



# National Transportation Safety Board Aviation Accident Final Report

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<b>Location:</b>	Caribbean Sea,	<b>Accident Number:</b>	ERA12LA085
<b>Date &amp; Time:</b>	November 24, 2011, 12:23 UTC	<b>Registration:</b>	N534P
<b>Aircraft:</b>	PIPER AIRCRAFT INC PA 46-350P	<b>Aircraft Damage:</b>	Substantial
<b>Defining Event:</b>	Loss of engine power (total)	<b>Injuries:</b>	2 Serious
<b>Flight Conducted Under:</b>	Part 91: General aviation - Ferry		

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## Analysis

While delivering the single-engine, turbine-powered airplane to Brazil during a multiple leg trip, the pilot decided to fly direct from his departure airport in Puerto Rico to his destination airport in Grenada instead of following the island chain and staying within power-off gliding distance of the shore. During the cruise portion of the flight, a total loss of engine power occurred over open water in visual meteorological conditions at 27,000 feet, about 119 miles west of a suitable landing area. During the loss of power, the engine torque indication dropped from the cruise power setting to 0 foot-pounds (ft-lbs) of torque, the engine then began to vibrate, and smoke began emanating from the engine. The pilot ditched the airplane, it sank, and it was not recovered. The pilot and the pilot-rated passenger were rescued by a French Navy helicopter.

The pilot said that he had decided to take a direct route instead of staying closer to the island chain between the two airports because he had ferried 3 airplanes down to Brazil in the last year and that it was a judgment call and a calculated risk because the engine was reliable. At the airplane's planned operating altitude of 27,000 feet, the airplane could have glided about 54 miles; if the route had been planned to take advantage of this glide distance, the pilot could have remained off shore island chain and taken a shorter, although not direct, route.

Review of fueling documentation, the Pilot's Operating Handbook (POH), and statements made by the pilot and pilot-rated passenger also revealed that on the accident flight, good operating practices were disregarded. For instance, during fueling, the airplane which was not equipped with fuel heaters, had been topped off with fuel, but no fuel icing additive had been added, even though the pilot was planning to operate the airplane at 27,000 feet. The airplane was also operated in excess of the manufacturer's published weight limitations, and no power setting or performance information was available for climb and cruise operations in excess of these limitations.

Furthermore, according to the pilot, before the loss of engine power, the torque was about 937 ft-lbs. According to the pilot-rated passenger, before the failure, the torque gauge was indicating about 980 ft-lbs. Review of the maximum cruise performance chart in the POH and Airplane Flight Manual (AFM) revealed that both of the stated torque settings exceeded the maximum torque setting listed on the chart. Operating the engine beyond the recommended power settings specified in the POH/AFM for a prolonged period will result in accelerated deterioration due to hot section component distress and will affect engine reliability and durability.

## Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The total loss of engine power during cruise flight for reasons that could not be determined because the airplane was not recovered. Contributing to the accident was the pilot's failure to comply with the airplane and engine limitations, and his decision to fly over water beyond power-off gliding distance from shore.

### Findings

<b>Not determined</b>	(general) - Unknown/Not determined
<b>Personnel issues</b>	Flight planning/navigation - Pilot
<b>Personnel issues</b>	Weight/balance calculations - Pilot
<b>Personnel issues</b>	Performance calculations - Pilot
<b>Environmental issues</b>	Water - Not specified

## Factual Information

### HISTORY OF FLIGHT

On November 24, 2011, about 1223 universal coordinated time, a Piper PA-46-350P, N534P, operated by Boeck & Boeck Incorporated, was substantially damaged during a ditching in the Caribbean Sea following a loss of engine power during cruise flight approximately 119 nautical miles west of Fort de France, Martinique. The certificated commercial pilot and his pilot rated passenger received serious injuries. Visual meteorological conditions (VMC) prevailed for the flight that departed Rafael Hernandez Airport (TJBQ), Aguadilla, Puerto Rico, destined for Maurice Bishop International Airport (TGPY), St. George's, Grenada. An instrument flight rules (IFR) flight plan was filed for the ferry flight conducted under 14 Code of Federal Regulations (CFR) Part 91.

According to the pilot, he had recently sold the airplane and was ferrying the airplane on a multiple leg ferry flight to the new owner in Brazil.

During the leg between TJBQ to TGPY they had taken off and climbed to 27,000 feet (Flight Level 270). During cruise over open water at FL270 about 40 minutes flight time from TGPY, almost simultaneously; the airspeed began to decrease, the engine torque indication went from 937 foot-pounds (ft-lbs) of torque to 0 ft-lbs of torque, the engine began to vibrate, and smoke began emanating from the engine. The pilot then reduced power to idle, moved the propeller control lever to the feather position, moved the fuel condition lever to the off position, and the firewall fuel shutoff lever to the off position. He then alerted Piarco air route traffic control center (ARTCC), Port of Spain, Trinidad, and advised them of his emergency and turned towards the island of Martinique which was the closest island. Piarco ARTCC then asked him of his intentions, and handed him off to Martinique air traffic control (ATC). The pilot then activated the onboard 406 emergency locator transmitter and proceeded in the direction of Martinique at best glide speed. The pilot tried to restart the engine but, it began to immediately smoke and vibrate and he terminated the start sequence. He then had his pilot rated passenger move to the back of the airplane and both he and the passenger donned their life vests. The passenger then retrieved the life raft, first aid kit, and a portable ELT, and readied them for deployment. The pilot then instructed him to open the top half of the main cabin door prior to impact.

Just prior to touchdown, the pilot observed that the water was choppy with waves approximately 6 feet in height. The airplane then impacted the water tail first at stall speed and bounced approximately three times before coming to rest on the surface of the water. During the impact, the pilot hit his head. After unstrapping he then turned around to exit the cockpit and observed that the raft had deployed in the cabin and his passenger was trapped. He then moved to the back of the cabin and he and the passenger pushed the raft out the main cabin door. After exiting, he tried to shut the main cabin door but his passenger was having difficulty swimming. The pilot then abandoned his attempt to close the door and assisted the passenger. They both boarded the life raft and the airplane sank approximately 15 minutes later.

According to French Authorities, after the pilot advised Piarco ARTCC at 1206 of the engine

failure, Piarco ARTCC contacted the French Navy which has a dual role as coast guard and defense for the French overseas departments and territories, and advised Martinique ATC of the emergency. A commuter air carrier aircraft, a French navy airplane, and a French navy helicopter were then vectored in the direction of the airplane. At approximately 1223 the airplane was considered to be down and at 1308 the first airplane arrived overhead. The helicopter arrived at 1355 and both occupants were sling lifted onboard and flown to Fort de France, Martinique.

## PERSONNEL INFORMATION

According to Federal Aviation Administration (FAA) records, the pilot held a commercial pilot certificate with ratings for airplane single-engine land, airplane single-engine sea, airplane multi-engine land, and instrument airplane. He also held a flight instructor certificate with ratings for airplane single-engine and instrument airplane. His most recent application for a FAA third-class medical certificate was dated September 1, 2011. The pilot reported that he had accrued 2,175 total hours of flight experience, of which 643 hours were in the accident airplane make and model.

## AIRCRAFT INFORMATION

The accident aircraft was a six-seat, single-engine, low wing, pressurized airplane of conventional metal construction. It was originally manufactured by Piper Aircraft in 2007 as a PA-46-350P.

It was equipped with retractable landing gear and was converted to a JetProp DLX when it had its original engine replaced with a 750 shaft horsepower Pratt & Whitney Canada (PWC) PT6A-35, turbo propeller engine in June of 2011.

At the time of the conversion the airplane had accrued 200.7 total hours of operation. At the time of the accident the engine had accrued approximately 15 hours of operation.

It could operate at an indicated airspeed of 260 knots at 27,000 feet above mean sea level.

## METEOROLOGICAL INFORMATION

The reported weather at TJBQ at 1050, included: winds 110 degrees at 4 knots, 10 miles visibility, sky clear, temperature 22 degrees C, dew point 20 degrees C, and an altimeter setting of 30.00 inches of mercury.

The reported weather at TFFF at 1200, included: winds 060 degrees at 4 knots, 4 miles visibility in light rain, scattered clouds at 1,000 feet, scattered clouds at 3,000 feet, broken clouds at 4,300 feet, temperature 24 degrees C, dew point 24 degrees C, and an altimeter setting of 29.94 inches of mercury.

## TESTS AND RESEARCH

Fueling Information

According to the fixed base operator (FBO) who serviced the airplane at TJBQ prior to the flight the pilot had the fuel topped off prior to departure. 126 gallons of Jet A was added but the pilot did not request the addition of any fuel icing additive though he was planning to conduct the flight at 27,000 feet and the airplane was not equipped with fuel heaters.

Review of the FBO's fuel quality test records did not reveal any anomalies with the Jet A that was provided.

### Maximum Ramp and Operating Weight

According to the JetProp DLX Pilot's Operating Handbook and FAA Approved Airplane Flight Manual (POH/AFM) the maximum ramp weight was 4,358 pounds and the maximum takeoff weight was 4,340 pounds. According to the pilot however, he departed TJBQ at 4,650 pounds.

### Climb and Cruise Information

Review of radar information revealed that the airplane after takeoff climbed to 27,000 feet in approximately 27 minutes, which averaged out to an approximate 1,000 foot per minute rate of climb. Review of the POH/AFM, however, revealed that no power setting or performance information was available for the declared takeoff weight of 4,650 pounds.

Review of the POH/AFM revealed that the airplane would have burned approximately 16 gallons of fuel during the climb resulting in an approximate weight at top of climb of approximately 4,543 pounds. No performance or power setting information was available for this weight either.

According to the pilot, during cruise prior to the loss of engine power, torque was indicating "around 937" ft-lbs of torque. According to the pilot rated passenger however, prior to the failure, the Torque Gauge was indicating approximately "980" ft-lbs. Review of the maximum cruise performance chart in the POH/AFM revealed that both of the stated torque settings exceeded the maximum torque setting listed on the chart.

### Recommended PT6A Engine Power Management

Pratt & Whitney Canada Document 09-1331 (Know Your PT6A) states in part that, a mission profile is established for every PT6A engine application. This mission is used to analyze and establish engine component lives and durability factors such as low cycle fatigue, creep, oxidation, and vibration. Using this data and taking into consideration airframe influences such as bleed extraction, accessory loading and inlet efficiency, the power setting information is established and then published in the POH/AFM.

### Power Rating Philosophy

This power rating philosophy is used to ensure the maximum likelihood that the PT6A engine will deliver the power specified in the POH/AFM throughout its life. To achieve this, all PT6A engine installations use torque as the primary power setting parameter. All other engine

parameters are only monitored to verify they are within acceptable limits. The POH/AFM contains power setting information which must be used to determine the torque setting for all ratings which vary according to altitude, ambient temperature and aircraft weight. This is important because the PWC rating philosophy is based on the engine being operated per the POH/AFM to achieve optimum reliability and durability.

Some of these power ratings are:

- The take-off rating, which is the maximum power certified for takeoff and is time limited to five minutes.
- The maximum continuous rating, which is a certified power setting for in-flight emergency use only, typically for twin engine applications where one engine is inoperative.
- The maximum climb and maximum cruise ratings which are the maximum powers approved by PWC for climb and cruise operation.

### Power Settings

All PT6A engine applications also use engine output torque as the primary power setting parameter. The POH/AFM contains power setting information which must be used to determine the correct torque settings to achieve take off and cruise in accordance with altitude, ambient temperature and aircraft weight.

The power lever should be set to the position which produces the required torque. Other engine parameters such as inter turbine temperature (ITT) and gas generator speed (Ng) are monitored only to verify that they are within acceptable limits. Operating the engine in accordance with the POH / AFM by using torque as the primary power setting parameter will achieve optimum reliability and durability.

Operating the engine beyond the recommended power settings specified in the POH/AFM for a prolonged period will result in accelerated margin deterioration due to hot section component distress and will affect engine reliability and durability.

### ADDITIONAL INFORMATION

#### Route of Flight

At the time of the loss of engine power, the airplane was approximately 119 nautical miles west of Fort de France, Martinique. When questioned as to why he had decided to take a direct route from TJBQ to TGPY instead of staying closer to the island chain between the two airports, the pilot advised the NTSB that he had ferried 3 airplanes down to Brazil in the last year and that "it was a judgment call" and "a calculated risk" as he would later "be flying over thousands of miles of jungle" and felt it was safer flying over water.

Review of aeronautical charts of the area revealed however that there were multiple landing areas available if the route of flight had been planned to remain within power off gliding

distance from shore along the island chain between TJBQ and TGPY.

Review of the POH/AFM also revealed that if a loss of power should occur at altitude and the airplane was trimmed for best gliding angle with the engine stopped and the propeller feathered, the airplane would travel approximately 2 miles for each thousand feet of altitude which would have allowed the airplane to glide approximately 54 miles.

## History of Flight

Enroute-cruise	Loss of engine power (total) (Defining event)
Emergency descent	Off-field or emergency landing
Emergency descent	Ditching

## Pilot Information

<b>Certificate:</b>	Commercial; Flight instructor	<b>Age:</b>	64, Male
<b>Airplane Rating(s):</b>	Single-engine land; Single-engine sea; Multi-engine land	<b>Seat Occupied:</b>	Left
<b>Other Aircraft Rating(s):</b>	None	<b>Restraint Used:</b>	
<b>Instrument Rating(s):</b>	Airplane	<b>Second Pilot Present:</b>	Yes
<b>Instructor Rating(s):</b>	Airplane single-engine; Instrument airplane	<b>Toxicology Performed:</b>	No
<b>Medical Certification:</b>	Class 3 Without waivers/limitations	<b>Last FAA Medical Exam:</b>	September 1, 2011
<b>Occupational Pilot:</b>	No	<b>Last Flight Review or Equivalent:</b>	November 8, 2011
<b>Flight Time:</b>	2175 hours (Total, all aircraft), 643 hours (Total, this make and model), 2087 hours (Pilot In Command, all aircraft), 18 hours (Last 90 days, all aircraft), 16 hours (Last 30 days, all aircraft)		

## Aircraft and Owner/Operator Information

<b>Aircraft Make:</b>	PIPER AIRCRAFT INC	<b>Registration:</b>	N534P
<b>Model/Series:</b>	PA 46-350P	<b>Aircraft Category:</b>	Airplane
<b>Year of Manufacture:</b>		<b>Amateur Built:</b>	No
<b>Airworthiness Certificate:</b>	Normal	<b>Serial Number:</b>	4636423
<b>Landing Gear Type:</b>	Retractable - Tricycle	<b>Seats:</b>	6
<b>Date/Type of Last Inspection:</b>	August 1, 2011 Annual	<b>Certified Max Gross Wt.:</b>	4340 lbs
<b>Time Since Last Inspection:</b>		<b>Engines:</b>	1 Turbo prop
<b>Airframe Total Time:</b>	215 Hrs at time of accident	<b>Engine Manufacturer:</b>	Pratt & Whitney
<b>ELT:</b>	Installed, activated, aided in locating accident	<b>Engine Model/Series:</b>	PT6A-35
<b>Registered Owner:</b>		<b>Rated Power:</b>	560 Horsepower
<b>Operator:</b>		<b>Operating Certificate(s) Held:</b>	None

## Meteorological Information and Flight Plan

<b>Conditions at Accident Site:</b>	Visual (VMC)	<b>Condition of Light:</b>	Day
<b>Observation Facility, Elevation:</b>	TFFF, 15 ft msl	<b>Distance from Accident Site:</b>	119 Nautical Miles
<b>Observation Time:</b>	12:00 Local	<b>Direction from Accident Site:</b>	100°
<b>Lowest Cloud Condition:</b>	Clear	<b>Visibility</b>	10 miles
<b>Lowest Ceiling:</b>	None	<b>Visibility (RVR):</b>	
<b>Wind Speed/Gusts:</b>	4 knots /	<b>Turbulence Type Forecast/Actual:</b>	/
<b>Wind Direction:</b>	60°	<b>Turbulence Severity Forecast/Actual:</b>	/
<b>Altimeter Setting:</b>	29.94 inches Hg	<b>Temperature/Dew Point:</b>	24° C / 24° C
<b>Precipitation and Obscuration:</b>	No Obscuration; No Precipitation		
<b>Departure Point:</b>	Aguadilla, PR (TJBQ)	<b>Type of Flight Plan Filed:</b>	IFR
<b>Destination:</b>	St. George's (TGPY)	<b>Type of Clearance:</b>	IFR
<b>Departure Time:</b>	10:33 UTC	<b>Type of Airspace:</b>	

## Wreckage and Impact Information

<b>Crew Injuries:</b>	1 Serious	<b>Aircraft Damage:</b>	Substantial
<b>Passenger Injuries:</b>	1 Serious	<b>Aircraft Fire:</b>	None
<b>Ground Injuries:</b>	N/A	<b>Aircraft Explosion:</b>	None
<b>Total Injuries:</b>	2 Serious	<b>Latitude, Longitude:</b>	14.345, -62.588611(est)

## Administrative Information

<b>Investigator In Charge (IIC):</b>	Gunther, Todd
<b>Additional Participating Persons:</b>	Jose A Pumares; FAA / IFO; Miramar, FL Vincent Ecalte; BEA; France Elaine Summers; TSBC; Canada Marc Gratton; Pratt & Whitney Canada; Canada
<b>Original Publish Date:</b>	June 19, 2013
<b>Note:</b>	The NTSB traveled to the scene of this accident.
<b>Investigation Docket:</b>	<a href="https://data.nts.gov/Docket?ProjectID=82390">https://data.nts.gov/Docket?ProjectID=82390</a>

The National Transportation Safety Board (NTSB), established in 1967, is an independent federal agency mandated by Congress through the Independent Safety Board Act of 1974 to investigate transportation accidents, determine the probable causes of the accidents, issue safety recommendations, study transportation safety issues, and evaluate the safety effectiveness of government agencies involved in transportation. The NTSB makes public its actions and decisions through accident reports, safety studies, special investigation reports, safety recommendations, and statistical reviews.

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](#).