



# National Transportation Safety Board Aviation Accident Final Report

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<b>Location:</b>	Cat Cay, Bahamas	<b>Accident Number:</b>	ERA13LA380
<b>Date &amp; Time:</b>	08/25/2013, 1406 EDT	<b>Registration:</b>	N720JF
<b>Aircraft:</b>	PIPER AIRCRAFT INC PA46R-350T	<b>Aircraft Damage:</b>	Substantial
<b>Defining Event:</b>	Loss of engine power (total)	<b>Injuries:</b>	2 Minor, 3 None
<b>Flight Conducted Under:</b>	Part 91: General Aviation - Personal		

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## Analysis

According to the pilot, he applied full power, set the flaps at 10 degrees, released the brakes, and, after reaching 80 knots, he rotated the airplane. The pilot further reported that the engine subsequently lost total power when the airplane was about 150 ft above ground level. The airplane then impacted water in a nose-down, right-wing-low attitude about 300 ft from the end of the runway.

The pilot reported that he thought that the runway was 1,900 ft long; however, it was only 1,300 ft long. Review of the takeoff ground roll distance charts contained in the Pilot's Operating Handbook (POH) revealed that, with flap settings of 0 and 20 degrees, the ground roll would have been 1,700 and 1,150 ft, respectively. Takeoff ground roll distances were not provided for use of 10 degrees of flaps; however, the POH stated that 10 degrees of flaps could be used. Although the distance was not specified, it is likely that the airplane would have required more than 1,300 ft for takeoff with 10 degrees of flaps.

Examination of the engine revealed saltwater corrosion throughout it; however, this was likely due to the airplane's submersion in water after the accident. No other mechanical malfunctions or abnormalities were noted.

Examination of data extracted from the multifunction display (MFD) and primary flight display (PFD) revealed that the engine parameters were performing in the normal operating range until the end of the recordings. The data also indicated that, 7 seconds before the end of the recordings, the airplane pitched up from 0 to about 17 degrees and then rolled 17 degrees left wing down while continuing to pitch up to 20 degrees. The airplane then rolled 77 degrees right wing down and pitched down about 50 degrees. The highest airspeed recorded by the MFD and PFD was about 70 knots, which occurred about 1 second before the end of the recordings. The POH stated that, depending on the landing gear position, flap setting, and bank angle, the stall speed for the airplane would be between 65 and 71 knots.

Based on the evidence, it is likely that the engine did not lose power as reported by the pilot. As the airplane approached the end of the runway and the pilot realized that it was not long enough for his planned takeoff, he attempted to lift off at an insufficient airspeed and at too

high of a pitch angle, which resulted in an aerodynamic stall at a low altitude. If the pilot had known the actual runway length, he might have used a flap setting of 20 degrees, which would have provided sufficient distance for the takeoff.

## Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's attempt to rotate the airplane before obtaining sufficient airspeed and his improper pitch control during takeoff, which resulted in the airplane exceeding its critical angle-of-attack and subsequently experiencing an aerodynamic stall at a low altitude. Contributing to the accident was the pilot's lack of awareness of the length of the runway, which led to his attempting to take off with the airplane improperly configured.

### Findings

<b>Aircraft</b>	Takeoff distance - Not specified Angle of attack - Not attained/maintained (Cause) Airspeed - Not attained/maintained (Cause)
<b>Personnel issues</b>	Performance calculations - Pilot (Factor) Aircraft control - Pilot (Cause) Expectation/assumption - Pilot Incorrect action selection - Pilot (Factor)

## Factual Information

### HISTORY OF FLIGHT

On August 25, 2013, about 1406 eastern daylight time, a Piper PA46R-350T, N720JF, impacted the water immediately after takeoff from the Cat Cay Airport (MYCC), Cat Cay, Bahamas. The airline transport pilot and four passengers received minor or no injuries. The airplane sustained substantial damage to both wings. The airplane was registered to, and operated by, Pure Beauty Farms under the provisions of Title 14 Code of Federal Regulations Part 91 as a personal flight. Visual meteorological conditions prevailed in the area and no flight plan had been filed for the flight destined for the Kendall-Tamiami Executive Airport (KTMB), Miami, Florida.

Under the provisions of Annex 13 to the Convention on International Civil Aviation and by mutual agreement, the Air Accident Investigation & Prevention Unit (AAIPU) delegated the accident investigation to the government of the United States. The AAIPU did not designate an accredited representative to the investigation.

According to the pilot, after the airplane was aligned with the center of the runway, he applied full power; confirmed the manifold pressure, rpm, fuel flow, and that the flaps were at the 10 degree flap setting. After the brakes were released for takeoff he confirmed that all of the systems were "in the green." At an airspeed of about 80 knots the airplane became airborne, subsequently, about 150 feet above ground level the airplane's engine "stopped" and the pilot lowered the nose. The airplane impacted the water in a flat pitch attitude and came to rest in about 6 feet of water.

According to two of the passenger's written statements, the airplane taxied down the runway, turned around, and departed. Within a few seconds after departure the airplane impacted the water and a sandbar a few hundred feet from the runway. None of the written passenger statements mentioned the engine stopping or losing power.

### PERSONNEL INFORMATION

The pilot, age 69, held an airline transport pilot certificate for airplane single-engine and multiengine land, a flight instructor certificate for airplane single-engine and multiengine, and a second-class airman medical certificate issued June 2, 2011. The pilot reported 12,250 total flight hours, with 210 hours in the accident aircraft make and model.

### AIRCRAFT INFORMATION

The six-seat, low-wing, retractable gear airplane, was manufactured in 2008. It was powered by a Lycoming TIO-540-AE2A 350-hp engine and equipped with a 3-blade Hartzell model HC-13YR-1E constant speed propeller. According to the airplane's maintenance records, the most recent annual inspection was completed August 2, 2013, at a recorded Hobbs meter reading of 999.5 hours and an engine total time in service of 999.5 hours.

### METEOROLOGICAL INFORMATION

The 1353 recorded weather observation at, Ft. Lauderdale-Hollywood International Airport (KFL), Fort Lauderdale, Florida, located about 56 miles from the accident location, included wind from 070 degrees at 11 knots, 10 miles visibility, scattered clouds at 2,200 feet above ground level (agl) and broken clouds at 11,000 feet agl, temperature 28 degrees C, dew point 23

degrees C; barometric altimeter 30.11 inches of mercury. According to the pilot, the wind at the departure airport was from 120 degrees at 5 knots.

#### AIRPORT INFORMATION

According to information provided by the Bahamas' Civil Aviation Training Department, the airport was a privately owned airport and at the time of the accident did not have an operating control tower. The airport was equipped with one runway, designated 14/32. The runway was 1,300 feet long, 75 feet wide, and the surface was listed as "aggregate." The runway dimensions were measured in Google earth and were similar as those provided by the Bahamas' Civil Aviation Training Department. According to photographs provided by the Royal Bahamas Police Force, the airport was about 3 feet above mean sea level. The pilot reported the runway length as 1,900 feet.

#### WRECKAGE AND IMPACT INFORMATION

According to photographs provided by the AAIPU of The Bahamas and the Royal Bahamas Police Force, the airplane came to rest in shallow water, about 300 feet from the end of the runway. The nose and right wing were submerged in the water and the fuselage extended above the water surface. The left wing was partially separated at the wing root and exhibited impact marks along the leading edge. The main landing gear was in the extended, or in the down position, and the flaps were extended; however, an exact flap position could not be ascertained.

#### ADDITIONAL INFORMATION

The airplane was equipped with an Avidyne Multi-Function Display (MFD) and an Avidyne Primary Flight Display (PFD). The units were removed by aircraft recovery personal and sent to the NTSB Vehicle Recorders Laboratory, Washington, DC for data retrieval.

The MFD unit contained a Compact Flash (CF) card which contained checklist approach charts, map information, and the flight log data. During operation, the MFD receives GPS position, time and track data, as well as altitude, engine, electrical system parameters, and outside air temperature. The MFD data was sampled every 6 seconds and was recorded to memory once every minute. The CF card contained 78 recorded events including the accident event.

The PFD unit consisted of an air data and altitude heading reference system and displays aircraft flight data including altitude, airspeed, vertical speed, and heading. The data was recorded at various rates. The PFD contained several recorded events including the accident flight.

Examination of the data parameters revealed an abrupt spike consistent with an impact at 1405:57. At 1405:48, the data indicated a 0 pitch attitude and the 1405:50 data recorded a pitch attitude of about 17 degrees nose up attitude. However, at 1405:52 the data indicated a 17 degree left roll, a pitch up to about 20 degrees, followed by a roll to the right of 77 degrees right wing down and a nose down pitch attitude of about 50 degrees. The engine data from the MFD contained parameters such as fuel flow, RPM, and Cylinder Head Temperatures; however the MFD stopped recording at 1405:51. From 1405:30 until the end of the recording, the recorded data indicated the inlet temperature was about 1250 degrees F, oil pressure was about 85 psi, RPM was 2500, manifold air pressure was about 37 inches of mercury, and the fuel flow was about 38 gallons per hour. Which, according to the Pilot Operating Handbook, are all considered to be in the "Green Arc" or the "Normal Operating Range." According to data

extracted from the PFD, the highest recorded airspeed occurred at 1405:56, which indicated 70.3 knots.

The engine was examined by NTSB personnel. Photographs taken of the engine revealed external corrosion and an internal examination revealed corrosion, similar to salt water intrusion. However, there was no conclusive indication of mechanical abnormalities that would have precluded normal operation.

Pilot's Handbook of Aeronautical Knowledge (FAA-H-8083-25A)

Section 4 "Aerodynamics of Flight" states in part "The stalling speed of a particular aircraft is not a fixed value for all flight situations, but a given aircraft always stalls at the same AOA [Angle of Attack] regardless of airspeed, weight, load factor, or density altitude. Each aircraft has a particular AOA where the airflow separates from the upper surface of the wing and the stall occurs. This critical AOA varies from 16 degrees to 20 degrees depending on the aircraft design. But each aircraft has only one specific AOA where the stall occurs."

Pilot Operating Handbook

According to Section 4 "Normal Procedures," there were several different types of takeoff procedures; which required different flap settings, liftoff speed, and climb speed or obstacle clearance speed. The section titled "Normal Technique" stated in part "When the available runway length is well in excess of that required and obstacle clearance is no factor, the normal takeoff technique may be used. The flaps should be in the 0 degree to 10 degrees position and the pitch trim set slightly aft of neutral. Align the airplane with the runway, apply full power, and accelerate to 80-85 KIAS [Knots Indicated Airspeed]." The section further stated "Takeoffs are normally made with flaps 0 degree to 10 degrees. For short field takeoffs or takeoffs affected by soft runway conditions or obstacles, total distance can be reduced appreciable by lowering the flaps to 20 degrees."

Section 5 "Performance" contained a warning that stated "Performance information derived by extrapolation beyond the limits shown on the charts should not be used for flight planning purposes." The section also contained two charts to determine takeoff ground roll distance. The first chart, "Takeoff Ground Roll distance – 0 degree Flaps" revealed that, considering the information provided by the pilot, the ground roll would have required about 1,700 feet. The chart provided "Associated Conditions," which required the wing flaps to be set at 0 degree, full throttle, 2500 RPM prior to brake release, a liftoff speed of 78 knots indicated air speed (KIAS), and a paved, level and dry runway.

The other chart, "Takeoff Ground Roll Distance - 20 degree Flaps," revealed, under the same conditions, the ground roll would have been about 1,150 feet. The chart further provided "Associated Conditions" which required the wing flaps to be set at 20 degrees, full throttle, 2500 RPM prior to brake release, a liftoff speed of 69 KIAS, and a paved, level and dry runway.

Section 5 also provided an "Angle of Bank vs. Stall Speed" chart, and a review of the chart revealed that with the landing gear down, flaps at 20 degree, and a bank angle of zero the stall speed would be about 65 knots. Then, with the landing gear and flaps both retracted the stall speed would be about 69 knots. The chart further revealed that at a 17 degree bank angle, the stall speed for landing gear down, flaps at 20 degrees would be about 66 knots and for both the landing gear and flaps retracted the stall speed would be about 71 knots. There was no stall speed, provided by the chart, for gear down and flaps at 10 degrees.

## History of Flight

Initial climb	Loss of engine power (total) (Defining event)
Emergency descent	Ditching Collision with terr/obj (non-CFIT)

## Pilot Information

Certificate:	Airline Transport; Flight Instructor; Commercial	Age:	69
Airplane Rating(s):	Multi-engine Land; Single-engine Land	Seat Occupied:	Left
Other Aircraft Rating(s):	None	Restraint Used:	
Instrument Rating(s):	Airplane	Second Pilot Present:	No
Instructor Rating(s):	Airplane Multi-engine; Airplane Single-engine; Instrument Airplane	Toxicology Performed:	No
Medical Certification:	Class 2 With Waivers/Limitations	Last FAA Medical Exam:	06/02/2011
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	04/29/2013
Flight Time:	12250 hours (Total, all aircraft), 210 hours (Total, this make and model), 9580 hours (Pilot In Command, all aircraft), 100 hours (Last 90 days, all aircraft), 40 hours (Last 30 days, all aircraft), 6 hours (Last 24 hours, all aircraft)		

## Aircraft and Owner/Operator Information

Aircraft Make:	PIPER AIRCRAFT INC	Registration:	N720JF
Model/Series:	PA46R-350T	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	No
Airworthiness Certificate:	Normal	Serial Number:	4692004
Landing Gear Type:	Retractable - Tricycle	Seats:	6
Date/Type of Last Inspection:	08/02/2013, Annual	Certified Max Gross Wt.:	5134 lbs
Time Since Last Inspection:		Engines:	1 Reciprocating
Airframe Total Time:	1000 Hours as of last inspection	Engine Manufacturer:	LYCOMING
ELT:	Installed, not activated	Engine Model/Series:	TIO-540-AE2A
Registered Owner:	PURE BEAUTY FARMS INC	Rated Power:	350 hp
Operator:	PURE BEAUTY FARMS INC	Operating Certificate(s) Held:	None

## Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	Day
Observation Facility, Elevation:	FLL, 9 ft msl	Distance from Accident Site:	56 Nautical Miles
Observation Time:	1353 EDT	Direction from Accident Site:	295°
Lowest Cloud Condition:	Scattered / 2000 ft agl	Visibility	10 Miles
Lowest Ceiling:	Broken / 11000 ft agl	Visibility (RVR):	
Wind Speed/Gusts:	7 knots /	Turbulence Type Forecast/Actual:	/
Wind Direction:	270°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	30.11 inches Hg	Temperature/Dew Point:	28° C / 23° C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Cat Cay, FN (MYCC)	Type of Flight Plan Filed:	None
Destination:	Miami, FL (TMB)	Type of Clearance:	VFR Flight Following
Departure Time:	1405 EDT	Type of Airspace:	

## Airport Information

Airport:	Cat Cay Airport (MYCC)	Runway Surface Type:	Asphalt; Gravel
Airport Elevation:	3 ft	Runway Surface Condition:	Dry
Runway Used:	14	IFR Approach:	None
Runway Length/Width:	1300 ft / 75 ft	VFR Approach/Landing:	None

## Wreckage and Impact Information

Crew Injuries:	1 None	Aircraft Damage:	Substantial
Passenger Injuries:	2 Minor, 2 None	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	2 Minor, 3 None	Latitude, Longitude:	25.403611, -77.773889 (est)

## Administrative Information

Investigator In Charge (IIC):	Shawn Etcher	Report Date:	04/27/2015
Additional Participating Persons:	Albert E Frank; FAA/FSDO; Miami, FL		
Publish Date:	04/27/2015		
Note:	The NTSB did not travel to the scene of this accident.		
Investigation Docket:	<a href="http://dms.ntsb.gov/pubdms/search/dockList.cfm?mKey=87873">http://dms.ntsb.gov/pubdms/search/dockList.cfm?mKey=87873</a>		

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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](#).