 1416:17. The airplane continued turning left at a low altitude to a position consistent with the left downwind leg of the airport traffic pattern and then disappeared from the camera's view at 1416:43. The airplane reappeared in the camera's view as it impacted water about .75 mile abeam the departure end of runway 8 at 1417:07.

According to the pilot's written statement and recorded interview, after he completed a preflight inspection, the passengers walked toward the airplane. The pilot then completed a final walkaround and visually checked the fuel in the fuel tanks. After the baggage was loaded and the passengers boarded the airplane, the pilot performed a safety/emergency briefing and started the engines. He received instructions from ATC to taxi to runway 8 via N taxiway and to hold short of the runway at S5. The pilot

performed a run-up using the checklist, and everything was within acceptable parameters.

After receiving clearance for takeoff from ATC, the pilot performed a takeoff roll and rotated the airplane at 85 knots. About 100 ft agl, he retracted the landing gear and noted that the airplane did not seem to be climbing or accelerating beyond 85 to 90 knots. He verified that the magnetos and fuel pumps were on and that the throttle, mixture, and propeller levers were in the "full forward" position. He also noted that all the engine instruments were in the green arc normal operating range. The airplane then yawed left, and the pilot noticed that the left engine rpm was less than the right, but that it remained in the green arc. The pilot subsequently turned left with the yaw to return to the airport, but the airplane was unable to maintain altitude. He then attempted to avoid a populated beach and ditched in shallow water. The pilot did not remember how he exited the airplane, but recalled that his face burned when he swam to the water's surface because of a fire. He tried two more times to reach the water's surface far enough away from the fire. He then saw two of the three passengers and attempted to swim back for the third passenger, but was in shock and had ingested too much water. A person on a paddle board then pulled the pilot from the water.

During a postaccident interview with two FAA inspectors, the front seat passenger stated that he was not a pilot, but that he was familiar with airplanes because he was an aerospace engineer and had spent some time in a Boeing 757 simulator with a friend. He stated that the pilot did not provide a safety briefing and that, instead, he (the front seat passenger) instructed the other passengers (minors) to fasten their seatbelts, and he fastened his seatbelt. As the airplane approached the runway, the pilot secured the door and started the takeoff process without reading any checklist. The airplane initially gained some altitude, but it then yawed left. The front seat passenger then noticed that the pilot did not correct the yaw and let the airplane turn perpendicular to the wind, at which point, he mentally questioned the pilot's competency and felt compelled to take the controls, but he did not touch anything. The airplane lost altitude and flew under a tree line while remaining in a left banking turn. The pilot then moved the yoke abruptly right, and the airplane collided with the water.

The front seat passenger reported that the pilot egressed first, but he did not recall how because the door was on the passenger's side of the airplane. The front seat passenger then egressed, followed by one other passenger. The third passenger did not egress, and the front seat passenger tried to go back toward the airplane, but the fire was too intense, and he was badly burned. The front seat passenger added that the sound of the engines did not change during the flight and that he noted no smoke or fuel odor.

Pilot Information

Certificate:	Commercial	**Age:**	22,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:**	No
Instructor Rating(s):	Airplane multi-engine; Airplane single-engine	**Toxicology Performed:**	Yes
Medical Certification:	Class 1 With waivers/limitations	**Last FAA Medical Exam:**	December 14, 2016
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	
Flight Time:	1200 hours (Total, all aircraft), 20 hours (Total, this make and model), 121 hours (Last 90 days, all aircraft), 49 hours (Last 30 days, all aircraft), 5 hours (Last 24 hours, all aircraft)		

The pilot held a commercial pilot certificate with ratings for airplane single-engine land, airplane multiengine land, and instrument airplane. He also held a flight instructor certificate with ratings for airplane single-engine and airplane multiengine. The pilot's most recent FAA first-class medical certificate was issued on December 14, 2016. The pilot reported a total flight experience of about 1,200 hours, about 200 hours of which were in multiengine airplanes and about 20 hours of which were in the accident airplane make and model.

Review of company records revealed that the pilot was hired in December 2016 and completed ground and flight training. At the time of his hire, he reported a total flight experience of 900 hours, 110 hours of which were in multiengine airplanes. From December 2016 through May 2017, the pilot flew about 220 hours in a Britten-Norman BN-2A-21 Islander, which could carry up to nine passengers and was equipped with two 300-horsepower Lycoming engines. The pilot completed training in the accident airplane make and model on May 25, 2017. He had accumulated about 20 hours in it during the 6 months before the accident. At the time of the accident, the last recorded entry in the pilot's logbook was dated February 28, 2017. At that time, the logbook indicated that the pilot had accumulated a total flight experience of about 933 hours, 234 hours of which were in multiengine airplanes.

Review of the pilot's FAA records revealed that he received a Notice of Disapproval of Application for a private pilot certificate on November 8, 2014. The pilot subsequently obtained his private pilot certificate on November 12, 2014. The pilot then obtained a multiengine rating during his first attempt on December 4, 2014. He received another Notice of Disapproval of Application for an instrument rating on January 30, 2015. The notice included comments that, upon reapplication, the pilot would be reexamined on preflight preparation and preflight procedures. He subsequently obtained an instrument rating on February 6, 2015. The pilot obtained a commercial pilot license (single-engine land) during his first attempt on March 18, 2015. He also obtained a commercial pilot certificate (multiengine land and instrument airplane) during his first attempt on April 11, 2015.

The pilot received another Notice of Disapproval of Application for a flight instructor certificate (multiengine rating) on June 16, 2015. The notice included comments that the pilot needed to review and understand the airplane's systems. The pilot subsequently obtained his flight instructor certificate with a multiengine rating on July 7, 2015. At that time, the pilot reported a total flight experience of 221 hours,

96.9 hours of which were in multiengine airplanes. The pilot received another Notice of Disapproval of Application for a flight instructor certificate (single-engine rating) on July 14, 2015. The notice included comments that the pilot needed more training teaching takeoffs and landings. The pilot subsequently obtained his flight instructor certificate with a single-engine rating on July 22, 2015.

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	**Registration:**	N21WW
Model/Series:	PA23 250	**Aircraft Category:**	Airplane
Year of Manufacture:	1975	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	27-7554066
Landing Gear Type:	Retractable - Tricycle	**Seats:**	6
Date/Type of Last Inspection:	November 16, 2016 Annual	**Certified Max Gross Wt.:**	5200 lbs
Time Since Last Inspection:	95 Hrs	**Engines:**	2 Reciprocating
Airframe Total Time:	9182 Hrs at time of accident	**Engine Manufacturer:**	LYCOMING
ELT:	C126 installed, activated, did not aid in locating accident	**Engine Model/Series:**	IO-540-C4B5
Registered Owner:	AIR AMERICA INC	**Rated Power:**	250 Horsepower
Operator:	AIR AMERICA INC	**Operating Certificate(s) Held:**	Commuter air carrier (135)
Operator Does Business As:		**Operator Designator Code:**	I32A

The six-seat, low-wing, tricycle-retractable-gear airplane was manufactured in 1975. It was powered by two Lycoming IO-540, 250-horsepower engines, each equipped with a Hartzell controllable pitch full-feathering propeller. According to maintenance records, the airplane's most recent annual inspection was completed on November 16, 2016. At that time, the airframe had accumulated 9,087.3 total hours of operation, and the engines had accumulated 695.3 hours since major overhaul. The airplane had flown about 95 hours from the time of that inspection until the accident.

Review of the airspeed indicator revealed that mph were depicted in the larger numbers on an outer ring and that knots were depicted in the smaller numbers on the inner ring. The airplane was not equipped with counter-rotating engines to offset yaw at slower airspeeds.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	TJSJ,9 ft msl	**Distance from Accident Site:**	1 Nautical Miles
Observation Time:	14:21 Local	**Direction from Accident Site:**	210°
Lowest Cloud Condition:	Few / 2400 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	17 knots / None	**Turbulence Type Forecast/Actual:**	/ None
Wind Direction:	70°	**Turbulence Severity Forecast/Actual:**	/ N/A
Altimeter Setting:		**Temperature/Dew Point:**	31°C / 24°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	San Juan, PR (TJSJ)	**Type of Flight Plan Filed:**	IFR
Destination:	Isla de Culebra, PR (TJCP)	**Type of Clearance:**	IFR
Departure Time:	14:15 Local	**Type of Airspace:**	

The recorded weather at TJSJ, at 1421, was wind from 070° at 17 knots; visibility 10 miles; few clouds at 2,400 ft, scattered clouds at 4,000 ft, and scattered clouds at 7,000 ft; temperature 31°C; dew point 24°C; and altimeter setting 29.98 inches of mercury.

Airport Information

Airport:	LUIS MUNOZ MARIN INTL TJSJ	**Runway Surface Type:**	Asphalt
Airport Elevation:	9 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	08	**IFR Approach:**	None
Runway Length/Width:	10400 ft / 200 ft	**VFR Approach/Landing:**	Precautionary landing

Wreckage and Impact Information

Crew Injuries:	1 Minor	**Aircraft Damage:**	Destroyed
Passenger Injuries:	1 Fatal, 2 Serious	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	On-ground
Total Injuries:	1 Fatal, 2 Serious, 1 Minor	**Latitude, Longitude:**	18.460277,-65.972778(est)

Examination of the wreckage following recovery to a hangar revealed that both wings had separated during impact. The right wing exhibited leading edge impact damage and buckling at the outboard section. The right flap and right aileron had separated from the wing and were recovered. The right engine remained attached to the wing, and the right propeller remained attached to the engine. The two propeller blades appeared undamaged and were in the normal operating range and not in a feathered position. The valve covers, spark plugs, oil filter, and vacuum pump were removed from the right engine. The spark plug electrodes, vacuum pump vanes, and drive coupling were intact. When the propeller was rotated by hand, crankshaft, camshaft, and valve train continuity were confirmed to the rear accessory section, and thumb compression was attained on all cylinders. The fuel injector servo and magnetos were removed. The fuel injector servo screen was absent of debris. Fuel was recovered from the fuel line to the engine-driven pump, the engine-driven fuel pump, the fuel line to the fuel servo, and the fuel servo. The fuel odor was consistent with 100 low lead aviation gasoline. The left magneto did not produce spark when rotated by hand, consistent with saltwater immersion. The right magneto produced spark at five of the six leads. The right flow divider attachment bolts were found loose. Two of the flow divider lines had separated, consistent with impact, and one line was found loose, and its B-nut was removed by hand with two turns. The fuel injector nozzles were unobstructed.

The left wing exhibited leading edge impact damage and buckling at the outboard section. The left flap remained attached to the wing. The left aileron had separated and was recovered. The left engine remained attached to the wing, and the left propeller remained attached to the engine. One propeller blade appeared undamaged, and the other blade was bent aft, but both blades were in the normal operating range and not in a feathered position. The valve covers, spark plugs, oil filter, and vacuum pump were removed from the left engine. The spark plug electrodes, vacuum pump vanes, and drive coupling were intact. When the propeller was rotated by hand, crankshaft, camshaft, and valve train continuity were confirmed to the rear accessory section, and thumb compression was attained on all cylinders. The fuel injector servo and magnetos were removed. The fuel injector servo screen was absent of debris. Fuel was recovered from the fuel line to the engine driven fuel pump, the engine-driven fuel pump, the fuel line to the fuel servo, the fuel servo, and the flow divider. The fuel odor was consistent with 100 low lead aviation gasoline. The fuel inlet hose B-nut at the fuel servo was loose. The magnetos did not produce spark when rotated by hand, consistent with saltwater immersion. Five of the six fuel injector nozzles were unobstructed, and one nozzle was obstructed. The oil filter element and oil suction screen were absent of metallic contamination.

Examination of the cockpit revealed that the landing gear and flaps were in the "retracted" position. The seatbelts and shoulder harnesses remained intact. The master switch was in the "off" position, and the left and right fuel pumps were in the "on" position. The left magneto switches were in the "on" position, and the right magneto switches were in the "off" position. Underwater photographs provided by law enforcement revealed that the right throttle lever was forward, whereas the right mixture and propeller levers were midrange. The left throttle lever was midrange, whereas the left propeller and mixture levers were forward. However, the preimpact positions of the levers could not be verified because the wings had separated during impact. The left engine fuel selector was found positioned to the left inboard main fuel tank position, and the right engine fuel selector was found positioned to the right outboard main fuel tank position. The crossfeed switch was found midrange and fragmented. Measurement of the rudder trim jackscrew corresponded to a neutral rudder trim position. Measurement of the stabilator trim jackscrew corresponded to full nose-up stabilator trim position, but damage was present near the jackscrew, and its trim indicator cable had separated. Control continuity was confirmed from the rudder

to the rudder pedals in the cockpit. Continuity was also confirmed from the stabilator to the cockpit area. Aileron continuity was confirmed from the respective aileron bellcranks, through the separated wing roots, to the cockpit area.

Medical and Pathological Information

The FAA's Bioaeronautical Science Research Laboratory, Oklahoma City, Oklahoma, conducted toxicological testing on a serum sample from the pilot. The results were negative for alcohol.

Tests and Research

The lap belt that secured the deceased passenger was retained and forwarded to an National Transportation Safety Board Survival Factors Specialist for further examination. The examination did not reveal any preimpact mechanical malfunctions, and the insert tab released from the buckle when the latch was lifted about 90°.

Additional Information

Fuel

The airplane was equipped with six fuel tanks. Each wing had a 36-gallon inboard fuel tank, a 36-gallon outboard fuel tank, and a 24-gallon auxiliary wingtip tank. The pilot reported that "all tanks" were full; however, the fueler stated that he always filled the four main fuel tanks, but not the auxiliary fuel tanks. The former director of operations of the operator stated that the auxiliary fuel tanks were usually left empty. The estimated fuel onboard at takeoff was 144 gallons in the four full main fuel tanks, or 864 lbs.

Weight and Balance

Review of the pilot's operating manual (POM) for the make and model airplane revealed that the airplane's maximum gross takeoff weight was 5,200 lbs. The pilot had calculated the airplane's weight for the accident takeoff as 4,335 lbs. A recalculation was completed after the accident based on the four main fuel tanks being full of fuel. The recalculation also included the weights of the front seat occupants

(220 lbs and 190 lbs) and the middle seat occupants (115 lbs and 120 lbs). The recalculation also included 125 lbs of baggage, which was in the rear of the airplane. The recalculated weight and balance revealed that the accident takeoff weight was about 4,850 lbs, which was 350 lbs below the maximum takeoff weight. The center of gravity was near the forward limit.

Performance

Review of a takeoff performance chart from the POM revealed that, given the conditions that existed at the time of the accident, 88°F, at sea level, at a takeoff weight of 4,850 lbs, and with a 15-knot headwind, the airplane required about 1,250 ft to take off and climb over a 50-ft obstacle. However, the performance chart noted a liftoff speed of 80 mph (70 knots) and the speed at the obstacle at 97 mph (84 knots). Further, the POM stated that the best angle-of-climb speed was 107 mph (93 knots) and that the best rate-of-climb speed was 120 mph (102 knots). The airplane's single-engine rate-of-climb speed was 240 ft per minute, with a best single-engine rate-of-climb speed of 102 mph (89 knots).

Administrative Information

Investigator In Charge (IIC):	Gretz, Robert
Additional Participating Persons:	Jose Zayas; FAA/FSDO; San Juan, PR James M Childers; Lycoming Engines; Williamsport, PA Damian Galbraith; Piper Aircraft; Vero Beach, FL Les Doud; Hartzell Propeller; Piqua, OH
Original Publish Date:	January 23, 2018
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=95287